Affinity Water

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Technical Report 4.11.1: Environmental Report - Appendices

Draft Final Water Management Resources Plan 2020-2080

May 2019

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Affinity Water
Draft Final Water Resources Management Plan 2019: Strategic Environmental Assessment (SEA)

Environmental Report Supporting Appendices

Project Number: 60344725

May 2019

Quality information

Prepared by	Checked by	Approved by
Alastair Peattie Associate Director Graham McGrath Assistant Consultant Rosie Cox Environmental Planner Cheryl Beattie Environmental Planner	Steve Smith Technical Director	Steve Smith Technical Director

Revision History

Revision	Revision date	Details	Name	Position
1.0	25 Oct 2017	Draft for internal review	Graham McGrath	Assistant Consultant
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3.0	02 November 2017	Revised Draft	Alastair Peattie	Principal Consultant
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5.0	21 January 2019	Revised to reflect consultation responses and the rdWRMP	Alastair Peattie	Associate Director
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8.0	17 May 2019	Revised for fWRMP19	Rosie Cox Cheryl Beattie Alastair Peattie	Environmental Planner Environmental Planner Associate Director
9.0	24 May 2019	Revised to reflect QA comments	Rosie Cox Alastair Peattie	Environmental Planner Associate Director

Prepared for:

Affinity Water,
Tamblin Way,
Hatfield,
Hertfordshire,
AL10 9EZ

Prepared by:

AECOM Limited
3rd Floor
Portwall Place
Portwall Lane
Bristol
BS1 6NA
UK

T: +44 117 901 7000
aecom.com

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Appendix I: Regulatory requirements

Environmental report must include:	Where in the Environmental Report has this been addressed?
(a) an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes;	This is provided in Chapter 2 of the Environmental Report.
(b) the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme;	This is provided in Chapter 3 of the Environmental Report and Appendix II.
(c) the environmental characteristics of areas likely to be significantly affected;	Provided in Appendix II.
(d) any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC (The Birds Directive) and 92/43/EEC (The Habitats Directive);	This is provided in Chapter 3 of the Environmental Report and Appendix II.
(e) the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation;	Provided in Appendix II.
(f) the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors;	These are set out in Chapters 4, 5 and 6 and 7 of the Environmental Report as well as Appendix V.
(g) the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme;	These are set out in Chapters 4, 5 and 6, 7 and 8 of the Environmental Report as well as Appendix V and VI.
(h) an outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information;	The outline reasons for the selection or rejection of alternatives are provided in Chapter 5 of the Environmental Report.
(i) a description of the measures envisaged concerning monitoring in accordance with Article 10;	There are provided in Chapter 9 of the Environmental Report.
(j) a non-technical summary of the information provided under the above headings.	A separate Non-technical summary has been prepared.

Appendix II: Scoping information

Population and Human Health

This section sets out the policy context and the environmental baseline with respect to population (e.g. demographics and population characteristics including future growth) and human health.

Policy context

The section below includes some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 1.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
National Planning Policy Framework (NPPF)	The NPPF sets out the government's view on sustainable development as defined in a planning context. Key messages from the NPPF which relate to population, economy and human health include: • One of the three overarching objectives of the NPPF is a social objective to; 'support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural wellbeing.' • 'Planning policies and decisions should aim to achieve healthy, inclusive and safe places which enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling.' • Policies and decisions should take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community. • Access to a network of high quality open spaces and opportunities for sport and physical activity is important for the health and wellbeing of communities. Development should avoid building on existing open space, sports and recreational buildings and land, including playing fields. • Promote the retention and development of local services and community facilities such as local shops, meeting places, sports venues, cultural buildings, public houses and places of worship.
Local Plans	All Local Plans post -2012 need to demonstrate they are in conformity with the NPPF and therefore deliver sustainable development. Recent changes to planning policy with regard to building standards means that they have less power / more of an evidence burden in developing policies that exceed the Building Regulations. In the context of water stressed areas this could make the implementation of some demand management measures more challenging.

Source: Annex A

Baseline review

The WRMP2018 population and household forecasts for the Central, Southeast and East regions are set out in **Tables 3.2** and **3.3**.

Table 1.2. Current and future population forecasts

WRZ	2016/17	2020/2021	2040/204	% increase 2040
1	358,709	378,832	382,987	7%
2	431,426	457,621	512,194	19%
3	707,724	769,233	917,256	30%
4	916,026	988,093	1,168,637	28%
5	291,745	320,268	390,502	34%
6	535,909	575,676	648,128	21%
Central (sub-total)	3,241,539	3,489,723	4,019,704	24%
Southeast (7)	163,469	176,470	209,938	28%
East (8)	155,023	164,352	185,595	20%

Source: WRMP2018

Table 1.3. Current and future households (number of properties)

WRZ	2016/17	2020/2021	2040/204	% increase 2040
1	142,600	145,559	159,711	12%
2	182,788	188,058	213,236	17%
3	296,180	311,892	386,813	31%
4	362,819	379,667	460,061	27%
5	135,413	142,746	177,725	31%
6	212,945	223,288	272,496	28%
Central (sub-total)	1,332,745	1,391,210	1,670,042	25%
Southeast (7)	78,825	82,964	105,482	34%
East (8)	74,683	76,834	88,978	19%

Source: WRMP2018

Central region

The Central region has a total population of 3,241,539 which is expected to grow by 24% by 2040 (with a corresponding increase in households of 25%). Within the Central region, WRZs 3, 4 and 5 (underlined in Table 1.2 and Table 1.3 above) will have the highest levels of population and household growth. These WRZs coincide with the major growth areas of Luton and Stevenage (WRZ3), Edgware (WRZ4), Harlow, and Saffron Waldon (WRZ5).

The Index of Multiple Deprivation (IMD) ranks every small area in England from 1 (most deprived) to 32,844 (least deprived). The IMD is a combination of information from seven 'domains' that produces and overall relative measure of deprivation.[1] The areas with the worst IMD score (the worst 0-20% of

[1] The domains and their weighting are: Income Deprivation (22.5%), Employment Deprivation (22.5%) , Education, Skills and Training Deprivation (13.5%) , Health Deprivation and Disability (13.5%) , Crime (9.3%), Barriers to Housing and Services (9.3%), and Living Environment Deprivation (9.3%)

Lower Super Output Areas (LSOAs)) are around the London fringe (Harrow, Barnet and Potters Bar), as well as the Luton and Harlow areas (**see Vol2 Figure 1.1**).

Local Planning Authorities, e.g. Harlow, Epping Forest, East Herts and Uttlesford, are working to regenerate areas of deprivation and to deliver high levels of housing and economic growth. This will increase water demand but also provide an opportunity; new development will implement more stringent planning policies, therefore potentially encouraging improved water reuse and demand management opportunities.

With regard to the health of the population, 83.52% of residents within the Central region were characterised as being in 'good' or 'very good' health which is above the UK average (81.39%). Further analysis of the Health Deprivation and Disability Domain reveals that health deprivation is particularly acute in areas around Luton and Harlow (see **Vol2 Figure 1.3**).[2] This higher level of deprivation may indicate the presence of populations sensitive to fluctuations in water chemistry and cost.

Southeast region

As of 2016/2017, the Southeast region had a total population of 163,469. This is expected to have grown by 28% by 2040 (with a corresponding increase of 34% in households). Within the region the main urban areas (which have relatively higher population densities than more rural areas) include Folkestone and Dover. At the time of the 2011 Census, these towns had populations of 61,060 and 38,959 respectively[3]. In addition to permanent residents, the Southeast region can have high numbers of visitors particularly during the summer (5.3 million staying visits in 2017[4]), which is in part due to the good transport links with the continent.

LSOAs within Folkestone and Dover are amongst the 20% most deprived in England - **see Vol 2 Figure 1.2 and 3.4** (presented in this report, subsequent to the scoping information). Deprivation is also present in more rural areas of the Southeast region including Romney Marsh, Hythe and New Romney. At the time of the 2011 Census, 83.64% of residents within the Southeast region were characterised as being in 'good' or 'very good' health, compared to the national average (81.39%).[5]

East region

The total population of the East region in 2016/2017 was 155,023. This is expected to have grown by 20% by 2040 (with a corresponding increase of 19% in households). Harwich and Clacton-on-Sea are the largest urban areas within the east region, however Colchester is located just outside the regions boundary.

Deprivation is present throughout the East region, with a significant amount of the WRZ8 LSOA's being amongst the 20% more deprived in England. Approximately 82.4% of residents within the East region were characterised as being in 'good' or 'very good' health at the time of the 2011 Census, which is slightly higher than the national average (81.39%).

Future environment without the rdWRMP2019

The population in the SEA Study Area is predicted to increase by an average of 24% from the current level of 3.56 million to approximately 4.4 million in 2040. Correspondingly, there will also be a 25% growth in households by 2040 to give a total of 1.86 million. The larger increase in *additional households* reflects a move towards smaller household sizes (and therefore greater per capita resource consumption).

[2] Census (2011) QS302EW - general health [online] available at: https://www.nomisweb.co.uk/query/construct/summary.asp?menuopt=200&subcomp= Accessed September 2016
[3] Census (2011) QS10SEW – population density [online] available at: http://www.neighbourhood.statistics.gov.uk/dissemination/LeadPage.do?pageId=1004&tc=1475577628547&a=5&b=6275080&c=dover&d=13&e=61&f=33488&g=6436833&i=1001x1003x1032x1004x1005&l=2491&o=362&m=0&r=1&s=1475577628547&enc=1 Accessed September 2016
[4] ONS (2019) International Passenger Survey [online] @ https://www.visitbritain.org/nation-region-county-data. Accessed January 2019.
[5] Ibid

The projected increases in population along with a baseline supply deficit will create pressure on existing water resources. This is intensified due to Affinity Water customers having one of the highest per capita consumption (PCC) figures in the UK (in the Central region there is a high weighted average PCC of 166 litres / person / day compared to the national average of 147l/p/d).[6]

Without the rdWRMP2019, the current plan is likely to roll forward with sustainability reductions and demand management options. However, all the Local Planning Authorities in the Study Area will likely be looking to grow their housing stock in line with population projections, increasing demand. Additionally, over an 80 year time frame, the effects of climate change in terms of both an interrupted water supply and fluctuating rainfall patterns will also add pressure on future water resource planning.

Key comments from previous consultation responses

Natural England highlighted that the SEA Directive and Regulations are "*clearly specific to environmental issues*". Natural England, therefore, felt that reference to economic impacts should be removed from the objectives and scope of the SEA, including from the Population, Economy and Human Health topic. References to specific economic objectives have not been included in this report nor in the evidence base.

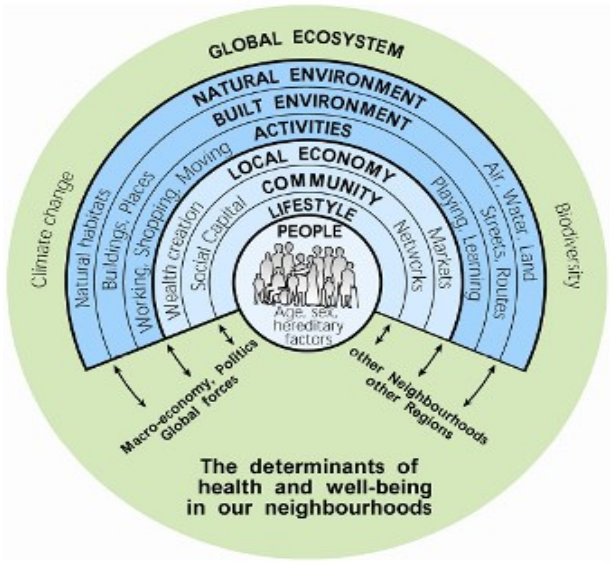
No significant effects for this topic were predicted for the WRMP14 SEA for either construction or operation.

Key issues

Key issues likely to arise during the lifetime of the rdWRMP2019 are as follows:

- The Central and Southeast regions will experience high levels of development and growth;
- All three regions have 'hotspots' of deprivation. Vulnerable people may be at disproportionate risk of effects of changes in the cost of water;
- The Study Area will experience a combination of the impacts of climate change, population increase, sustainability reductions and water stress. All of these factors create a challenging environment for Affinity Water to deliver a sustainable water supply; and
- It is important to note that human health and wellbeing have strong inter-relationships with all of the other topics in the scope of the SEA. These are highlighted in **Figure 1.1** which illustrates the 'determinants of health' i.e. the range of factors that combine together to affect the health of individuals and communities.

Figure 1.1. Determinants of health[7]



[6] Affinity Water (2014) Final Water Resources Management Plan 2015-2020
[7] Local Government Association (2010) Social, economic and environmental determinants of health [online] @ http://www.local.gov.uk/health/-/journal_content/56/10180/3511260/ARTICLE/ Accessed September 2016

Proposed SEA scope

Pressure from a growing population (and increases in future households) is likely to increase the demand for water in the Study Area. Also, the supply of water is a factor in the ability of the region to develop and grow through providing new developments (e.g. Harlow) with an adequate supply of water.

Access to clean water is a key determinant of human health and, as such, this has the potential to affect the health of the population within the Study Area e.g. if water is unavailable or the water supply is altered or interrupted.

An increasing population is a key driver for increased demand but population itself is not seen as something that can be influenced by the rdWRMP2019 (i.e. options are unlikely to affect the population or demographics). It is proposed that for this SEA, the effects on population should not be considered.

The effect that options might have on regeneration areas is something that can be influenced by the rdWRMP2019 (e.g. developing supplies close to main areas of growth and ensuring resilience of supply). It is therefore proposed that for this SEA, the effects on regeneration should be considered.

Health can be affected indirectly and directly by the availability of water. It is proposed that for this SEA, the effects on health and wellbeing should be assessed. **Table 1.4** presents the SEA objectives and appraisal questions that will be used for the assessment of the effects of the rdWRMP2019 on regeneration, health and wellbeing.

Table 1.4. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Ensure the availability of adequate supply, and quality, of water in order to support health and wellbeing along with the regeneration ambitions of the Study Area?	Enable the growth ambitions of the Study Area to be realised?	The Central and Southeast region, in particular, will experience high levels of development and growth.
	Provide affordable access to clean water adequate to support health?	Health can be affected indirectly and directly by the availability and quality of water.
	Ensure that customers are not disproportionality affected by cost?	All regions have ‘hotspots’ of deprivation. Vulnerable people may be at risk of disproportionate effects of changes in the cost of water.

Tourism and Recreation

This section sets out the policy context and the environmental baseline with respect to tourism and recreation (including countryside access). It is important to note that tourism and recreation have significant inter-relationships with other topics; in particular, biodiversity and nature conservation, human health, landscape character, and cultural heritage.

Policy context

The section below includes some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 2.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
Area of Outstanding Natural Beauty (AONB) Management Plans	An AONB is an area of countryside in England, Wales or Northern Ireland which has been designated for conservation due to its significant landscape value through the Countryside and Rights of Way Act 2000. AONBs are designated in recognition of their national importance, by Natural England, Natural Resources Wales, or the Northern Ireland Environment Agency. AONBs are provided with a degree of protection from development similar to those of national parks and are largely managed by local authority advisory committees. There are three AONB's located within the Study Area. Two within the Central region (Chilterns, and Surry Hills) and one within the Southeast region (Kent Downs). The Chilterns AONB[8] management plan sets out the following elements in its vision: • Conserving and enhancing natural beauty; • Increasing understanding and enjoyment; and • Fostering social and economic wellbeing. The Surrey Hills AONB[9] management plan sets out the following vision: *"The Surrey Hills AONB is recognised as a national asset in which its natural and cultural resources are managed in an attractive landscape mosaic of farmland, woodland, heaths, downs and commons. It provides opportunities for appropriate business enterprise and for all to enjoy and appreciate its natural beauty."* The Kent Downs AONB[10] management plan emphasises the importance of the following elements in its vision: • Sustainable development; • Landform and landscape character; • Biodiversity; • Farmed landscape; • Woodland and trees; • Historic and cultural heritage; • Heritage Coasts; • Geology and natural resources; • Vibrant communities; and • Access, enjoyment and understanding.

[8] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://www.chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf. Accessed September 2016

[9] Surrey Hills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://surreyhills.akikodesign.com/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf. Accessed September 2016.

[10] Kent Downs AONB Unit (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014 - 2019 [online] available at: http://www.kentdowns.org.uk/uploads/documents/KD_AONB_final_plan_09.09.14.compressed.pdf. Accessed September 2016

Document title	Key message
	The Dedham Vale AONB[11] Management Plan sets out the following vision: *"The Dedham Vale Area of Outstanding Natural Beauty (AONB) and Stour Valley Project area is a distinctive landscape with agriculture and wildlife at its core that retains its natural beauty and special qualities, which is conserved and enhanced by a wide ranging partnership. It is an area where residents feel a strong sense of belonging, visitors are welcomed to enjoy the countryside and the heritage is understood and appreciated by all."*
Local Plans	In terms of local context, local authorities produce Local Plans which provide guidance to developers on planning policy. Every Local Plan contains policies which are relevant to tourism and recreation within the local authority area as they set out how development policies that cover *inter alia*: • Increasing tourism in the area; and • Protecting designated landscapes.

Source: Annex A

Baseline review

Central region

The Central region is home to a number of major airports (Heathrow, Luton, and Stansted) which provide domestic and international tourism links. There are a number of other routes which provide access to tourist hotspots in southern England and Wales. This includes the M4 corridor which provides access to South Wales and the South West, and the M3 which provides access to Hampshire (including the South Downs National Park). London also acts as a major tourist hub with 18.6m international visits in 2015. This was an increase of 1.2 million (6.8%) from 2014.[12] The Chilterns AONB on the north west fringes of the Central region and the Surrey Hills to the south also attract tourists. Additionally, within the Study Area there are a range of areas with biodiversity value which are used for recreation (see Chapter 6 'Biodiversity, flora and fauna' for more details).

Sport England designates 'significant areas for sport' (SASP). This designation *"recognises the most important sites for individual sports."*[13] The Central region includes the following SASPs:

- River Wey (canoeing) in Weybridge;
- (Draft) Chertsey Weir (canoeing) in Chertsey;
- Dunstable Airfield (gliding) in Dunstable;
- John Battleday Water Ski (water skiing) at Thorpe Park; and
- Heron Lake (water skiing) in Wraysbury.

The Lee Valley White Water Centre, opened as part of the 2012 Olympics, is not in the Operating Area for Affinity Water but is nonetheless a significant tourist attraction. It is important as a number of water bodies (e.g. the Rivers Roding and Stort) feed into the River Lee and provide water that supports flows in the vicinity of this attraction.

Southeast region

The ferry port of Dover and the Eurotunnel connection at Folkestone provide key international access routes to and from the Southeast region. This means that the region can see large numbers of visitors

[11] Dedham Vales AONB & Stour Valley Project (2016): 'Dedham Vale Area of Outstanding Natural Beauty Management Plan 2016-2021' [online] available at: http://www.dedhamvalestourvalley.org/about-us/aonb-management-plan/ [last accessed 11/01/19]
[12] ONS (2016) Travel Trends 2015 [online] available at: https://www.ons.gov.uk/peoplepopulationandcommunity/leisureandtourism/articles/traveltrends/2015 Accessed September 2016
[13] Sport England (2016) SASP Register [online] @ https://www.sportengland.org/facilities-planning/planning-for-sport/planning-tools-and-guidance/signifcant-areas-for-sport/sasp-register/. Accessed September 2016.

(5.1 million staying visits in 2015[14]). This is set to increase in the future, with expansion likely as a result of the Dover Western Docks Revival. As such, tourism is important to the local economy, and has the potential to increase stress on water supply. This is most likely to occur during the summer months due to the combination of an influx of domestic and international tourists which coincides with reductions in supply that can occur during summer months due to dryer conditions.

The Kent Downs AONB, Heritage Coasts and other heritage assets in the region are also likely to draw tourists, as well as the opportunity for recreational boating, and other water based recreation activities. No SASPs have been identified in the Southeast region.

East region

Within the East region, Harwich International Port provides daily passenger access routes from Holland, hosting approximately 1 million passengers every year. Harwich is also a major international cruise port, with the majority of cruise ships arriving in the summer months.

The draft Tendring district Local Plan[15] identifies a vision for developing tourism in the seaside towns of Clacton-on-Sea, Frinton-on-Sea, Walton-on-the-Naze, and Harwich. Therefore, increased tourism has the potential to increase stress on water supply, particularly in the summer months.

A section of the Dedham Vale AONB falls within the North East boarder of the East region, attracting tourists. Additionally, around the Study Area there are a range of areas with biodiversity value which are used for recreation and tourism (see Chapter 6 'Biodiversity, flora and fauna' for more details).

Future environment without the rdWRMP2019

Domestic tourism and its contribution to the South East of England's economy decreased prior to 2014 reflecting a decline in overall levels of tourism (a 9% fall in domestic trips compared to 2013). Tourism in the Central Region increased over the same period. With regard to the future of tourism, the decision to leave the European Union may have an impact on both international tourist arrivals and domestic tourism; at this stage it is impossible to estimate the degree to which this will change. The government's endorsement of the recommendation of the Airports Commission to expand Heathrow rather than Gatwick airport will be a driver for further pressure on the water supply in the Central region.

In the absence of the rdWRMP2019, the increase in demand on water supply could have an effect on water sensitive recreational activities and tourism. This may result in local economic impacts.

Key comments from previous consultation responses

Natural England highlighted that the SEA Directive and Regulations are *"clearly specific to environmental issues"*. Natural England, therefore, felt that reference to economic impacts from the objectives and scope of the SEA, including in the Tourism and Recreation topic should be removed. However, it is considered that the impacts of water resource options on land use, and recreation and tourism can have important knock-on effects for the regional economy. As such; the economy has been discussed as part of the baseline.

No significant effects on tourism and recreation were predicted for the WRMP14 SEA resulting from either construction or operation.

Key issues

- Tourism and recreation provide both valuable benefits to health and wellbeing and also contribute towards local economies. There are a number of SASPs and tourism 'hotspots' in the Study Area;
- Tourism, particularly in the summer months when it can coincide with lower water supplies, can place a strain on water resources and therefore have implications for water resources management; and

[14] ONS (2016) International Passenger Survey [online] @ https://www.visitbritain.org/nation-region-county-data. Accessed November 2016.
[15] Tendering District Council (2017): 'Tendring District Local Plan 2013-2033 and Beyond Publication Draft' [online] available at https://www.tendringdc.gov.uk/sites/default/files/documents/planning/Planning_Policy/SDTDC_001%20Tendring%20Local%20Plan%20October%202017.pdf [last accessed 11/01/2018]

- The future for tourism is uncertain; levels could go up or down.

Proposed SEA scope

Although the majority of recreation areas are outside of waterbodies owned by Affinity Water, the rdWRMP2019 options could still impact on tourism and the use of recreation areas either directly or indirectly. Changes in hydrology through the selection of certain options may affect water tables and flows (e.g. to the River Lee). It is therefore proposed that for this SEA, the effects on tourism and recreation should be assessed.

Table 2.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

Table 2.2. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	Result in increased water-based recreational opportunities or new tourist attractions?	There are a number of SASPs and tourism hotspots dependent on the hydrology of the Affinity Water Operating Area.
	Alter water levels that affect water-based recreation assets?	
	Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?	The wider area has many rights of way on other linear infrastructure to access recreation which can be disturbed through construction impacts.

Material Assets

Introduction

This section sets out the policy context and the environmental baseline with respect to material assets and waste. It is important to note that material assets and waste have significant inter-relationships with other topics, in particular, tourism and recreation, air quality, and climate change mitigation.

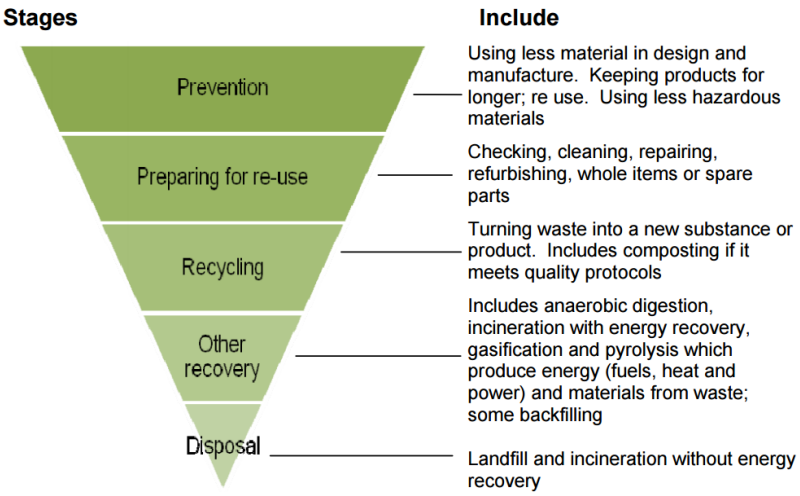
The term 'material asset' is not defined in the SEA Directive or Regulations. However, for the purpose of this SEA material assets are defined as:

> *"it … includes the impacts to people from disruption to strategic infrastructure such as major roads, rail, ports and airports…"* and "*Material assets also include potential impacts associated with raw materials and waste generation."* [16]

Policy context

The section below includes some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 3.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
Waste and Emissions Trading Act 2003	Under the Waste and Emissions Trading Act 2003[17], councils responsible for the disposal and collection of waste have a duty to develop a strategy which outlines how they manage municipal waste. The aim of the strategy is to change the way waste is managed, minimise landfill and drive new initiatives, with the aim of encouraging waste prevention and greater levels of recycling and composting.
Defra (2011) Government Review of Waste Policy in England 2011	The review was guided by the "waste hierarchy" – this ranks waste management options according to what is best for the environment – see below: 
HM Treasury (2015) Fixing the Foundations: creating a more prosperous nation.	This report emphasised productivity through: • "Encouraging long term investment in economic capital, including infrastructure, skills and knowledge; and • Promoting a dynamic economy that encourages innovation and helps resources flow to their most productive use. A fifteen point plan for productivity is provided." • The document sets out a 15 part framework for raising productivity, including the use of reliable and low carbon energy

[16] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report.
[17] [online] available at: http://www.legislation.gov.uk/ukpga/2003/33/contents Accessed September 2016

Document title	Key message

Source: Annex A

Baseline review

In England, the latest statistical release from Defra (2016) concludes that from 2004 to 2013, Raw Material Consumption (RMC) (excluding fossil fuels) decreased from 547 million tonnes to 410 million tonnes; the part of an ongoing reduction in RMC across the UK since 2004.[18] In terms of waste produced, municipal waste generation and storage is loosely linked the rdWRMP2019 in that there are potential pathways of pollutants from landfill to water supplies.

It is assumed that all municipal waste is collected and disposed of in an appropriate manner and the rdWRMP2019 would have no impact on either its generation or disposal. In considering waste generated by Affinity Water (and other water companies), a proxy measurement is the level of commercial and industrial waste generated in England. The use of national level data will not be as accurate as that for the region or Operating Area; they can however indicate broad tends in waste generation. The latest data for construction and industrial waste in England indicate that in 2012, 39 million tonnes were generated.

Central region

In 2015 Heathrow had nearly 75 million passengers[19] passing through the airport. This was an increase of about 9% compared to the baseline of the WRMP2014.Luton and Stansted airports had about 12 million and 23 million passengers respectively. Heathrow airport has recently been expanded to provide a further terminal (Terminal 5) and Stansted Airport has made a planning application for a second runway (see **Vol 2 Figure 3.1).** There are also a number of hospitals and industrial facilities in the Central region (e.g. Luton and Dunstable Hospital, New QEII Hospital, Princess Alexandra Hospital, and GlaxoSmithKline). All these facilities will need a secure supply of water.

There are a number of land based transport infrastructure links in the Central region e.g. the M11, M1, A1 (M), M4 and M3 and main rail routes to Bristol and Birmingham and to and from London. There is also Crossrail (due December 2018); and the proposed alignment for the High Speed Two (HS2) Phase One between London and the West Midlands.

Jacobs (2014) [20] indicated that Affinity Water Central generated an estimated 73,963 tonnes of excavated waste material in 2010/11 from maintenance works of which 68% was reused or recycled with the rest sent to landfill.

Southeast region

Economic activity and infrastructure associated with the ports of Dover and Folkestone and the nuclear power station at Dungeness are some of the key factors relating to material assets in the Southeast region (**see Vol 2 Figure 3.2**). The Port of Dover is Europe's busiest ferry port; in 2015 about 13.19 million passengers used the port. [21] This number follows a general decreasing trend since

[18] Defra (2016) Digest of waste and resource statistics [online] available at: https://www.gov.uk/government/statistics/digest-of-waste-and-resource-statistics-2016-edition. Accessed September 2016.
[19] UK Civil Aviation Authority (2016) Air Passengers by Type and Nationality of Operator 2015 [online] @ https://www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Data_and_analysis/Datasets/Airport_stats/Airport_data_2015/Table_08_Air_Passengers_by_Type_and_Nat_of_Operator_2015.pdf. Accessed September 2016.
[20] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report. Accessed September 2016.
[21] Port of Dover (2015) Annual Report & Accounts [online] @ http://www.doverport.co.uk/downloads/DHB_Annual_Report%20and%20Accounts%202015_WEB.pdf Accessed Sept 2016

a peak of 14.49 million passengers in 2007. In 2015 2.53 million commercial vehicles used the port, an increase from 2.36 million in 2007. The port had an annual turnover of £59.8 million in 2015.[22]

The Channel Tunnel is located in Folkestone and links the town with Calais, France. About 10 million passengers used the Eurostar to cross the English Channel in 2015.[23] These ports and terminals are a key component of the local economy.

HS1 connects St Pancras in London with the Channel Tunnel and connects with the international high-speed routes between London, Paris, and Brussels. The HS1 connection to Ashford and the M20 provide connections from the Southeast region to the rest of the UK. Lydd airport is located approximately one mile north east of the town of Lydd and offers regular flights to Le Touquet Airport in northern France.

Hospitals in the Southeast region (e.g. Buckland Hospital in Dover and Royal Victoria Hospital in Folkestone) are signficaint users of water (and sensitve to changes in water chemistry). Dungeness nuclear power station employs over 700 people to operate Dungeness B and decommission Dungeness A (via Magnox);[24] the reactor represents an important centre of local demand.

Jacobs[25] reported that the:

> *"South east region generated an estimated 12,641 tonnes of excavated waste material in 2010/11 from maintenance works of which 69% was reused or recycled with the rest sent to landfill."*

East region

The Harwich International port has a range of economic activities and infrastructure associated with it, including both passenger travel and freight services. Clacton Hospital and Tendring Europark are significant users of water present within the East region.

Additionally, land based transport infrastructure links are also present within the East region, including the A120 and main rail routes between London and the East of England.

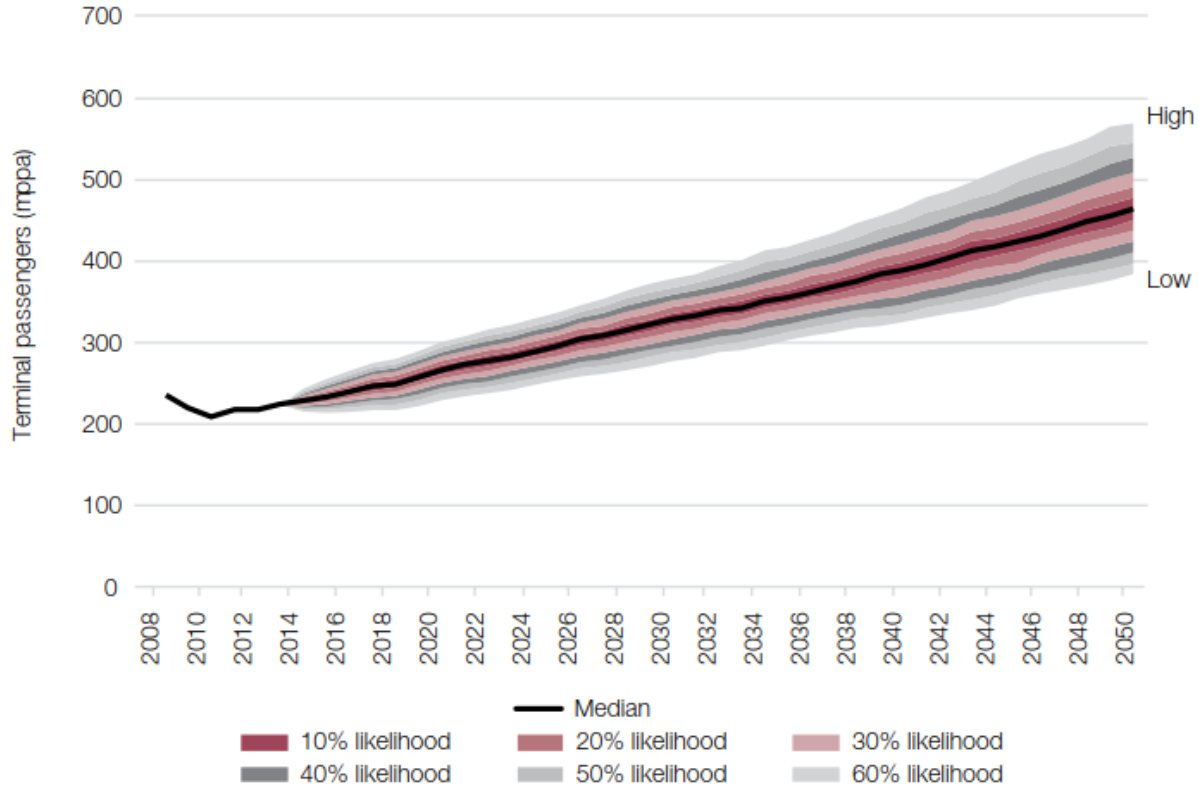
Future environment without the rdWRMP2019

The Central and Southeast regions both have important assets that require a consistent and high-quality supply of water. Furthermore, there is a range of assets that could constrain or be affected by construction and maintenance of options (e.g. through construction of HS2).

Increases in air travel are due to be focused in the Southeast region with "*more than half of the total UK travel demand… forecast for 2030…for airports in the South East of England."*[26]

[22] Port of Dover (2015) Annual Report & Accounts [online] @ http://www.doverport.co.uk/downloads/DHB_Annual_Report%20and%20Accounts%202015_WEB.pdf Accessed Sept 2016
[23] Eurotunnel Group (2015) Traffic volumes for the past 10 years [online] @ http://www.eurotunnelgroup.com/uk/eurotunnel-group/operations/traffic-figures/. Accessed September 2016
[24] See: https://www.edfenergy.com/energy/power-stations/dungeness-b
[25] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report.
[26] DfT (2003) The Future of Air Transport [online] @ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/272086/6046.pdf. Accessed September 2016

Figure 3.3. Unconstrained national air passenger forecasts, carbon-traded, 2008-2050[27]



As **Figure 3.3** illustrates, up to 2050 there is likely to be a significant increase in passengers in the UK (over double). The government has confirmed its support for airport expansion in the South East at Heathrow.

Nationally there appears to be a reduction in waste generated and waste being disposed by landfill. It is assumed that waste reductions will continue and that these will be reflected in Affinity Waters' operations.

Key issues

- The Central, Southeast and East regions have significant infrastructure that needs a consistent water supply; and
- The ongoing infrastructure developments of HS2 and Crossrail (and expansion at Heathrow) have the potential to disrupt water supply operations and generate increases in demand.

Proposed SEA scope

The delivery of supply options is likely to require some level of construction waste and supply disruption. As key infrastructure, e.g. Heathrow Airport, expands there will be a corresponding increase in water demand. The rdWRMP2019 will need to accommodate this expansion as well as ensuring a resilient supply. It is therefore proposed that for this SEA, the effects on construction and industrial waste, and infrastructure should be assessed.

Generation of municipal waste and its disposal will not be subject to assessment as it is not considered that this falls within the geographic scope or objectives of the rdWRMP2019.

Table 3.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

[27] Airports Commission (2015) Airports Commission: Final Report [online] @ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/440316/airports-commission-final-report.pdf. Accessed September 2016.

Table 3.2. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Maintain key infrastructure in support of the local economy?	Impact on strategic transport infrastructure such as airports, major roads and railway lines?	The ongoing infrastructure developments of HS2 and Crossrail (and expansion at Heathrow) have the potential to disrupt water supply operations and generate increases in demand.
	Impact on critical services and industries e.g. energy productions and hospitals?	Both the Central, Southeast and East regions have significant infrastructure that needs a consistent water supply;
Reduce material consumption and the generation of waste?	Require significant new construction or demolition of existing assets?	N/A
	Result in higher levels of reuse of waste?	

Biodiversity, Flora and Fauna

A complex relationship exists between water and nature conservation. There are significant inter-relationships between this topic and others, in particular landscape and cultural heritage.

Policy context

This section sets out some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'

Table 4.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
EU Biodiversity Strategy	Adopted in May 2011, the EU Biodiversity Strategy was established a new Europe-wide target to *"halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020".*
A Green Future: Our 25 Year Plan to Improve the Environment	The recently published 25 Year Environment Plan sets out the Government's environmental plan of action over the next quarter century, in the context of Brexit. The Plan aims to tackle the growing problems of waste and soil degradation, improving social justice through tackling pollution and promoting the mental and physical health benefits of the natural world. It also sets out how the Government will address the effects of climate change. These aims are supported by a range of policies which are focused on the following six key areas: • Using and managing land sustainably; • Recovering nature and enhancing the beauty of landscapes; • Connecting people with the environment to improve health and wellbeing; • Increasing resource efficiency, and reducing pollution and waste; • Securing clean, productive and biologically diverse seas and oceans; and • Protecting and improving the global environment
The National Planning Policy Framework (NPPF)	Key messages from the NPPF set out the Plan should: Contribute to the government's commitment to halt the overall decline in biodiversity by minimising impacts and achieving net gains in biodiversity wherever possible; Promote the 'preservation, restoration and recreation of priority habitats, ecological networks' and the 'protection and recovery of priority species'; Plan for biodiversity at a landscape-scale across local authority boundaries; Take account of the effects of climate change in the long term. Adopt proactive strategies to adaptation and manage risks through adaptation measures; and. Protect high quality open space or mitigate their loss (unless a lack of need is established).
Natural Environment White Paper	The 'Natural Environment White Paper' (NEWP) sets out the importance of a healthy, functioning natural environment to sustained economic growth, prospering communities and personal wellbeing. It includes commitments to: Halt biodiversity loss, support functioning ecosystems and establish coherent ecological networks by 2020; Establish a new voluntary approach to biodiversity offsetting to be tested in pilot areas; Address barriers to using green infrastructure to promote sustainable growth; and Taking account of all the economic and non-economic benefits derived from natural resources (such as food, timber and water) and functioning natural systems (such as healthy, fertile soils; clean water and air; and a regulated climate) to allow an 'ecosystems approach' to be taken in order to manage ecosystems in a more integrated fashion.
The UK post-2010 Biodiversity Framework	The UK Biodiversity Action Plan (UK BAP) was published in 1994 and was the UK government's response to the Convention on Biological Diversity. The UK BAP described the biological resources of the UK and provided detailed plans for conservation of these resources. Action plans for the most threatened species and habitats were set out to aid recovery, and national reports, produced every three- to five-years, showed how the UK BAP was contributing to the UK's progress towards the significant reduction of biodiversity loss. The 'UK Post-2010

	Biodiversity Framework', published in July 2012[28], succeeds the UK BAP and 'Conserving Biodiversity – the UK Approach', and is the result of a change in strategic thinking following the publication of the Convention on Biological Diversity's (CBD) 'Strategic Plan for Biodiversity 2011–2020.[29]
The Habitats Directive	he main aim of the Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. In applying these measures Member States are required to take account of economic, social and cultural requirements, as well as regional and local characteristics.
The Wildlife and Countryside Act 1981	The Wildlife and Countryside Act 1981 consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) in Great Britain (NB Council Directive 79/409/EEC has now been replaced by Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version)).
NERC act	Section 41 of the NERC Act highlights the important habitats and species that have declined in coverage over recent decades and are now considered to be threatened

Source: Annex A

Baseline review

Sites of biodiversity value are generally designated at three levels, international, national and local. Internationally important sites are those designated under the Habitat, and Birds Directive, and the Ramsar Convention. These are collectively known as European sites and include Special Areas of Conservation, Special Protection Areas and Ramsar sites. At a national level, Sites of Special Scientific Interest (SSSI) are designated under the National Parks and Access to the Countryside Act 1949, amended in the Environment Act 1995. At a local level Sites of Importance for nature Conservation (SINCs) can be designated by Local Planning Authority, and thus are granted protection through the development plan.

Whilst 'designated' biodiversity sites are offered a degree of protection from development and other activities through European and domestic legislation there are still a significant amount of sites designated 'below' European and UK legislation that have biodiversity value locally and cumulatively. The array of designated and non-designated sites forms a network of sites that can be mutually supportive and inter-connected.

Section 41 of the Natural Environment and Rural Communities (NERC) Act highlights the important habitats and species that have declined in coverage over recent decades and are now considered to be threatened. Some of the protected species and habitats within the Study Area (such as wetlands and calcareous grassland) are identified in Section 41 of the NERC Act.

Ancient woodlands are defined as areas "*that have been wooded continuously since at least 1600 AD*"[30]. These areas are generally protected at a local level through planning policy. There are areas of Ancient Woodland throughout both regions.

Central region

A 10 km buffer around the Study Area was used to capture all the designated sites that may be affected by the rdWRMP2019. Within this wider buffer, the Central region contains 4 Special Protection Areas, 11 Special Areas of Conservation, 3 Ramsar sites, 14 National Nature Reserves, no

[28] JNCC (2012) The UK Post-2010 Biodiversity Framework [online] @ http://jncc.defra.gov.uk/page-6189. Accessed September 2016
[29] CBD (2010) The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets [online] @ https://www.cbd.int/decision/cop/?id=12268. Accessed September 2016.
[30] DCLG (2012) National Planning Policy Framework [online] @ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf. Accessed November 2016

Marine Protection Zones and 254 SSSI's. Within the Operating Area itself, there are 3 Special Protection Areas, 5 Special Areas of Conservation, 2 Ramsar sites, 5 National Nature Reserves, no Marine Protection Zones and 108 SSSI's. For further information on these European and Nationally designated sites, see **Annex B** of this report**.**

The main habitat types in the Central Region include:

- Woodlands – located throughout the Chilterns, Thames Valley, Thames Basin Heaths and Northern Thames Basin;
- Enclosed farmland - located throughout the Chilterns, Thames Valley, Thames Basin Heaths and Northern Thames Basin;
- Semi-natural grasslands - located throughout the Chilterns, Thames Valley, Thames Basin Heaths and Northern Thames Basin;
- Wetlands and floodplains - located throughout the Thames Valley, and Northern Thames Basin; and
- Heathland - located throughout the Northern Thames Basin.

Some of the priority BAP habitats identified by Affinity Water within the Central region include:

- Ancient woodland: isolated areas across Central region which include larger sections which are part of the Watling Chase and Thames Chase Community Forests;
- Wetland habitats including lowland grazing marsh and reedbeds: these are located in the Upper Lee Valley and Thames Basin and also in isolated areas around Watford and Staines;
- Calcareous grassland and heath: including the Chilterns AONB;
- Heath and acid grassland: Thames Basin Heath SPA;
- Arable cereal margins: These are concentrated in the north and east of the region;
- Chalk streams; and
- Reedbeds.

Jacobs[31] identified that there are also non-native species present within the region. These species include Chinese mitten crabs, Japanese knotweed, mink, signal crayfish and floating pennywort. Affinity Water has also identified giant hogweed and himalayan balsam as non-native species in the Central region. Non-native species can become invasive which may cause damage to the environment, economy and human health. This may have significant negative knock on effects for native species and the wider ecosystem in such areas. A key issue for the SEA will be to determine to what extent options (particularly those involving long distance water transfers) influence the spread of non-native species.

Fish migration in the Study Area can be impeded by weirs and sluices found on the Lower Thames. Affinity Water has installed fish screens and eel passes to mitigate impacts on these receptors (e.g. fish screens at river intakes to prevent fish entrainment). Additionally, Affinity Water has also undertaken works on two lakes which are designated as Heavily Modified Water Bodies so that they achieve Good Ecological Potential by 2027. Further replacement fish screens, to meet the Eels Regulations, have also been installed at Ardleigh.[32]

Southeast region

A 10 km buffer around the Study Area was used to capture the designated sites downstream of the Operating Area that may be affected by the dWRMP2019. Within this wider buffer, the Southeast region contains 3 Special Protection Areas, 8 Special Areas of Conservation, 3 Ramsar sites, 6 National Nature Reserves, 5 Marine Protection Zones and 31 SSSI's. Within the Operating Area itself, there is 1 Special Protection Area, 5 Special Areas of Conservation, 1 Ramsar site, 2 National Nature

[31] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report.
[32] Affinity Water (2014) Final Water Resources Management Plan, 2015-2020.

Reserves, 2 Marine Protection Zones and 14 SSSI's. For further information on these European and Nationally designated sites, see **Annex B** of this report.

The main habitat types in the Southeast region include:

- Coastal margin – in the Romney Marshes, and North Downs;
- Enclosed farmland - in the Romney Marshes, Wealden Greensands, and North Downs;
- Semi-natural grasslands - in the Romney Marshes, Wealden Greensands, and North Downs;
- Wetlands and floodplains - in the Romney Marshes;
- Woodlands - in the Wealden Greensands, and North Downs; and
- Chalk rivers and streams.

Jacobs[33] identified that there are also non-native species present within the region. These species include mink, marsh frogs, Himalayan balsam, Canadian pondweed, Australian swamp stonecrop, Japanese knotweed, zebra mussel, giant hogweed, water fern, Turkish crayfish, pacific oyster, and leathery sea squirt. The dWRMP2019 has the potential to enable the translocation of such species through long distance water transfers. This may have significant negative knock on effects for native species and the wider ecosystem in such areas. A key issue for the SEA will be to determine to what extent options (particularly those involving long distance water transfers) influence the spread of non-native species.

The Thames Estuary supports over 120 different fish species, which are important both ecologically and economically. The River Dour is also noted to have an important population of Brown Trout within the context of Kent rivers The Zoological Society of London noted that: *"Since being declared "biologically dead" in the 1950's, the environment has improved significantly and the Thames Estuary is now one of the world's most unpolluted metropolitan tideways."*[34]

Some options within the South East Region have the potential to impact negatively on the marine environment, and consequently there may be a need to consider impacts on BAP Priority Species present within the marine environment. Marine species and habitats were assessed separately from terrestrial and freshwater habitats and species. The marine UK BAP criteria were developed from the Review of Marine Nature Conservation (RMNC) and the Irish Sea Pilot (ISP). There are a total of 25 marine BAP Priority habitats[35], and 87 marine BAP Priority Species.[36]

East region

A 10 km buffer around the Study Area was used to capture the designated sites downstream of the Operating Area that may be affected by the rdWRMP2019. Within this wider buffer, the East region contains 8 Special Protection Areas, 1 Special Area of Conservation, 1 candidate Special Area of Conservation, 7 Ramsar sites, 4 National Nature Reserves, 1 Marine Protection Zone and 33 SSSI's. Within the Operating Area itself, there are 3 Special Protection Areas, 1 Special Area of Conservation, 1 candidate Special Area of Conservation, 3 Ramsar sites, 2 National Nature Reserves, 1 Marine Protection Zone and 18 SSSI's. For further information on these European and Nationally designated sites, see **Annex B** of this report.

Some of the priority BAP habitats within the East region include:

- Coastal Saltmarsh – around the Colne estuary, Hamford Water, and River Stour;
- Mudflats – around the Colne estuary, Hamford Water, and River Stour;
- Coastal and Floodplain Grazing Marsh;
- Deciduous Woodland;
- Wood pasture and Parkland;

[33] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report.
[34] Available online at: https://www.zsl.org/conservation/regions/uk-europe/monitoring-thames-fish (Accessed September 2016)
[35] Joint Nature Conservation Committee (2016) UK BAP list of Priority Habitats [online] available at: http://jncc.defra.gov.uk/page-5706
[36] Joint Nature Conservation Committee (2016) UK BAP list of Priority Species [online] available at: http://jncc.defra.gov.uk/page-5167

Future environment without the rdWRMP2019

An analysis of water dependent SSSIs (see **Annex B**) indicates that the condition of some SSSIs have changed since PR14. Of concern are the four that have recorded a declined in condition status (Fray's Farm Meadows, Rye Meads, Staines Moor and Dungeness, Romney Marsh and Rye Bay).

Future anthropogenic activities and increased population growth in the future will have a detrimental impact to protected sites and wider biodiversity features in the future. This is liked to water demand, and supply, and will therefore need to be considered as part of the SEA with regards to the rdWRMP2019. Furthermore the effects of climate change may have an effect on water dependant species' ability to adapt to a change in water levels and / or quality.

Water supply in the Study Area can affect the condition of designated sites and as such the DWRMP2019 has a role to play in ensuring a favourable environment for SSSI conditions to improve. Water-dependant habitats (such as reed beds and wet woodland) are particularly susceptible to changes in water quality and quantity. These habitats will be vulnerable to changes in the water supply in the short and long-term (e.g. the impacts of climate change).

The environmental quality of water bodies should improve in the future, as requirements of the WFD are implemented and sustainability reductions take effect. Additionally, new protected areas are likely to be designated in the future, for instance, a third tranche of MCZs are currently planned to be designated in 2018. This should result in significant positive benefits for the protected species and areas. Also, through the National Environment Programme (NEP), Affinity Water is putting in place schemes for improving biodiversity and catchment management (relating to biodiversity drivers) which should have a positive effect on water quality and supply.

Key comments from previous consultation responses

During scoping, Natural England highlighted that a number of environmental designations including SPA and Ramsar sites should be updated to reflect new designations and that a number of amendments to a number of Acts and Regulations relating to biodiversity should be made. Additionally, Natural England sought that the objective for biodiversity, flora and fauna more explicitly stated a need to conserve and enhance biodiversity, including designated sites and habitats and species of principal importance.

In response to the 2014 SEA Environmental Report, Natural England identified omissions in the SEA in regard to the consideration of invasive species, geological or geomorphological SSSIs, opportunities to enhance landscape character and the issue as to whether to consider air quality and noise impacts. These comments have been addressed in this report.

Key issues

- A number of non-native species are found in the Study Area and there is potential for the dWRMP2019 to contribute to the restoration of habitats affected by the presence of these non-native species;
- Rivers and lakes within the Southeast region are vulnerable to low flows and poor water quality;
- The Thames Estuary supports over 120 different fish species, and the River Dour is noted to have an important population of Brown Trout within the context of Kent rivers. These are important both ecologically and economically;
- A number of SSSIs in the Study Area have deteriorated in condition since WRMP 2014; and
- There is the potential for further habitat fragmentation and loss through development activities and future population growth in the area.

Proposed SEA scope

Options / programmes can directly or indirectly impact on both terrestrial or aquatic habitats and species. It is therefore proposed that for this SEA, the effects on biodiversity, flora and fauna should be assessed. Specifically, the SEA will focus on the impact to nationally and internationally designated sites; non-designated sites will not be a focus of this assessment.

Table 4.4 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

Table 4.4. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Protect and enhance biodiversity including designated and other important habitats and species?	Impact on European sites?	Addressed through the HRA process.
	Lead to the loss or degradation of priority habitats or species or lead to the creation of new priority habitats?	There is the potential for further habitat fragmentation and loss through development activities.
	Impact on non-native species?	A number of non-native species are found in the Study Area.
	Affect the condition of SSSIs, particularly those that have a trend of declining condition?	A number of SSSIs in the Study Area have deteriorated in condition since WRMP 2014.
	Provide opportunities for biodiversity enhancement?	In response to EA feedback

Landscape, Townscape and Visual Amenity

Landscape quality, including the quality of the cultural or historic landscape, is important to the public's enjoyment of the countryside. As such this chapter has cross-cutting relevance to other SEA topics including biodiversity, flora and fauna, and tourism and recreation access.

Policy context

This section sets out some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 5.1. Key messages from the review the policies, plans and programmes

Document title	Key message
European Landscape Convention	The European Landscape Convention of the Council of Europe, (the 'Florence Convention') promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues. The Florence Convention introduced a Europe-wide concept centring on the quality of landscape protection, management and planning and covering the entire territory, not just outstanding landscapes.
The National Planning Policy Framework (NPPF)	Key messages from NPPF include that the Plan should: • Conserve and enhance valued landscapes, giving particular weight to those identified as being of national importance; • Recognise heritage assets as an 'irreplaceable resource' that should be conserved in a 'manner appropriate to their significance', taking account of 'the wider social, cultural, economic and environmental benefits' of conservation, whilst also recognising the positive contribution new development can make to local character and distinctiveness; and • Consider the effects of climate change in the long-term, including in terms of landscape. Adopt 'proactive strategies' to adaptation and manage risks through adaptation measures including well planned green infrastructure.
Area of Outstanding Natural Beauty (AONB) Management Plans	These are landscapes which distinctive character and natural beauty are so precious that it is in the nation's interest to safeguard them. AONBs are designated in recognition of their national importance and to ensure that their character and qualities are protected for all to enjoy. The primary purpose of AONB designation is: • To conserve and enhance the natural beauty of the landscape. • Two secondary aims complement the purpose: – To meet the need for quiet enjoyment of the countryside; and – To have regard for the interests of those who live and work there.
Heritage Coasts[37]	Heritage Coasts are 'defined' rather than designated. As such, there is no statutory designation process like that associated with national parks and AONBs. They were established to conserve the best stretches of undeveloped coast in England. A Heritage Coast is defined by agreement between the relevant maritime local authorities and Natural England. The national policy framework and objectives for Heritage Coasts were developed by the Countryside Commission, a predecessor of Natural England, and ratified by the government. Heritage Coasts were established to conserve, protect and enhance: • the natural beauty of the coastline; • their terrestrial, coastal and marine flora and fauna; • their heritage features; • encourage and help the public to enjoy, understand and appreciate these areas; • maintain and improve the health of inshore waters affecting Heritage Coasts and their beaches through appropriate environmental management measures; and • take account of the needs of agriculture, forestry and fishing and the economic and social needs of the small communities on these coasts.

Source: Annex A

[37] See: https://www.gov.uk/government/publications/heritage-coasts-protecting-undeveloped-coast/heritage-coasts-definition-purpose-and-natural-englands-role

Document title	Key message

Baseline review

Central region

The Central Region contains two AONBs (**see Annex D**):

- **The Chilterns AONB:** The Chilterns AONB lies to the north west of London covering an area of 833 km^2; "It extends over 74 km from south west to northeast and c.18 km by south east to north west, stretching in a band from western Oxfordshire, across Buckinghamshire into the fringes of Hertfordshire and Bedfordshire." The Historic Landscape Characterisation Report goes on to define the Chilterns AONB as *"…principally rural in character, the Chilterns lie within the hinterland of Greater London and are fringed by substantial settlements, including Reading, High Wycombe, Marlow, Chesham, Amersham, Aylesbury, Hemel Hempstead, Luton, Dunstable and Hitchin. This surrounding area has been, and continues to be, subject to considerable development pressure."*[38][emphasis added]
- **The Surrey Hills AONB:** the Surrey Hills AONB was one of the first landscapes to be designated an AONB (designated in 1958). 40 % of the AONB is covered by woodland; 14% of this woodland is designated as Ancient Woodland. 18% is heath and commons and 1% is chalk grassland. There are 37,000 people living in the AONB whilst 30 million visitor days per year are spent in the AONB. The AONB faces the following key pressures and threats:
  - Housing development;
  - Off road vehicles;
  - Energy (oil, gas, fracking);
  - Loss of local services;
  - Excavation of minerals;
  - Changes in agriculture;
  - Aircraft noise;
  - Climate change;
  - Mountain biking; and
  - Road cycling.[39]

The government sets out that National Character Areas (NCAs) "*divide England into 159 distinct natural areas. Each is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity. Their boundaries follow natural lines in the landscape rather than administrative boundaries.*"[Emphasis added].[40] There are five NCAs within the Central region:

- **South Suffolk and North Essex Clayland (Area 86):** "*This NCA is made up of undulating countryside, incised by small river valleys flowing east to the North Sea, with sporadic but narrow interfluve plateaux. This is an area of chalky boulder clay (glacial till) but with more topographical variation than the area to the north.*"[41]
- **Chilterns (Area 110):** "*Landform is dictated by chalk strata which have been tilted upward to create a north-east to south-west escarpment. The scarp faces north-west across low-lying vales.*

[38] The Chilterns Conservation Board (2009) The Changing Landscape of the Chilterns [online] available at: http://www.chilternsaonb.org/uploads/files/AboutTheChilterns/HistoricEnvironment/The_Changing_Landscape_of_the_Chilterns.pdf.
[39] Surrey Hills Conservation Board (2014) Management Plan 2014-2029 [online] available at: http://www.surreyhills.org/board/management-plan-2014-2019/.
[40] See: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making
[41] Natural England (2014) NCA Profile: 86 South Suffolk and North Essex Clayland (NE515) [online] @ http://publications.naturalengland.org.uk/publication/5095677797335040?category=587130. Accessed September 2016

The dip slope descends down into the London Basin and appears as a plateau behind the crest of the scarp."[42]

- **Northern Thames Basin (Area 111):** *"This NCA can be broken down into four sub-character areas: Hertfordshire plateaux and river valleys; Essex wooded hills and ridges; London Clay lowlands; and Essex heathlands. The Hertfordshire plateaux and river valleys area is topographically complex, having many valleys cut into the broad plateau landform which is often obscured by vegetation cover. In places river erosion has created isolated landforms such as the Shenley Ridge. The Essex wooded hills and ridges rise above the London Clay lowlands to an altitude of approximately 100 m AOD. The London Clay lowlands are generally flat and typically gently undulating. Broadly, the Essex heathlands landform is relatively flat with only minor undulations; however, some of the river valleys are steep sided such as the Stour, Colne and Roman."*[43]
- **Thames Basin Lowlands (Area 114):** "*This is an essentially lowland area lying within the London Basin. The land is a gently undulating plain for the most part, rising towards the dip slope of the North Downs to the south and east and to the Thames Basin Heaths in the west."*[44]
- **Thames Valley (Area 115):** "*In its northern parts, the landform reflects the rolling hills characteristic of the nearby Chilterns. Here, the Chalk is overlain by clay and gravel, giving rise to a plateau and a series of knolls. The central part of the Thames Valley is dominated by the Thames flood plain, giving way to clay vales further south. There are lakes in the east resulting from mineral workings."*[45]

Southeast region

The Southeast region contains one AONB (see **Annex D**):

- **The Kent Downs AONB**: this AONB covers 878 km^2 from the White Cliffs of Dover to the Surrey Border. It contains one of the South East's highest points at 250 metres (the Sevenoaks Greensand ridge).There are also three main river catchments which cut through the AONB, draining in a south to north direction. The biggest of these are the Rivers Darent, Medway and Great Stour. The white cliffs of Dover and Folkestone are also located within the AONB and are defined as Heritage Coasts. [46]

There are also three NCAs in the Southeast region:

- **North Downs (Area 119):** "*The backbone of the Downs is a distinctive ridge with a steep south-facing scarp and northern dip slope. The ridge is cut by numerous dry valleys, some containing winterbournes. The Downs end abruptly in the east at the distinctive landmark of the White Cliffs. During the ice ages although not glaciated the area was under the influence of very cold tundra-like conditions at the edge of the ice sheets. Processes of erosion and deposition during this period have contributed significantly to the formation of the present landscape."*[47]
- **Wealdon Greensand (Area 120):** *"The Wealden Greensand NCA follows the outcrop of Upper and Lower Greensand which curves around the western end of the Wealden anticline in West Sussex, east Hampshire and Surrey and forms a conspicuous ridge running west to east across Surrey and Kent terminating in coastal cliffs at Folkestone Warren. Time and the elements have removed overlying strata to leave the well-defined concentric outcrops that encircle the Low and High Weald. Surface water is a feature across the Greensand with streams and rivers draining off the dip slope. Late Pleistocene landslips, in particular cambering and gullying, are common along inland escarpments and parts of the coast. Most notable is the Folkestone Warren land slip, where*

[42] Natural England (2013) NCA Profile:110 Chilterns (NE406) [online] @ http://publications.naturalengland.org.uk/publication/4977697?category=587130. Accessed September 2016
[43] Natural England (2013) NCA Profile:111 Northern Thames Basin (NE466) [online] @ http://publications.naturalengland.org.uk/publication/4721112340496384?category=587130. Accessed September 2016
[44] Natural England (2014) NCA Profile:114 Thames Basin Lowlands (NE571) [online] @ http://publications.naturalengland.org.uk/publication/5682232412864512?category=587130. Accessed September 2016
[45] Natural England (2014) NCA Profile:115 Thames Valley (NE379) [online] @ http://publications.naturalengland.org.uk/publication/3865943?category=587130. Accessed September 2016
[46] Kent Downs Conservation Board (2014) Management Plan 2014-2019 [online] available at: http://www.kentdowns.org.uk/uploads/documents/KD_AONB_final_plan_09.09.14.compressed.pdf
[47] Natural England (2014) NCA Profile:119: North Downs (NE431) [online] @ http://publications.naturalengland.org.uk/publication/7036466?category=587130. Accessed September 2016

massive chalk has slipped on underlying Gault Clay. Here twelve major landslips have occurred since 1765, the most notable being in 1915 when the coastal railway line was displaced."[48]

- **Romney Marshes (Area 123):** *"The geology of the NCA is dominated by coastal deposits and, most importantly, the cuspate shingle foreland of Dungeness. The NCA owes its existence to the growth of this feature, first in its role as a barrier beach and later as a cuspate foreland, leading to the siltation and subsequent drainage of the shallow bay between Dungeness and the ancient shoreline. Over the centuries the foreland has gradually changed shape under the forces of wind and tide becoming progressively sharper. Today the shingle foreland is composed of several hundred storm beaches, in several groups, which record the location and shape of the foreland at each stage of its formation. Behind the shingle beach alluvial deposits filled the shallow bay, and with subsequent drainage, these have formed the Romney and Walland Marshes, Denge Marsh and East Guldeford and Pett Levels."* [49]

The Southeast region encompasses the Dover-Folkestone Heritage Coast which was defined in January 1998 and covers a length of 8km with an area of 4km^2. It lies between Dover and Folkestone and covers the 'The White Cliffs of Dover'. The Southeast region also contains the South Foreland Heritage Coast which lies to the north east of Dover. It was designated in January 1998 and covers a length of 8km and total area of 6km^2.

Unlike national parks and AONBs the Heritage Coast designation is non-statutory, and designations can only be made with the agreement of local authorities and landowners. However, the majority of Heritage Coasts fall within statutorily designated landscapes such as national parks and AONBs. In the case of the Dover-Folkestone and South Foreland Heritage Coasts, both fall within the Kent Downs AONB designated area and as such are provided with statutory protection.[50]

East region

The East region contains one AONB (see **Annex D**):

- **Dedham Vale and Stour Valley AONB:** covers 458 km^2 of the Essex/Suffolk border in the East of England. Much of the eastern end of the AONB is associated with the celebrated landscape artist, John Constable, and many of the views he painted remain recognisable today. Much of the middle section of the Stour Valley is associated with the nationally recognised artist Thomas Gainsborough. The wildlife and landscape views of the AONB and Stour Valley ensure that the area remains a nationally important asset.[51]

The area is covered by four NCAs:

- **Northern Thames Basin (Area 111):** *"This NCA can be broken down into four sub-character areas: Hertfordshire plateaux and river valleys; Essex wooded hills and ridges; London Clay lowlands; and Essex heathlands. The Hertfordshire plateaux and river valleys area is topographically complex, having many valleys cut into the broad plateau landform which is often obscured by vegetation cover. In places river erosion has created isolated landforms such as the Shenley Ridge. The Essex wooded hills and ridges rise above the London Clay lowlands to an altitude of approximately 100 m AOD. The London Clay lowlands are generally flat and typically gently undulating. Broadly, the Essex heathlands landform is relatively flat with only minor undulations; however, some of the river valleys are steep sided such as the Stour, Colne and Roman."*[52]

- **Greater Thames Estuary (Area 81)**: this NCA "*is predominantly a remote and tranquil landscape of shallow creeks, drowned estuaries, low-lying islands, mudflats and broad tracts of tidal salt marsh and reclaimed grazing marsh that lies between the North Sea and the rising ground inland. It forms the eastern edge of the London Basin and encompasses the coastlines of South Essex*

[48] Natural England (2013) NCA Profile:120 Wealden Greensand (NE465) [online] @ http://publications.naturalengland.org.uk/publication/5331490007154688?category=587130. Accessed September 2016
[49] Natural England (2013) NCA Profile:123 Romney Marshes (NE499) [online] @ http://publications.naturalengland.org.uk/publication/5701066775592960?category=587130. Accessed September 2016
[50] Natural England (2015) Heritage Coasts: protecting undeveloped coast [online] available at: https://www.gov.uk/government/publications/heritage-coasts-protecting-undeveloped-coast
[51] Dedham Vale AONB and Stour Valley Project (2016) Management Plan 2016-2021 [online] available at: http://www.dedhamvalestourvalley.org/about-us/aonb-management-plan/
[52] Natural England (2013) NCA Profile:111 Northern Thames Basin (NE466) [online] @ http://publications.naturalengland.org.uk/publication/4721112340496384?category=587130. Accessed September 2016

and North Kent, along with a narrow strip of land following the path of the Thames into East London. Despite its close proximity to London, the NCA contains some of the least settled areas of the English coast, with few major settlements and medieval patterns of small villages and hamlets on higher ground and the marsh edges."[53]

- **Suffolk Coast and Heaths (Area 82)**: this NCA "*lies on the North Sea coast between Great Yarmouth in the north and the port town of Harwich in the south, forming a long, narrow band that extends between 10 and 20km inland. Its inland western boundary is with the South Norfolk and High Suffolk Claylands and South Suffolk and North Essex Claylands NCAs, with projections up many small river valleys. It is one of the driest parts of the country, with local rainfall typically only two-thirds of the national average. The distinctive landscape character is a product of its underlying geology, shaped by the effects of the sea and the interactions of people. It is mainly flat or gently rolling, often open but with few commanding viewpoints. In many places, and especially near the coast, wildlife habitats and landscape features lie in an intimate mosaic, providing great diversity in a small area*."
- **South Suffolk and North Essex Clayland (Area 86)**: this NCA "*covers the four counties of Suffolk, Essex, Hertfordshire and Cambridgeshire. It stretches from Bury St Edmunds in the north-west to Ipswich in the north-east, roughly following the line of the A14 trunk road through the Gipping Valley. It then embraces the Colchester hinterland before encompassing the urban areas of Braintree and Chelmsford in the south and stretching to Bishop's Stortford and stevenage in the west. It is an ancient landscape of wooded arable countryside with a distinct sense of enclosure. The overall character is of a gently undulating, chalky boulder clay plateau, the undulations being caused by the numerous small-scale river valleys that dissect the plateau. There is a complex network of old species-rich hedgerows, ancient woods and parklands, meadows with streams and rivers that flow eastwards. Traditional irregular field patterns are still discernable over much of the area, despite field enlargements in the second half of the 20th century. The widespread moderately fertile, chalky clay soils give the vegetation a more or less calcareous character. Gravel and sand deposits under the clay are important geological features, often exposed during mineral extraction, which contribute to our understanding of ice-age environmental change*."

Future environment without the rdWRMP2019

Drivers for change in the landscape (in both regions) include, but are not limited to:

- **Climate change** - increased evaporation, changing rainfall patterns, sea level rise (in the Southeast region), increased risk of flooding, invasive species, and drought;
- **Development pressure** – a pressure and an opportunity as new development allows for mitigation such as green infrastructure to potentially be delivered. This is likely to be focused in the London commuting belt and driven partly by meeting London's unmet housing need in the wider south east;
- **Increased recreation** – as a result of population growth; and
- **Water availability** - implementation of the WFD should improve the ecological status or potential of the NCA's rivers and the quality of groundwater.

In the absence of the rdWRMP2019, the implementation of WRMP2014 is likely to have ongoing effects on the landscape. Options proposed for rdWRMP2019 that include above ground engineering e.g. bunded reservoirs, pumping stations are likely to have some impact on the landscape, temporary or permanent. This will not necessarily be negative as some options will provide opportunities for landscape enhancement.

Key comments from previous consultation responses

Natural England stated in response to the scoping consultation that: "*It may be helpful to add Kent Downs AONB and Surrey Hills AONB to the consultation body list*". The relevant AONB management boards will be consulted during the consultation exercise for this assessment. Natural England further noted in the responses to the SEA Environmental Report that there should be greater emphasis on 'enhancement' in the SEA objectives.

[53] Natural England (2013) NCA Profile: 81 Greater Thames Estuary [online] available at: http://publications.naturalengland.org.uk/publication/4531632073605120?category=587130 [accessed January 2019]

Key issues

- There are a range of designated areas of landscape value in all regions; and
- The landscape in all regions is facing a range of challenges from climate change and other factors.

Proposed SEA scope

The rdWRMP2019 supply options have the potential to affect the landscape e.g. bunded reservoirs in areas of flat topography. Given the sensitive nature of local receptors and the potential for impacts, it is proposed that for this SEA, the effects on landscape should be assessed. Specifically, the assessment will focus on the effects on designated landscapes.

Table 5.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

Table 5.2. SEA Framework of objectives and assessment questions

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Conserve and enhance landscape character and visual amenity?	Impact views from public rights of way, designated landscapes, parks or other valued places?	There are a range of designated areas of landscape value in all regions.
	Provide opportunities for landscape enhancement?	All regions face development pressures including from London and the development ‘spill over’ required to meet London’s housing need.

Air Quality and Noise

The pollutants of greatest concern to health and biodiversity in the UK are particulate matter (PM) (specifically $PM_{2.5}$ and PM_{10}), nitrogen oxides (NO and NO_2), ammonia and ozone. The transport sector is the dominant source of PM_{10} and NO_2 emissions in England.[54] The highest levels of PM_{10} and NO_2 emissions are seen in large urban areas and on busy roads. Concentrations of PM_{10} and NO_2 decrease away from the main source of the emission and, as such, concentrations of these pollutants generally tend to be lower in rural areas.[55] However, high levels of PM_{10} and NO_2 can often occur due to congestion on the roads of small market towns, or where road infrastructure was not designed for the volume of traffic or type of vehicles it currently accommodates. Ammonia reacts with other gaseous pollutants to form particles which account for a significant fraction of the $PM_{2.5}$ which is the major cause of the health effects associated with air pollution.

Policy context

This section sets out some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 6.1. Key messages from the review of the policies, plans, and programmes

Document title	Key message
Environmental Noise Directive	The EU Environmental Noise Directive is the main EU instrument to identify noise pollution levels and to trigger the necessary action at both Member State and at EU level. To pursue its stated aims, the Noise Directive focuses on three action areas: the determination of exposure to environmental noise; ensuring that information on environmental noise and its effects are made available to the public; preventing and reducing environmental noise where necessary and preserving environmental noise quality where it is good.
Ambient Air Quality Directive	The EU Ambient Air Quality Directive[56] and the 4th Air Quality Daughter Directive[57] set the air quality standards against which national and local ambient air quality policies are formulated. The directives set limit values and target values for various pollutants in ambient air including nitrogen dioxide (NO_2) and require the EU Member States to assess and report compliance and take action to rectify any exceedances of those values.
Air Quality Action Plans	The UK government and the devolved administrations are required under the Environment Act 1995 to produce a national air quality strategy. The strategy sets out how responsibilities for meeting EU limits are effectively shared between government and local authorities. Where an air quality management area (AQMA) is designated, local authorities must produce an air quality action plan describing the pollution reduction measures to be put in place in pursuance of air quality standards and objectives (generally the same as limit values).

Source: Annex A

Baseline review

Central region

There are 52 Air Quality Management Areas (AQMAs) located wholly or partly within the Central region. This is due to the predominantly urban land use and commensurately high levels of traffic (**see**

[54] National Atmospheric Emissions Inventory, J MacCarthy, G Thistlethwaite, Y Pang, E Salisbury and T Misselbrook (2012), Air Quality Pollutant Inventories for England, Scotland, Wales and Northern Ireland: 1990-2010; [online] available at: http://ukair.defra.gov.uk/reports/cat07/1209130947_DA_AQPI_2010_MainBody_v1.pdf. Accessed September 2016.
[55] National Atmospheric Emissions Inventory, J MacCarthy, G Thistlethwaite, Y Pang, E Salisbury and T Misselbrook (2012), Air Quality Pollutant Inventories for England, Scotland, Wales and Northern Ireland: 1990-2010; [online] available at: http://ukair.defra.gov.uk/reports/cat07/1209130947_DA_AQPI_2010_MainBody_v1.pdf. Accessed September 2016
[56] [online] available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050. Accessed September 2016
[57] [online] available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:023:0003:0016:EN:PDF. Accessed September 2016

Annex D). These include AQMAs in Saffron Walden, Luton, Hitchen, Sawbridgeworth, Gerrard's Cross and the northwest of London.

Noise maps produced by Defra show that generally, the ambient noise level is highest around motorways and main roads; for instance noise around the M25 can exceed 70 decibels. In contrast, the surrounding areas generally have a lower ambient noise level of below 54.9 decibels.[58]

Southeast region

There are two AQMAs within the region, both are located in Dover. The area around the A20 has been designated as an AQMA, as well as the junction of High Street and Ladywell Road (see **Annex D**).

There is no noise data available from Defra for the Southeast region. The noisiest places are likely to be within the urban areas (along the main roads and railway networks) and the ports of Folkestone and Dover.

East region

There are no designated AQMAs within the East region, and no noise data is available from Defra. The noisiest places again are likely to be within the urban area (along the main roads and railway networks).

Future environment without the rdWRMP2019

Any new development is likely to result in increased traffic flows during construction periods. This is likely to lead to increased emissions and worsening air quality on a temporary basis. This might in part be mitigated by actions set out in AQMAs and through the introduction of new technology e.g. electric cars and more fuel efficient engines. Noise levels are likely to increase, driven by increases in traffic.

Key comments from previous consultations responses

Natural England commented on the Environmental Report that *"Air quality and noise impacts have been scoped out of the SEA as Affinity Water does not consider them to be relevant at the plan level. Natural England disagrees, and advises that the SEA should highlight the potential for noise, dust and air pollution to affect local communities".*
AECOM propose to retain air quality and noise in the scope of this SEA.

Key issues

- Air quality in Central region is poor in some urban areas as highlighted by the number of AQMAs in place (Dover, Saffron Walden, Luton, Hitchen, Sawbridegworth, Gerrard's Cross and the northwest of London); and
- Increased development is likely to see increased emissions, particularly in urban areas.

Proposed SEA scope

The construction of new development, particularly major infrastructure projects (e.g. new reservoirs) can lead to long-term temporary impacts relating to construction activities (e.g. HGV traffic, dust, noise and vibration and potential contamination through storage of chemicals on site). Given the sensitivity of the areas, it is proposed that for this SEA, the effects on air quality and noise should be assessed.

Table 6.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

Table 6.2. SEA Framework of objectives and assessment questions:

[58] Defra interactive noise maps [online] available at: http://services.defra.gov.uk/wps/portal/noise/maps Accessed September 2016

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Minimise the effects of the option / rdWRMP2019 on air quality and noise?	Impact an AQMA?	Air quality in Central region is poor in some urban areas as highlighted by the number of AQMAs in place, In particular, these are; Dover, Saffron Walden, Luton, Hitchen, Sawbridgeworth, Gerrard's Cross and the northwest of London.

Climate

A complex relationship exists between climate change and others topic, in particular, human health, biodiversity, and water. This chapter covers factors pertaining to both climate change mitigation and climate change adaptation.

Policy context

This section sets out some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 7.1. Key messages from the review of the policies, plans, and programmes

Document title	Key message
Kyoto Protocol on Climate Change	The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The Protocol commits parties to reducing greenhouse gas (GHG) emissions by setting internationally binding emission reduction targets. There are currently 192 parties to the Protocol, and the first commitment period ran between 2008 and 2012. The second commitment period began on 1 January 2013 and will end in 2020.
The Paris Agreement	In 2015, 195 countries adopted the Paris Agreement. This an agreement within the United Nations Framework Convention on Climate Change dealing with GHG emissions mitigation, adaptation, and finance starting in the year 2020. Under the Paris Agreement, governments must prepare, communicate and maintain Nationally Determined Contributions, essentially national climate action plans including targets and measures to reduce emissions. Ahead of the Paris Agreement, governments were invited to submit Intended Nationally Determined Contributions setting out anticipated climate actions post-2020. While evidence suggests that, fully implemented, the INDCs will be insufficient to keep warming below 2°C, actions will be reviewed every five years with a view to restricting temperature rise to well below 2°C and, ideally, limiting it to 1.5°C.
The UK Climate Change Programme	The United Kingdom's Climate Change Programme was launched in November 2000 by the British government in response to its commitment agreed at the 1992 United Nations Conference on Environment and Development (UNCED). The 2000 programme was updated in March 2006. The stated strategies of the 2000 programme were to: • Improve business' use of energy, stimulate investment and cut costs; • Stimulate new, more efficient sources of power generation; • Cut emissions from the transport sector; • Promote better energy efficiency in the domestic sector, saving householders money; • Improve the energy efficiency requirements of the building regulations; • Continue cutting emissions from agriculture; • Ensure the public sector took a leading role.
The Climate Change Act 2008	The Climate Change Act was passed in 2008 and established a framework to develop an economically credible emissions reduction path. The act included a number of measures to achieve this. These are as follows: • The Committee on Climate Change was set up to advise the Government on emissions targets, and report to Parliament on progress made in reducing GHG emissions. • 2050 Target: The act commits the UK to reducing emissions by at least 80% in 2050 from 1990 levels. This target was based on advice from the Committee on Climate Change. The 80% target includes emissions from the devolved administrations. • Carbon Budgets: The Act requires the Government to set legally binding 'carbon budgets'. A carbon budget is a cap on the amount of greenhouse gases (GHG) emitted in the UK over a five-year period. The Committee provides advice on the appropriate level of each carbon budget which is designed to reflect cost-effective path to achieving the long terms objectives. The first four carbon budgets have been put into legislation and run up to 2027. • A National Adaptation Plan requires the Government to assess the UK's risks from climate change, prepare a strategy to address them and encourage critical organisations to do the same.
The National Planning	Key messages from NPPF include that the Plan should:

Document title	Key message
Policy Framework (NPPF)	• Support the transition to a low carbon future in a changing climate as a 'core planning principle'; • Plan for new development in locations and ways which reduce GHG emissions; • Actively supporting energy efficiency improvements to existing buildings; • Positively promoting renewable energy technologies; • • Direct development away from areas highest at risk of flooding, with development *"…not to be allocated if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding."* Where development is necessary, it should be made safe without increasing levels of flood risk elsewhere; • Take account of the effects of climate change in the long-term, taking into account a range of factors including flooding; and • Adopt proactive strategies to adaptation and manage risks through adaptation measures including well planned green infrastructure.

Source: Annex A

Baseline review

Data on the potential effects of climate change is not available at the level of the Study Area although research on the probable effects of climate change in the UK at a regional level has been undertaken.

ClimateUK produced a summary of the climate change risks for the South East of England. This summary states that:

> *"The South East's high population and levels of economic activity put considerable pressure on housing, recreation, and natural resources, and the South East has the greatest ecological footprint of all the UK regions. It also features particular vulnerability to climate change. With 1250 kilometres of coastline featuring dense population, important infrastructure, and important habitats and species, the South East is especially susceptible to sea level rise and flooding, while recent summers have demonstrated the vulnerability of people, buildings, and infrastructure to drought and overheating. The latest climate projections suggest that these impacts are likely to intensify in coming decades."*[59]

Regarding the future implications of climate change, research was released in 2009 by the UK Climate Projections (UKCP09) team[60]. UKCP09 provides climate information for the UK up to the end of this century. Projections of future changes to the climate are simulated from climate models. Projections are broken down to a regional level across the UK and are shown in probabilistic form, which illustrates the potential range of changes and the level of confidence in each prediction. This information is currently being updated and UKCP18 will deliver more up to date predictions in the near future.

As highlighted by the research, the effects of climate change for the South East of England by 2080 for a medium emissions scenario[61] are likely to be as follows:

- the central estimate of change in winter mean temperature is + 3ºC and summer mean temperature of + 3.9ºC; and
- the central estimate of change in winter mean precipitation is + 22% and summer mean precipitation is –23%.

[59] ClimateUK (2012) A Summary of Climate Change Risks for South East England [online] @ http://climateuk.net/sites/default/files/SouthEast-NewText-1-A4.pdf. Accessed September 2016
[60] The data was released on 18th June 2009: See: http://ukclimateprojections.defra.gov.uk/ Accessed September 2016
[61] UK Climate Projections (2009) South East 2050s Medium Emissions Scenario [online] available at: http://ukclimateprojections.metoffice.gov.uk/23907?emission=medium Accessed September 2016

The recently published UK Climate Change Risk Assessment 2017[62]set out a series of challenges for the water industry. Specifically, it states that:

> *"Climate change is projected to reduce the amount of water in the environment that can be sustainably withdrawn whilst increasing the demand for irrigation during the driest months. At the same time the growing population will create additional demands on already stretched resources in some parts of the country."*

Note that the whole of the Operating Area is under water stress and that the South East, including Kent, is among the driest parts of England.

Central region

Jacobs reported that "*116,300 tonnes of carbon dioxide equivalent were reported to Ofwat for Central region in 2011. This included 1,900 tonnes from company vehicles and transportation. This is part of the commitment to record and reduce emissions that contribute to climate change."*[63]

Southeast region

Jacobs stated that "*Affinity Water reported 6,100 tonnes of carbon dioxide equivalent to Ofwat for Southeast region in 2011. This includes 280 tonnes from company vehicles and transportation."* [64]

Future environment without the rdWRMP2019

As highlighted by the UK Climate Projections (UKCP09) team[65], the effects of climate change for the South East by 2050 for a medium emissions scenario are likely to be as follows:

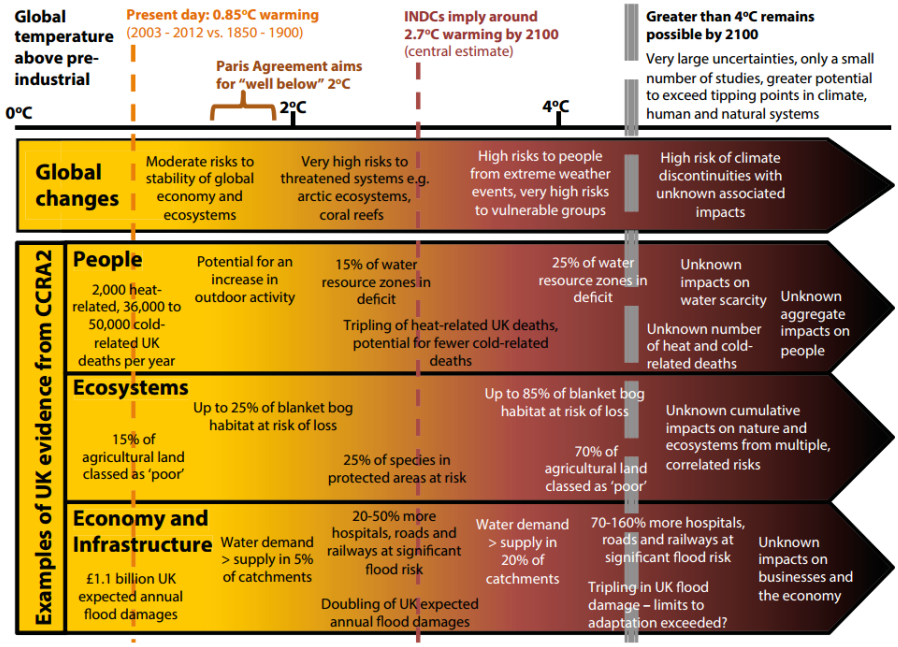
- The central estimate of change in winter mean temperature is + 2.2ºC and summer mean temperature of + 2.8ºC; and
- The central estimate of change in winter mean precipitation is + 16% and summer mean precipitation is –19%.

This is likely to increase the risks to water resources, including from flooding and drought. As a result, water supply infrastructure will need to be planned to be resilient and adaptive to the effects of climate change.

Figure 7.1 sets out the magnitude of UK climate change impacts for various degrees of global warming. Note that the water supply deficit increases as the global temperature also rises. **Figure 7.2** sets out the climate change risks and opportunities.

[62] Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017[online] @ https://documents.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf. Accessed September 2016
[63] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report.
[64] Ibid
[65] The data was released on 18th June 2009: See: http://ukclimateprojections.defra.gov.uk/ Accessed September 2016

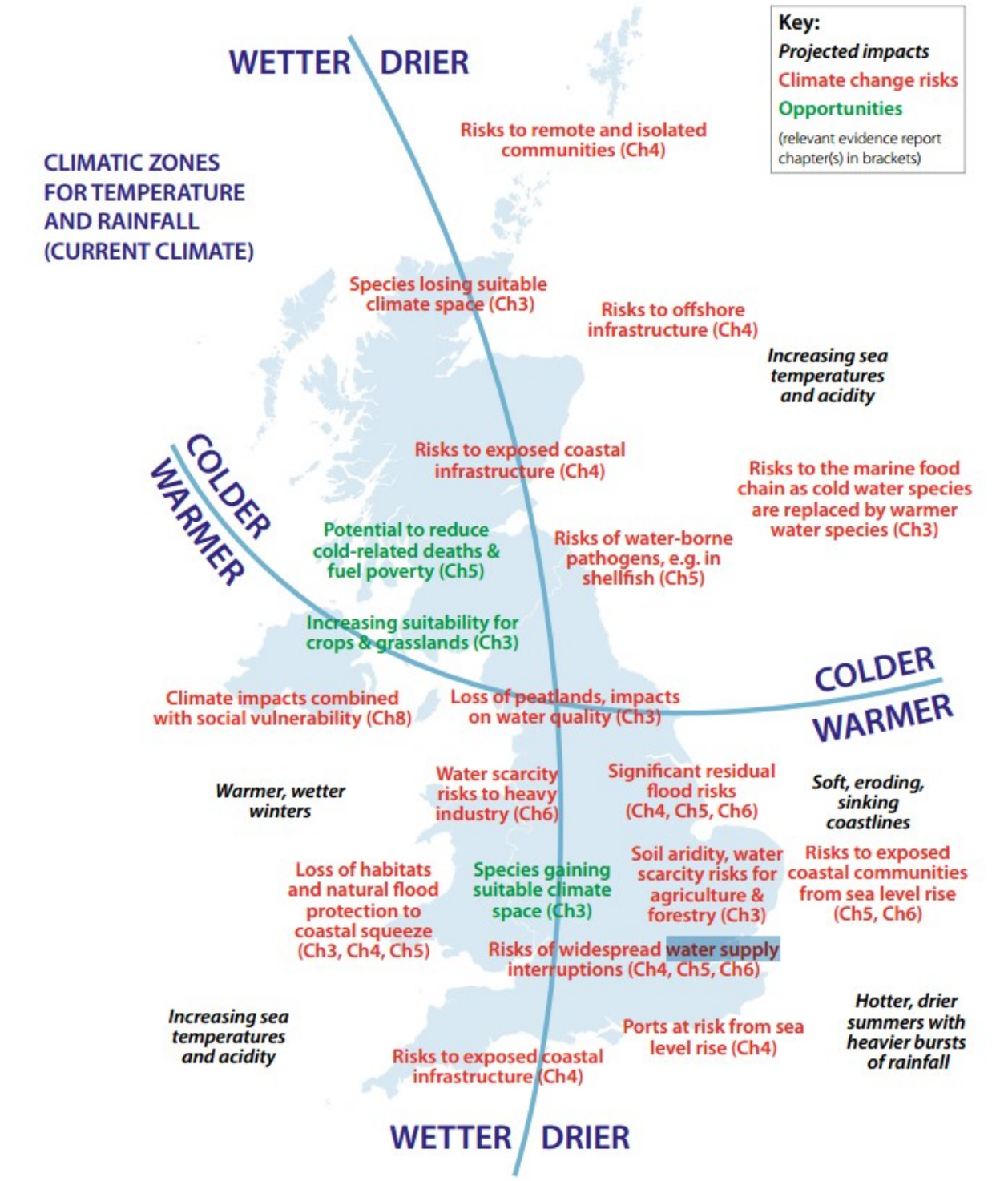
Figure 7.1. Magnitude of UK climate change impacts for various degrees of global warming[66]



Source: Warren et al. (2016) for the ASC.
Notes: This chart shows a selection of impacts drawn from the CCRA2 chapters for different degrees of global temperature increase above a pre-industrial baseline. The methodology, references and precise temperature estimates for each of the impacts shown can be found in Warren et al. (2016) for the ASC, including for a wider range of impacts than shown above. Colours in bars denote changes in global temperature only, and do not indicate the magnitude or severity of the impacts shown (and therefore this should not be compared to the 'burning embers' diagram in IPCC (2014, Assessment Box SPM.1, Figure 1)). The temperature scale refers to the possible changes in global temperature by the end of the century but not the rate of change. Many impacts will be sensitive to the speed, as well as the magnitude, of global temperature change.
Water resource zones (WRZs) are those used for the public water supply.
Intended Nationally Determined Contributions (INDCs) towards reducing global greenhouse gas emissions are as proposed by countries in advance of the Paris Conference of the Parties (Gütschow et al., 2015).

[66] Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017[online] @ https://documents.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf. Accessed September 2016

Figure 7.2. Spatial distribution of climate change risks and opportunities for the United Kingdom[67]



Source: ASC synthesis of the Evidence Report chapters.

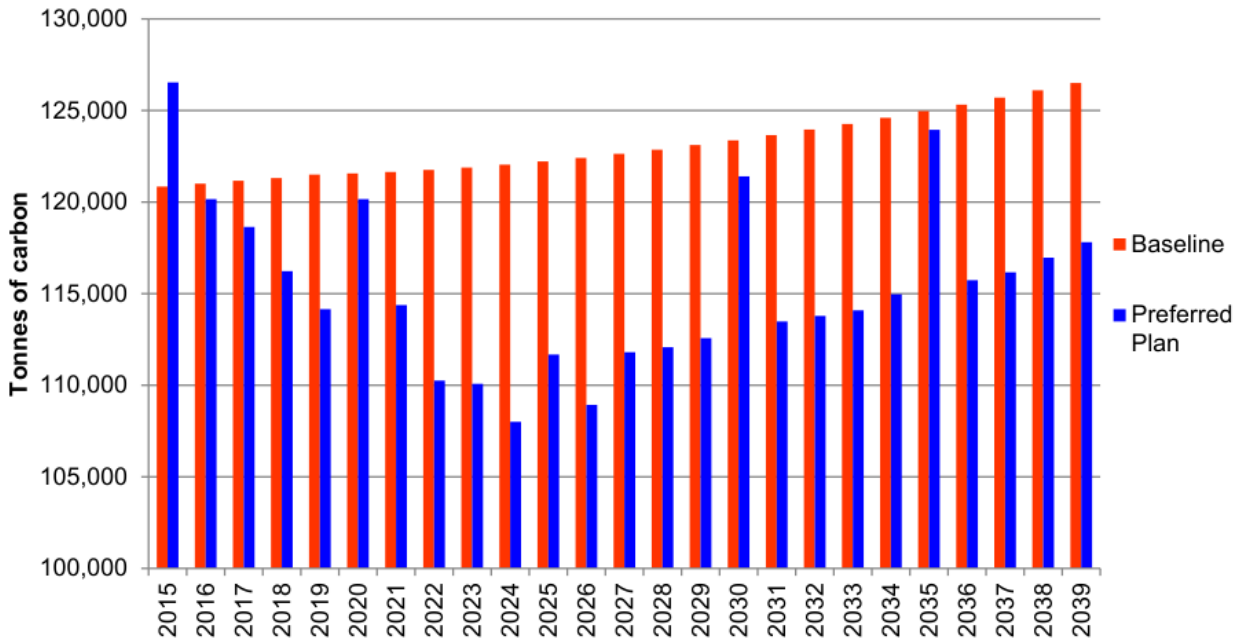
Notes: The risks presented are not exhaustive and will not be confined to the area(s) shown. The climate zones indicated are based on the current climate (see: http://www.metoffice.gov.uk/public/weather/climate/). Whilst all parts of the UK are expected to warm, and to become wetter (at least in winter), heat-related impacts are expected to be more pronounced in southern UK areas, and water scarcity and aridity stronger in the east.

[67] Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017[online] @ https://documents.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf. Accessed September 2016

In terms of climate change mitigation, per capita emissions are likely to continue to decrease as energy efficiency measures, renewable energy production and new technologies become more widely adopted. In 2008 the water industry contributed 0.8 % of annual UK GHG emissions. [68] This is a modest proportion but there is potential for the rdWRMP2019 to reduce emissions through energy efficiency and low carbon measures.

The implementation of WRMP2014 itself is, according to Affinity Water's projected carbon footprint for WRMP2014, likely to result in a reduction in the company's carbon footprint to 2039. However, the trend in carbon emissions is still likely to be on the increase (see **Figure 7.3**).

Figure 7.3. Preferred WRMP carbon footprint, NYAA. [69]



Key issues

- The Study Area is one of the driest parts of the UK and also one of the most populated;
- Summers in the South East are predicted to become hotter and drier, while winters become warmer and wetter. This has implications for summer supply shortages and winter flooding;
- The water industry contributes to 0.8 % of annual UK GHG emissions. The rdWRMP2019 has the potential to play its part in reducing this contribution; and
- Affinity Water is predicted to reduce its carbon footprint over the WRMP2014 life time; however, the rate of reduction is likely to decrease towards the later end of the plan period.

Proposed SEA scope

Climate change is likely to have significant impacts on water resources through decreases in mean summer precipitation and increases in temperature. It is recognised that this presents a risk to water supply. There is potential for the rdWRMP2019 to reduce climate change emissions and to adapt to potential climate change impacts. Given the risk to water supply and potential contribution to greenhouse gas emissions, it is proposed that for this SEA, the effects on climate change should be assessed.

[68] Environment Agency (2008) Greenhouse gas emissions of water supply and demand management options [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291728/scho0708bofv-e-e.pdf Accessed September 2016

[69] Affinity Water (2014) Final Water Resources Management Plan, 2015-2020.

Table 7.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

Table 7.2. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Minimise the carbon footprint of the Company?	Reduce / increase predicted carbon footprint?	Affinity Water is predicted to reduce its carbon footprint but it is likely to increase at the later end of the plan period.
	Maximise the company's resilience to a changing climate?	Summers in the South East are predicted to become hotter and drier, while winters become warmer and wetter. This has implications for summer supply shortages and winter flooding.
Adapt to climate change?	Affect the resilience of the local environment and Affinity Water assets to climate change?	The Study Area is one of the driest parts of the UK and also one of the most populated.

Water

Water management (e.g. improving water quality, enhancing drought resilience and effectively managing flood risk) has significant inter-relationships with other topics. In particular, biodiversity and nature conservation, human health, soil management and climate change adaptation are affected by water management.

Water management and the purification and detoxification of water are 'regulating' ecosystem services delivering benefits in terms of pollution control. There is a further link between land-use and hydrology – better soil management has the potential to improve water retention in soils, slowing run-off for example. This has a bearing on water resources and flood alleviation.

Policy context

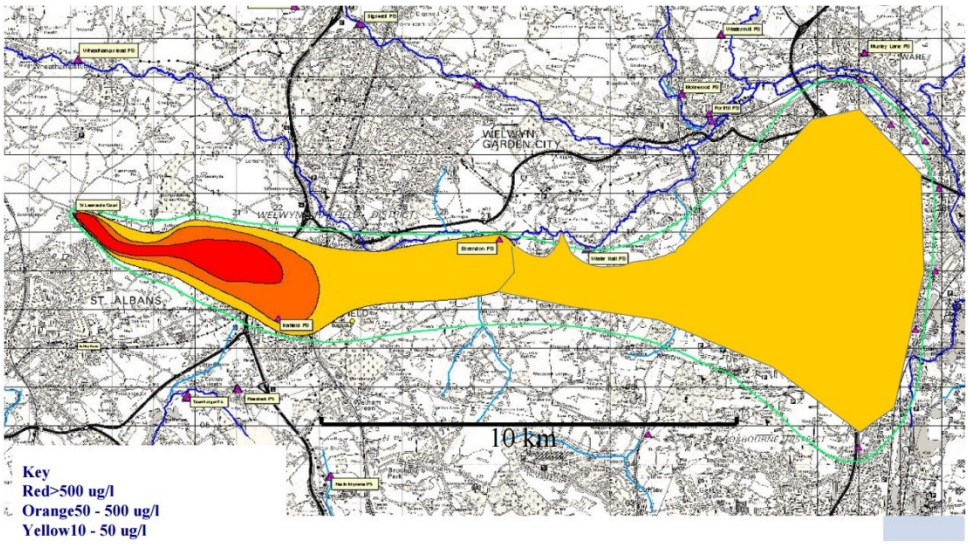
This section sets out some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 8.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
Water Framework Directive	The Water Framework Directive (WFD) was adopted and came into force in December 2000. The purpose of the WFD is to establish a framework for the protection of surface waters, transitional waters (estuaries), coastal waters and groundwater. The WFD requires Member States to establish river basin districts and for each of these a river basin management plan which are used to manage the water quality. WFD objectives include: For surface waters: • prevent deterioration; • aim to achieve good ecological status (or for Artificial or Heavily Modified Water Bodies, good ecological potential); • aim to achieve good chemical status; • aim to reduce/cease emissions, discharges & losses from priority substances and priority hazardous substances and; • meet protected area objectives where relevant. For groundwaters: • prevent deterioration of status; • aim to achieve good quantitative[70] status; • aim to achieve good chemical status; • prevent or limit the input of pollutants; • reverse significant upward trends in the concentration of pollutants; and • meet protected area objectives where relevant. The WFD envisages a cyclical process where river basin management plans are prepared, implemented and reviewed every six years. The first set of River Basin Management Plans (RBMPs) that covered the period 2009-2015 have been replaced by new RBMPs which cover the period to 2021. These updated plans set out how a minimum of 680 (14%) of waters will improve.
Defra (2018) Draft National Policy Statement for Water Resources Infrastructure	The Draft NPS for Water Resources Infrastructure sets out the need and government's policies for the development of nationally significant infrastructure projects relevant to water resources in England. It will help to ensure that where nationally significant water resources infrastructure is needed, it can be delivered in a timely manner to a high standard.
Urban Waste Water Treatment Directive	The Urban Waste Water Treatment Directive is one of a number of European Union (EU) Directives that have the objective of protecting the water environment for the animals and plants that live in and around water, for recreation, and its use as a resource for drinking water, sanitation, industry and commerce. The Directive was adopted on 21 May 1991.

[70] Groundwater status consists of both quantitative (the amount of groundwater) and chemical (the quality of groundwater) components. To achieve good groundwater quantitative status, the available groundwater resource (i.e. the long-term average rate of overall groundwater recharge to the body) should not be exceeded by the long-term annual average rate of abstraction.

	This Directive deals with urban waste water collection, waste water treatment and its discharge, as well as the treatment and discharge of waste water from certain industrial sectors It mandates waste water collection and treatment in urban agglomerations with a population equivalent of over 2,000, and more advanced treatment in places with a population equivalent above 10,000 in sensitive areas.
Drinking Water Directive	The Drinking Water Directive addresses the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption. It was implemented in relation to public water supplies by the Water Supply (Water Quality) Regulations 2000, as amended. The Regulations require that water companies apply a risk-based approach to ensure the directive objectives are met. It is recommended this is carried out using the World Health Organisation (WHO) 2004 Guidelines for Drinking Water Quality – Water Safety Plans (WSPs) methodology.
Nitrates Directive	The Nitrates Directive aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The Nitrates Directive forms an integral part of the WFD and is one of the key instruments in the protection of waters against agricultural pressures.
Water Industry Act 1991 duties- Code of Practice on Conservation, Access and conservation of natural beauty	The relevant bodies/water undertakers should avoid damage arising from any works and land use changes which could have an adverse effect on the character of the landscape. Projects should be designed to: • conserve and enhance the landscape character of an area; • use local materials and building styles wherever possible; and • if possible plant native species which are appropriate to the site and of local provenance and which contribute to the achievement of national or local biodiversity targets.
Thames River Basin Management Plan	The Thames River Basin District (RBD) extends from the source of the River Thames in Gloucestershire through London to the North Sea. A large proportion of the RBD is within Greater London and as such this area of the RBD is very urbanised. In this context, population densities and transport networks put pressure on the water environment, which include: • Discharges from sewage works; • Physical modification of rivers and estuaries to facilitate development, flood risk management or navigation. These can have significant impacts on the natural functioning of aquatic and wetland ecosystems; • Water demand in the Thames RBD is extremely high which has implications for maintaining future water supply in a manner which does not negatively affect the natural environment; and • Climate change induced sea level rise may have significant effects into the future, in terms of effects to people and properties as well as affecting ground and surface water bodies. These challenges relate to a range of specific pressures which include: • Abstraction; • Diffuse pollution from agriculture such as a pesticides; • Bromate and bromide contamination of the Vale of St. Albans Safeguard Zone in the area of Hatfield, north London(see **Figure 8.1**); and • Physical modification such as flood defence structures. **Figure 8.1. Bromate contamination around Hatfield**



Achieving good ecological status or potential by 2021 is the default objective for the RBMP. Where certain conditions apply, alternative objectives have been set. These include:

- 58% of surface water bodies maintaining or aiming to achieve good ecological status between 2015 and 2027;
- 5.8% of surface water bodies have been set an objective of reaching moderate ecological status by 2027;
- 66% of groundwater bodies have an objective of maintaining or aiming to achieve good quantitative status between 2015 and 2027; and
- 95% of groundwater bodies have an objective of maintaining or aiming to achieve good chemical status between 2015 and 2027.

Anglian Water River Basin Management Plan	The Anglian River Basin District covers 27,900km^2 and extends from Lincolnshire to Essex north to south and from Northamptonshire to East Anglia east to west. There are over 7.1 million residents within the district which includes the urban centres of Lincoln, Northampton, Milton Keynes and Chelmsford. Significant water management issues include: • Physical modifications - affecting 51% of water bodies in this RBD; • Pollution from waste water – affecting 50% of water bodies in this RBD; • Pollution from towns, cities and transport - affecting 10% of water bodies in this RBD; • Changes to the natural flow and level of water - affecting 10% of water bodies in this RBD; • Negative effects of invasive non-native species - affecting 6% of water bodies in this river RBD; and • Pollution from rural areas - affecting 47% of water bodies in this RBD. Aiming to achieve good status or potential by 2021 is the default objective for the RBMP. Where certain and specific conditions apply, alternative objectives (to good status by 2021) have been set. These either involve taking an extended time period to reach the planned status (for example, good by 2027) or aiming to achieve a lower status (for example, moderate by 2015).
South East River Basin Management Plan	There are more than 3.1 million residents within this RBD, and there are major urban centres at Southampton, Portsmouth and Ashford. The key challenges for this area include: • High population densities and transport networks; • Discharges from sewage works; • Physical modification of rivers and estuaries to facilitate development, flood risk management or navigation; • The RBD has some of the highest levels of personal water use in the country combined with high population densities resulting in very high water usage. This can have knock on negative effects for water supply to the surrounding environment; and • Climate change induced sea level rise may have significant effects into the future, in terms of effects to people and properties as well as affecting ground and surface water bodies. These challenges relate to a range of specific pressures that need to be dealt with in this RBD. Achieving good status or potential by 2021 is the default objective for the RBMP. Where certain conditions apply, alternative objectives have been set. These include: • 72% of groundwater bodies have an objective of maintaining or aiming to achieve good quantitative status between 2015 and 2027; and

	• 100% of groundwater bodies have an objective of maintaining or aiming to achieve good chemical status between 2015 and 2027.
Catchment Abstraction Management Strategies	The Environment Agency assesses the availability of water resources for abstraction through the Catchment Abstraction Management Strategy (CAMS) approach. This approach determines how much water is reliably available for abstraction on a catchment by catchment basis. By taking into account the amount of water already licensed for abstraction and how much water the environment needs, the Environment Agency can determine how much water is potentially available for further abstraction. CAMS are an integral part of the Water Framework Directive's River Basin Management Planning[71]. These strategies are reviewed and updated when required. The Study Area has ten CAMS in place, these are: • Stour CAMS; • Rother CAMS; • Colne CAMS; • Combined Essex CAMS; • Upper Lee CAMS; • Upper Ouse and Bedford Ouse CAMS; • Roding, Beam, Ingrebourne and Mardyke CAMS; • Wey CAMS; • London CAMS; and • Thames Corridor CAMS.

Source: Annex A

Baseline review

Affinity Water currently has 130 groundwater sources, four river intakes on the River Thames, one impounding reservoir and 12 bulk supply imports from neighbouring water companies. Approximately 65% of their water is from groundwater sources and the rest from surface water. Affinity Water also provides bulk supply exports to three water companies. [72]

Central region

With regards to the Study Area's location relative to RBD's, a significant proportion of the Central region lies within the Thames RBD, while a small area to the north, near Saffron Walden, is located within the Anglian RBD.

In this respect, the 2015 update to the Thames RBMP[73], and the 2015 update to the Anglian RBMP[74] highlight a number of significant water management issues for surface water and groundwater resources located within the Thames RBD and Anglian RBD.

Physical modifications: These affect 44% of water bodies in the Thames RBD, and 51% of water bodies in the Anglian RBD. The Thames RBD notes that:

> *"People have made many physical changes to rivers, lakes and estuaries, for example, flood defences and weirs, and changes to the size and shape of natural river channels for land drainage and navigation. These modifications alter natural flow levels, cause excessive buildup of sediment in surface water bodies and the loss of habitats and recreational uses. In many cases the uses and associated physical modifications need to be maintained. In these circumstances it may not be possible to achieve good ecological status."*

[71] The latest round of abstraction licensing strategy's which use the CAMS process were published in 2013 [online] available at: https://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process Accessed September 2016
[72] Affinity Water (2014) Final Water Resources Management Plan, 2015-2020.
[73] Environment Agency (2015) Thames River Basin District River Basin Management Plan [online] available at: https://www.gov.uk/government/collections/river-basin-management-plans-2015#thames-river-basin-district-rbmp-2015 Accessed September 2016
[74] Environment Agency (2015) Anglian River Basin District River Basin Management Plan [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/500463/Anglian_RBD_Part_1_river_basin_management_plan.pdf Accessed September 2016

Pollution from waste water: affecting 45% of water bodies in the Thames RBD and 50% in the Anglian RBD. The Thames RBD notes that:

> *"Waste water, or sewage, can contain large amounts of nutrients (such as phosphorus and nitrates), ammonia, bacteria, harmful chemicals and other damaging substances. It can enter water bodies where sewage treatment technology to remove enough of the phosphorus and harmful chemicals doesn't exist, from leakages from privately owned septic tanks and, in wet weather, storm overflows can discharge untreated sewage having a significant impact on bathing waters. Population growth and changes in rainfall patterns are increasing the pressure on the sewer network."*

Pollution from towns, cities and transport: affecting 17% of water bodies in the Thames RBD and 10% of those in the Anglian RBD. The Thames RBD notes that:

> *"Rainwater draining from roofs, roads and pavements carries pollutants, including grit, bacteria, oils, metals, vehicle emissions, detergent and road salt drains to surface water, including estuaries and coastal waters. Many homes and workplaces have 'misconnected' drains, meaning that dirty water often enters surface waters and groundwater rather than foul sewer drains."*

Changes to the natural flow and level of water: affecting 12% of water bodies in the Thames RBD, and 10% in the Anglian RBD. The Thames RBD notes that:

> *"Reduced flow and water levels in rivers and groundwater caused by human activity (such as abstraction) or less rainfall than usual that there is not enough water for people to use and wildlife might not be able to survive. Reduced flow affects the health of fish and exaggerates the impacts of barriers such as weirs. Climate change research shows that by 2050 England can expect significant seasonal variations, with higher winter and lower summer flows, and a reduction in flow overall. In the long term, there will be less water available to abstract for drinking, industry and irrigating crops."*

Negative effects of invasive non-native species: affecting 3% of water bodies in the Thames, and 6% in the Anglian RBD. The Thames RBD notes that:

> *"Invasive non-native species can have significant economic impacts. The cost of controlling invasive species to make sure that flood defences and the natural environment are not compromised is rising. American signal crayfish are becoming widespread and affect animals such as fish and invertebrates. Other species such as mitten crabs destroy habitats like reed beds and can cause banks to collapse by burrowing into them. Climate change is thought to drive certain species northwards, increasing their frequency and variety in the future and affecting the condition of water bodies."*

Pollution from rural areas: affecting 27% of water bodies in the Thames RBD and 47% of water bodes in the Anglian RBD. The Thames RBD notes that:

> *"Some approaches to land management have increased the amount of soils and sediment that are being washed off the land carrying phosphorus into waters which can cause excessive algae growth called 'eutrophication'. A changing climate means that more intense rainfall is likely to occur, increasing the risk of impacts further. Nitrate from fertilisers has built up in groundwater over decades and will take a long time to reduce. Sedimentation from erosion, forestry practices, saturated and compacted fields and livestock trampling on river banks has affected river ecology by smothering fish spawning grounds. Other impacts include bacteriological contaminations from animal faeces, and inappropriately stored and applied livestock slurry being washed off the land and pesticides from farming, forestry, golf courses and parks. These contaminants pose a particular threat to bathing waters, shellfish waters and drinking water."*

Surface water

40% of the water within the Central region is drawn from surface water sources including surface water sources and imports from neighbouring water companies: Thames Water, Anglian Water and Cambridge Water. Affinity Water also exports water to South East Water and Cambridge Water.[75]

There are a large number of water bodies within the Study Area (**see Annex D**). The main river catchments within the Central region include the River Thames, Colne and Lee.

Affinity Water extracts water from the principal aquifers in the Upper Ouse and Bedford Ouse. This results in low flows in the Upper Hiz and the River Oughton. Spring flows have been shown to be reduced in the Upper Hiz resulting in the drying out of the stream, particularly during periods of drought.[76]

- Regarding flood risk, there are three flood risk areas which are within or border the Central region (**see Annex D**). There are two primary flood risk areas within the Thames RBD and one which is only partly within the Thames RBD.[77]
- The London flood risk area falls completely within the Thames river basin district. It encompasses Greater London as well as a small part of Surrey and falls across several catchments.
- The Medway flood risk area falls completely within the Thames river basin district, and within the Medway catchment.
- The South Essex flood risk area is partly within the Thames river basin district, but falls mostly within the Anglian river basin district.

Groundwater

60% of the water supply in used in the Central region is abstracted from groundwater sources with boreholes abstracting from Chalk and gravel aquifers. [78] The main groundwater bodies within the region are:

- Upper Lee Chalk: Currently in poor quantitative status due to the impact on surface waters and resource balance, and poor chemical status. Water in the Upper Lee CAMS area is not available for licensing due to low flows;
- Mid Chilterns Chalk: Currently in poor quantitative status due to the impact on surface waters and resource balance, and poor chemical status;
- Essex Gravels: Currently in good quantitative status, but poor chemical status;
- Lower Thames Gravel: Currently in good quantitative status and chemical status; and
- Lower Greensand: Currently in poor quantitative status and chemical status.

The Central region covers an area which is partly or fully covered by eight CAMS. (**see Annex D**). These provide a water resource assessment of groundwater within the Central region.

- Colne CAMS[79]: The upper reaches of the Colne's main tributaries are dependent on the unconfined Chalk as a source of groundwater to maintain their flow. The Colne CAMS states that the groundwater unit balance across the entire CAMS area shows that more water has been abstracted based on recent amounts than the amount available.
- Combined Essex CAMS[80]: The Essex CAMS states that ecological features dependent on groundwater from the Chalk to the north of the confined Chalk aquifer have been identified as

[75] Affinity Water (2014) Final Water Resources Management Plan, 2015-2020.
[76] Environment Agency (2013) *The Upper Ouse and Bedford Ouse Abstraction Licensing strategy* [online] @ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289835/LIT7708_df73f8.pdf. Accessed September 2016.
[77] Environment Agency (2016) Thames River Basin District Flood Risk Management Plan 2015-2021: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507138/LIT_10229_THAMES_FRMP_PART_A.pdf Accessed September 2016
[78] Affinity Water (2014) Final Water Resources Management Plan, 2015-2020.
[79] Environment Agency (2013) [online] available at: https://www.gov.uk/government/publications/colne-catchment-abstraction-licensing-strategy Accessed September 2016
[80] Environment Agency (2013) [online] available at https://www.gov.uk/government/publications/cams-essex-abstraction-licensing-strategy Accessed September 2016

being at 'probable significant risk' from groundwater abstraction. Additionally, low levels of recharge to the main confined Chalk aquifer and unsustainable groundwater abstraction have been identified as issues.

- Upper Lee CAMS[81]: The River Lee and its tributaries are dependent on the underlying groundwater aquifer for much of their flow, with a smaller proportion coming from overland runoff. Because of this, many tributaries of the Lee are winterbourne (only flowing after prolonged precipitation) and suffer from low flows during periods of low rainfall. It concludes that these issues can be exacerbated by abstraction. Groundwater bodies in the CAMS area are failing the requirement to meet Good Ecological Status (as required by the WFD).
- Upper Ouse and Bedford Ouse CAMS[82]: The most heavily utilised groundwater sources in the Upper and Bedford Ouse are the Lower Greensand and Chalk aquifers to the south and west of the CAMS catchment. The CAMS shows that the majority of the CAMS area is comprised of unproductive strata. Although abstraction on the west side is assessed on a case by case basis, the groundwater unit balance for the area around Dunstable (which falls within the Affinity Water Operating Area) shows more water has been abstracted based on the amount available.
- Roding, Beam, Ingrebourne and Mardyke CAMS[83]: this CAMS noted that groundwater flow is generally in a southerly direction towards Dagenham. Hence most of the groundwater aquifer within the catchment is managed under the London CAMS (where chalk groundwater is confined below the London Clay).
- Wey CAMS[84]: There are two main aquifers in the Wey CAMS, the Lower Greensand and the Chalk. There are currently over 220 abstraction licences in the Wey Catchment licensed to abstract over 340 ML/day in total. Groundwater abstraction accounts for around two thirds of licensed water abstraction. The CAMS notes that the area around Guildford has local resource status of 'restricted water available for licensing'.
- London CAMS[85]: In the majority of the London CAMS area, groundwater bodies are below the indicative flow requirement to help support Good Ecological Status. Where the Chalk is confined, water availability underneath the London CAMS area is subject to the London licensing policy. This policy shows that there are significant portions in east and west London where the groundwater unit balance shows groundwater is available for licensing. However there are still areas to the north, centre, and south of London where the groundwater unit balance shows more water has been abstracted based on recent amounts than the amount available.
- Thames CAMS: The CAMS states that within the Affinity Water Operating Area of the Thames CAMS area, the groundwater unit balance shows more water has been abstracted based on recent amounts than the amount available.

Southeast region

Surface water

90% of water used in the Southeast region is abstracted from Chalk and Lower Greensand groundwater boreholes with a minor component from the Denge Gravels; small amounts of water are also imported from South East Water and Southern Water. [86]

There are two main river catchments within Southeast region; the Rother and the Dour.

[81] Environment Agency (2013) [online] available at https://www.gov.uk/government/publications/upper-lee-catchment-abstraction-licensing-strategy Accessed September 2016
[82] Environment Agency (2013) [online] available at https://www.gov.uk/government/publications/cams-upper-ouse-and-bedford-ouse-abstraction-licencing-strategy. Accessed September 2016
[83] Environment Agency (2013) [online] available at https://www.gov.uk/government/publications/roding-beam-ingrebourne-and-mardyke-catchment-abstraction-licensing-strategy Accessed September 2016
[84] Environment Agency (2013) [online] available at https://www.gov.uk/government/publications/roding-beam-ingrebourne-and-mardyke-catchment-abstraction-licensing-strategy Accessed September 2016
[85] Environment Agency (2013) [online] available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289888/LIT_2545_705985.pdf Accessed September 2016
[86] Affinity Water (2014) Final Water Resources Management Plan, 2015-2020.

The River Rother abstraction licensing strategy[87] notes that the main pressure from the public water supply network within the catchment is found in the east around Folkestone and Hythe; and that the largest concentration of non-public water supply abstraction pressure is seen in the Romney and Walland marshes for agricultural purposes.

The Stour Abstraction Licensing Strategy[88] notes that the River Dour is an important groundwater-fed Chalk stream, although it has only a small catchment of around 80km^2. It also states that the River Dour is particularly sensitive to low flows and has been the subject of a programme seeking to reduce the frequency, duration and intensity of future low flow events.

The Southeast region, falls within the South East RBD. As such, the flood risk management plan for this district holds information on the flood risk data. [89] There is one Flood Risk Area in the RBD (**see Annex D**). This was identified through the Preliminary Flood Risk Assessment process as an area of potentially significant local flood risk. However this Flood Risk Area is located within the Brighton and Hove City Council's unitary boundary, and as such is not part of the Affinity Water Southeast region.

Groundwater

All of the water resources within the Southeast region are abstracted from aquifers. The Chalk around Dover provides about 80% and the remaining 20% is abstracted from the shallow Denge Gravel aquifer and Lower Greensand around Dungeness.

The three main groundwater water bodies within the Southeast region include: The Kent Romney Marsh, the Kent Lower Greensand Eastern, and East Kent Chalk. The Southeast region covers an area which is partly or fully covered by two CAMS (**see Annex D**). These provide a water resource assessment of groundwater within the Southeast region.

- Stour CAMS: The Stour CAMS notes that Chalk dominates the geology of the catchment in terms of water bearing potential. However, the Lower Greensands in the Upper Great Stour and the East Kent Tertiaries in the Wingham catchment are also a significant source of base flow to the rivers. The estimates on availability of water for licensing from groundwater's here vary with models on different flow rates and the estimation is the same for both ground and surface waters. However, at medium to low flow rates, the groundwater unit balance shows more water has been abstracted based on recent amounts than the amount available for a large proportion of the area.
- Rother CAMS: the Rother CAMS area groundwater resource is made up of the Ashdown Sands aquifer which shows a theoretical surplus of water; and the Denge Gravels aquifer. The CAMS states that a balance between abstractions and recharge is particularly important for this aquifer, not only to safeguard stable groundwater levels, but also because changing groundwater level can influence saline intrusion into the aquifer. The estimates on availability of water for licensing from groundwater here vary with models on different flow rates, and the estimation is the same for both ground and surface waters. However, availability at mid to low flow rates, shows that generally the north east corner of the CAMS area is most resilient, while the remainder of the area can suffer from low flows which result in it failing the requirement to meet Good Ecological Status.

East region

The East region lies within the Anglian RBD, and the 2015 update to the Anglian RBMP[90] highlights a number of significant water management issues for surface water and groundwater resources located within.

[87] Environment Agency (2013) Rother Abstraction Licensing Strategy [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289886/LIT_2575_306e9b.pdf Accessed September 2016
[88] Environment Agency (2013) Stour Abstraction Licensing Strategy [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289867/LIT_2048_61c7f0.pdf. Accessed September 2016
[89] Environment Agency (2016) South East River Basin District Flood Risk Management Plan 2015 – 2021 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507135/LIT_10221_SOUTH_EAST_FRMP_PART_A.pdf Accessed September 2016
[90] Environment Agency (2015) Anglian River Basin District River Basin Management Plan [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/500463/Anglian_RBD_Part_1_river_basin_management_plan.pdf Accessed September 2016

Within the Anglian RBD:

- Physical modifications affect 51% of water bodies;
- Pollution from waste water affects 50% of water bodies;
- Pollution from towns, cities and transport affects 10% of the water bodies;
- Changes to the natural flow and level of water affects 10% of the water bodies;
- Negative effects of invasive non-native species affects 6% of the water bodies; and
- Pollution from rural areas affects 47% of the water bodies.

Surface water

None of the water supply within the East region is drawn from surface water sources within the area. The water bodies within the region are identified within **Annex D** and the main river catchments include the Stour, Colne Essex, Blackwater, Chelmer and Crouch and Roach.

Groundwater

The East region normally takes 100% of its water supply from groundwater sources. The water bodies within the region are identified within **Annex D**.

The Essex Abstraction Licensing Strategy[91] notes that a large proportion of the watercourses within the catchment have been classified under the Water Framework Directive as Heavily modified water bodies (HMWBs) due to the presence of flow control structures. Several of the rivers are designated as HMWBs due to the presence of river support schemes. The Rivers Stour and Blackwater are supported by the Ely Ouse to Essex transfer Scheme (EOETS). The Colne has the capability to be supported by groundwater although this is rarely done. The EOETS was developed to augment flows in Essex rivers for subsequent transfer into public water supply reservoirs. It comprises two main elements, a transfer of surface water to Essex and the provision of groundwater to supplement the transfers via the Great Ouse Groundwater Scheme (GOGS). GOGS was developed with the EOETS to pump water into the Little Ouse and Thet Rivers for transfer into the Cut Off Channel and subsequently into Essex. It was developed to provide water at times of low flow when there is insufficient water in the Ely Ouse to meet the demands of water users and the environment in Essex, particularly in drought years.

Future environment without the rdWRMP2019

Surface water

Surface water quality is likely to improve as a result of actions outlined within the RBMPs. Additionally, sustainability reductions and compliance with WFD will likely improve water quality over the life of the rdWRMP2019. In the Absence of the rdWRMP2019, There could be a risk that the objectives of the RBMP will not be achieved as actions to reduce demand and deliver abstraction reduction may not be carried out.

There will also be significant pressures placed on surface water resources in the future through climate change. This is likely to reduce mean summer precipitation and increase mean summer temperatures, and conversely increase precipitation during the winter. In turn this is likely to result in reductions to flow levels during the summer, which may lower river base levels. While in the winter it may result in more widespread and frequent flooding.

The population of the Operating Area is forecast to grow significantly in the future and this increase in population will also place additional supply side demand on water resources.

[91] Environment Agency (2017) Essex Abstraction Licensing Strategy [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/636594/ALS_2017_Essex.pdf Accessed January 2019.

In the absence of the rdWRMP2019, future surface water quality may be placed under a higher strain than would otherwise be the case. This is driven by a lower level of preparation for adaptation to climate change induced water scarcity combined with increasing population numbers.

Groundwater

A review of relevant CAMS documents has revealed that a high proportion of aquifers within the Operating Area are classed as over-abstracted. Although the Environment Agency have reduced abstraction licences in these areas, it is likely that groundwater will continue to experience many of the same pressures as those experienced by surface water bodies e.g. through an increasing population.

Key comments from previous consultations responses

Surface water

The Environment Agency requested that information on the updated CAMS was included and Natural England proposed that the objective for surface water was altered to better reflect the mechanisms for achieving environmental objectives. These comments have been addressed in this report.

Groundwater

Comments received from Natural England requested that the SEA should consider whether the hydrological influence of any option stretches beyond the buffer zone, including influence on groundwater levels and flows which may support groundwater-fed habitats, as well as down-stream influences of rivers. Additional comments received from Natural England requested that if any options would be delivered outside of the supply zone (including resource developments or pipelines), then these sites and their area of hydrological influence should also be included in the SEA Study Area. The SEA will assess the implications of water transfers from outside the supply area using the available information. The sourcing of options for transfers and new pipelines outside of the rdWRMP2019 area are not addressed within the WRMP as this would be considered through the neighbouring WRMP (to avoid double counting of impacts). The cumulative effects of south east wide options being considered through the Water Resources in the South East Group (WRSE) will be the subject of another assessment, which will subsequently be integrated within the Environmental Report for the dWRMP2019.

Key issues

For surface water:

- 40% of the water used within Central region comes from surface water;
- There is a requirement to ensure there is no further deterioration in the quality of surface waters;
- There are no major rivers or surface water storage areas in the Southeast region, and therefore no possibility of surface water abstractions;
- No surface water is abstracted in the East region; and
- There are three Flood Risk Areas completely or partly located within the Central region.

For groundwater:

- A large proportion of groundwater supplies within the Affinity Water Operating Area are under severe stress;
- There is a requirement to ensure there is no further deterioration in the quality of ground waters; and
- There is a high level of reliance on groundwater supplies (60% of the water used within Central region comes from groundwater while 90% of water in the Southeast region is abstracted from groundwater Chalk aquifers and normally 100% of water used in the East region is abstracted from groundwater sources).

Proposed SEA scope

Surface water

The rdWRMP2019 will have a direct influence on the level of abstraction from surface water resources. This influence is currently limited to the Central region as there are no major surface water storage areas currently present in the Southeast region. Through the influence on abstraction rates, the rdWRMP2019 will have an indirect impact on the quantity and quality of water present within surface water bodies.

Groundwater abstractions within the Southeast region may also have indirect impact on flow rates in smaller surface water bodies present such as rivers, and in particular Chalk streams where there are unconfined groundwater aquifers present.

The rdWRMP2019 may also have additional impacts on the hydro-geomorphology of water bodies through alterations to water courses such as through the use of weir's or reservoir dams.

Surface water and ground water are therefore scoped into the assessment. The assessment will focus on aspects relating to water quality, water quantity and hydro-geomorphology.

Groundwater

The rdWRMP2019 will have a direct influence on the level of abstraction from groundwater resources. This in turn will impact on the quantity of water within an aquifer. It may also have wider implications in terms of the water table level. Unconfined aquifers which are over abstracted may also have additional impacts on surface water bodies such as low flow rates. The rdWRMP2019 may also have impacts in terms of groundwater quality. For instance, aquifers which are located in coastal areas may be at risk from saline water intrusion if over abstraction continues. Given this, it is proposed that for this SEA, the effects on groundwater should be assessed. The assessment will focus on impacts to water table levels, saline intrusion, and groundwater pollution.

Table 8.2 presents the SEA objective and appraisal questions that will be used for the assessment in this topic

Table 8.2. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Protect and improve surface and groundwater body status?	Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	A large proportion of groundwater supplies within the Affinity Water Operating Area are under severe stress.
	Improve water treatment and water quality before it returns to surface water bodies?	A large proportion of groundwater supplies within the Affinity Water Operating Area are under severe stress.
	Alter water table levels and amount of water within aquifers?	60% of the water used within Central region comes from groundwater while 90% of water in the Southeast region is abstracted from groundwater Chalk aquifers and 100% of water in the East region is normally abstracted from groundwater sources.
	Increase the risk of saline intrusion or other pollution risks to the aquifers?	A large proportion of groundwater supplies within the Affinity Water Operating Area are under severe stress.
Avoid adverse impact on surface and groundwater levels and flows?	Protect or restore adequate levels of flow in rivers and streams?	40% of the water used within Central region comes from surface water.

Minimise the risk of flooding taking account of climate change?	Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	There are three Flood Risk Areas completely or partly located within the Central region.

Heritage assets and archaeology

This section sets out the policy context and the environmental baseline with respect to cultural heritage assets[92] and archaeology. It is important to note that heritage assets have significant inter-relationships with other topics, in particular human health, biodiversity, and tourism and recreation. It should also be noted that the rdWRMP2019 has the potential to affect both heritage assets and archaeology.

Policy context

The section below includes some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 9.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
Water Industry Act 1991 duties- Code of Practice on Conservation, Access and Recreation	• Archaeological remains and historic buildings, and the historic environment more generally, may be subject to differing pressures. Where proposed works would result in lower water levels, there may be a threat of drying out and decay of water logged materials such as timber. Buildings, monuments and other historic features are also vulnerable to damage caused by misuse or neglect. • The relevant bodies should: • carry out surveys of archaeological, historical and architectural features; • avoid disturbance of archaeological or historic features, and works damaging to the historic environment generally, and where disturbance is unavoidable, details of such features should be recorded; • protect buildings, monuments and other historic features from damage caused by misuse or neglect • maintain features whether or not in current use; • conserve and/or record details of, for example, machinery, equipment, documents; • consult local authority archaeologists in England, or the relevant regional Archaeological Trust in Wales, and conservation officers where historic or archaeological features are affected; • circulate lists of surplus movable features to potential new keepers such as industrial archaeology or history societies, county archivists, civic trusts, and the English and Welsh Royal Commissioners on Ancient and Historical Monuments; and • in respect of plant or machinery, consult the Science Museum or the Council for British Archaeology.
National Planning Policy Framework (NPPF)	Key messages from the NPPF include that the Plan should: • Recognise heritage assets as an 'irreplaceable resource' that should be conserved in a 'manner appropriate to their significance', taking account of 'the wider social, cultural, economic and environmental benefits' of conservation, whilst also recognising the positive contribution new development can make to local character and distinctiveness. • Substantial harm to or loss of a grade II listed building, park or garden should be exceptional, and substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens and World Heritage Sites, should be wholly exceptional
Ancient Monuments and Archaeology Act	The Ancient Monuments and Archaeological Areas Act 1979 was passed to protect the archaeological heritage of Great Britain. Section 61(12) defines sites that warrant protection due to their being of national importance as 'ancient monuments'. These can be either Scheduled Ancient Monuments or *"any other monument which in the opinion of the Secretary of State is of public interest by reason of the historic, architectural, traditional, artistic or archaeological interest attaching to it".*
Statement on the Historic	The government's Statement on the Historic Environment England 2010 calls for those who have the power to shape the historic environment to recognise its value and to manage it in an

[92] "*A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing).*" Also included in the scope are Conservation Areas designated by Local Planning Authorities.

Environment for England	intelligent manner in light of the contribution that it can make to social, economic and cultural life. It outlines six strategic aims: • Strategic Leadership: Ensure that relevant policy, guidance, and standards across Government emphasise our responsibility to manage England's historic environment for present and future generations; • Protective Framework: Ensure that all heritage assets are afforded an appropriate and effective level of protection, while allowing, where appropriate, for well managed and intelligent change; • Local Capacity: Encourage structures, skills and systems at a local level which: promote early consideration of the historic environment; ensure that local decision makers have access to the expertise they need; and provide sufficiently skilled people to execute proposed changes to heritage assets sensitively and sympathetically; • Public Involvement: Promote opportunities to place people and communities at the centre of the designation and management of their local historic environment and to make use of heritage as a focus for learning and community identity at all levels; • Direct Ownership: Ensure all heritage assets in public ownership meet appropriate standards of care and use while allowing, where appropriate, for well managed and intelligent change; and • Sustainable Future: Seek to promote the role of the historic environment within the Government's response to climate change and as part of its sustainable development agenda.

Source: Annex A of this SEA Scoping Report

Baseline review

Central region

There are no World Heritage Sites (WHS) within Central region but there are numerous Listed Buildings, Scheduled Monuments, and wider Conservation Areas, along with Registered Parks and Gardens. In line with comments from Historic England (then known as English Heritage) on the SEA of the previous WRMP, AECOM have included a 500 m 'buffer' around scheduled monuments and Listed Buildings as an 'area of influence'. This will be used to determine which options may have the potential to affect these assets.

The assessment will focus on those heritage assets which have been defined as at risk by the Historic England Heritage at Risk Programme. In this regard, the Listed Buildings, Places of Worship, Scheduled Monuments, and Conservation Areas designated as being at risk are shown in **Annex D. Annex C** provides further detail on heritage assets in the Study Area which have been identified as being at risk.

Southeast region

There are no WHSs within the Southeast region but there are numerous Listed Buildings, Scheduled Monuments, wider conservation areas along with registered parks and gardens. Notable is the historic Port of Dover which includes a number of heritage assets at risk (e.g. the Western Heights Fortifications, Fort Burgoyne and the Western Heights Conservation Area. The Heritage Assets within the Southeast region which are considered at risk are set out in **Annexes C and D.**

East region

There are no WHSs within the East region but there are numerous Listed Buildings, as well as Scheduled Monuments, wider conservation areas and three registered parks and gardens. There are a number of heritage assets at risk, which are identified within **Annex C** and further visual detail is provided in **Annex D**. Of the note; Clacton Seafront Conservation Area is just one of five conservation areas within this region considered to be at risk.

Key comments from previous consultations responses

In line with comments received from Historic England (then known as English Heritage) a more detailed baseline review on the historic environment has been included (specifically mapping of heritage assets,

Key comments from previous consultations responses

consideration of a 500 m buffer and a focus on heritage at risk) and the objective for cultural heritage and archaeology has been updated in-line with Historic England Guidance.

Key issues

- There are no internationally designated sites (World Heritage Sites) within the Study Area;
- The Central region has a large quantity of heritage assets at risk dispersed over a large area; and
- The Southeast region has considerable volumes of military defence and maritime heritage assets focused around Dover and Folkestone.
- The East region has a number of heritage assets, including five conservation areas considered to be 'at risk'.

Proposed SEA scope

Heritage assets have been scoped into the SEA as the rdWRMP2019 may include options that have potential impacts on heritage assets or their setting. The rdWRMP2019 has the potential to affect heritage assets and archaeology through the construction of new supply options (and site facilities such as pumping stations) may create impact pathways to sensitive receptors (e.g. archaeological assets) as well as temporary impacts on heritage assets and their setting through visual intrusion. Additionally, if options have an effect on groundwater levels this could potentially impact on heritage assets located within the floodplain. Given the linkages highlighted, it is proposed that for this SEA, the effects on heritage assets and archaeology should be assessed. The assessment will focus on heritage assets 'at risk'.

Table 9.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

Table 9.2. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Conserve and enhance the historic environment, heritage assets and their settings?	Conserve and/or enhance heritage assets and the historic environment?	Large number of heritage assets 'at risk'
	Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	Large number of heritage assets 'at risk'

Geology and soils

This section sets out the policy context and the environmental baseline with respect to geology and soil management. It is important to note that soil management has significant interrelationships with other topics, in particular biodiversity and climate change adaptation.

Policy context

The section below includes some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 10.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
Defra (2009) Safeguarding our Soils – A Strategy for England	This strategy sets out policy on protecting soils for the long term and related core objectives for research. It sets out the practical steps that are needed to take to prevent further degradation of soils, enhance, restore and ensure their resilience, and improve understanding of the threats to soil and best practice in responding to them. • Revised Common Agricultural Policy cross-compliance Soil Protection Review;[93] • A review of the need for future options under Environmental Stewardship to improve soil protection; • A new goal to significantly reduce the rate of loss of stored soil carbon by 2020; • A commitment to developing a new framework for action for peat protection, including on horticultural peat use post 2010; • Reviewing thresholds for pollutants entering soil through recycling materials to land; • Publishing a new code of practice for soil use on construction sites and a new toolkit for planners in 2010 on how to take account of soil functions through the planning system; • Reviewing the effectiveness of the existing planning policy to protect important soils and whether there is a need to update it; and • Publishing new best practice guidance on decision making for contaminated land.
Defra (2011) The Natural Choice: Securing the value of nature, The Natural Environment White Paper	The Government's White Paper's set a 2030 target for all of England's soils to be sustainably managed through tackling threats to degradation. This was to be achieved, in part, by further research to explore linkages between soil degradation and the delivery of vital ecosystem services; including how to manage lowland peatlands in a way that supports efforts to tackle climate change.

Source: Annex A of this SEA Scoping Report

Baseline review

Central region

The Central Region has a diverse geology. The dominant classifications are described below and in **Annex D**.[94]

- **Deep sand to clay** – this is located to the south of the regions, around Woking, Staines on Thames and Esher.

[93] Cross compliance is a set of standard requirements of the Common Agricultural Policy (CAP) to protect soils and maintain a range of both habitat and landscape features for anyone claiming payments under the Single Payments Scheme. Environmental Stewardship is the main agri-environment scheme in England and provides funding to farmers and other land managers who deliver effective environmental management on their land. One of its five primary objectives is to help protect natural resources, including soil. The England Catchment Sensitive Farming Delivery Initiative (ECSFDI) aims to tackle diffuse water pollution from agriculture in order to meet the objectives of the Water Framework Directive.

[94] The Central region also includes reading beds, alluvial sands and gravels, and river terrace deposits.

- **London Clay**: a band of clay that extends from Harrow and Rickmansworth to Epping and Harlow to the east of the region
- **Chalk**: this extends over the majority of the north of the region and extends from Amersham in the west to Saffron Waldon and Great Dunmow in the east.

Annex D illustrates the distribution of agricultural land across the Central Region. It can be seen that the region has a high proportion of the best and most versatile land.[95] The highest quality (Grade 1) can be found to the north east of the region (to the east of Stevenage). Further south and west the land is predominately Grade 3. Good quality land is indicative of a high level of agricultural activity; which is water dependent.

The previous SEA Scoping Report identifies that there are:

> *"several authorised landfill sites within Central region including at Ware, Roydon, Tyttenhanger and Sundon. There is a cluster of authorised landfills close to the M4 / M25 corridor at Egham, Wraysbury, West Drayton and Colnbrook, making use of former gravel extraction works. There are many more historic landfill sites across the region. These can carry a higher risk to potential schemes as they may not be sealed to current standards and the records may not be as complete in terms of what contaminants may be present."*[96]

Southeast region

The Southeast region is slightly less diverse in geology that the Central Region (see **Annex D**).

In terms of the availability of the highest quality agricultural land, higher quality land (Grade 2) is located to the south near St. Mary's Bay and Dymchurch and lower quality (but still the best and most versatile) can be found to the north of the region – see **Annex D**.

The previous SEA Scoping Report identifies that there are authorised landfills at "*Sandling Sand pit near Folkestone and Austin's Lane in Dover".*

East region

The East region is dominated by three distinct types of deposit; London Clay of the Tertiary age, boulder clay, sands and gravels deposited during the Ica Age, and coastal muds and silts laid down over the past few thousand years (see **Annex D**).

In terms of the availability of the highest quality agricultural land, higher quality land (Grade 1) is located in the west of the region, predominantly in the land west of Lawford stretching south to Great Bromley. Grade 2 land is also dispersed throughout the region, with again a strong presence in the west. Lower grade agricultural land (Grade 3) dominates in the east of the region, however this could still potentially be best and most versatile agricultural land (Grade 3a). **Annex D** provides further detail.

Future environment without the rdWRMP2019

Sites designated for geodiversity (i.e. SSSIs) are unlikely to be affected by the options being proposed through the rdWMP2019.

> *The UK Climate Change Risk Assessment (CCRA) identified that "extreme weather events, such as very high or very low temperatures and changes in precipitation, are likely to become more frequent throughout this century. These changes pose a threat to future productivity and farming and forestry business incomes. In addition, the cumulative effects from soil erosion and disease may affect businesses over many years."*

[95] Best and most versatile agricultural land: Land in grades 1, 2 and 3a of the Agricultural Land Classification (ALC).
[96] Jacobs U.K. Limited (2014) Final Water Resources Management Plan: Strategic Environmental Assessment Environmental Report. Accessed September 2016.

Key comments from previous consultations responses

In line with comments received from the Environment Agency and Natural England, spatial information has been gathered to help analyse the effects of the dWRMP2019 on agriculture (through the identification of options that would result in the loss of high grade agricultural land.

Key issues

Soil and therefore agriculture is threatened by the effects of climate change though:

- erosion;
- new and emerging pests and diseases; and
- increases or decreases in local soil moisture content.

Proposed SEA scope

Geology has been scoped out of the SEA because it is not considered that any of the options or programmes would affect the geology of the Study Area significantly.

Soil is scoped into the assessment, as options brought forward through the rdWRMP2019 may have negative effects on soil through construction etc. and may also have an effect on water supply to the agricultural industry. Soil erosion is an issue to public water supply e.g. surface water intakes) as well as the surface water bodies in terms of WFD. This will be assessed through the identification of the grade of land that an option is proposed on, and the likely proportion of land that would be lost through implementation of the option / programme.

Table 10.2 presents the SEA objective and appraisal questions that will be used for the assessment in relation to this topic.

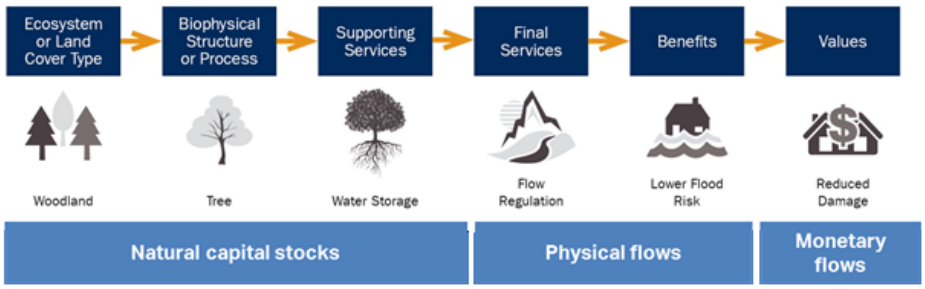
Table 10.2. SEA Framework of objectives and assessment questions:

SEA objective (will the rdWRMP2019…?)	Assessment questions (would the options / programme)	Link to key issue
Minimise loss of soil quality and sterilisation of mineral resources?	Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	Scarcity of high value agricultural land.

Ecosystem services and the WRMP

Natural capital is one of the five forms of capital upon which economic activity relies, alongside financial, manufactured, human and social capital. Natural capital (or natural capital assets) gives rise to a flow of ecosystem services, which were defined by the Millennium Ecosystem Assessment (2005) as "the benefits that people obtain from ecosystems" (see **Figure 11.1.**).[97]

Figure 11.1. Natural capital and ecosystem service flows



Ecosystem services include the provision of food, water, timber and fibre (provisioning services); the regulation of climate, water quality and flood risk (regulating services); opportunities for recreation, tourism and cultural development (cultural services); and underlying functions such as photosynthesis and pollination (supporting services).

A natural capital approach can take many forms, but is generally interpreted as any activity that seeks to include consideration of natural capital or ecosystem services within a decision-making process. The ways in which this can be achieved are numerous, but can include:

- Ecosystem services assessment (ESA): In which an activity's impacts and/or dependencies on ecosystem services are quantified. This could include, for example, the volume of water extracted or an area of habitat created through quarrying operations.
- Ecosystem services valuation (ESV): In which the monetary value associated with change in ecosystem service provision is estimated and reflected in decision-making, such as the value of pollination services generated through habitat creation. An ESA is a necessary preliminary step to undertaking an ESV.
- Natural capital audit (NCA): Which measure in physical terms the gains and losses (or stocks and flows) of natural capital and associated ecosystem services over a given period of time.

The following section provides an overview of the policy context underpinning the inclusion of ecosystem services within the rdWRMP2019. A high level baseline assessment of the ecosystem services provided by different habitats within the Affinity Water regions is also included.

Policy context

This section sets out some of the key messages from the context review, for a full list of documents reviewed please refer to **Annex A** 'Policy, plan and programme review'.

Table 11.1. Key messages from the review of the policies, plans and programmes

Document title	Key message
EU Biodiversity Strategy to 2020: Our life insurance,	This EU Strategy[98] sets out the steps to halt the loss of biodiversity and ecosystem services in the EU by 2020 and restore them as far as possible. The strategy outlines six main targets and 20 actions for implementation up to 2020. The six targets are: • Halt, and where possible reverse, the deterioration in the status of all species and habitats covered by EU nature legislation. The strategy aims to achieve twice as many habitat assessments and 50% more species assessments under the Habitats Directive showing an

[97] Adapted from Potschin, M.B. and Haines-Young, R.H. (2011). Ecosystem services: Exploring a geographical perspective. Progress in Physical Geography 2011 35: 575.
[98] European Parliament (2012) Our life insurance, our natural capital: an EU biodiversity strategy to 2020 [online] @ http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/EP_resolution_april2012.pdf. Accessed September 2016.

our natural capital (2011)	improved conservation status, and 50% more species assessments under the Birds Directive showing a secure or improved status. • Maintain and enhance the delivery of ecosystem services across the EU landscape by establishing green infrastructure and restoring 15% of degraded ecosystems. • Achieve a measurable improvement of the conservation status of species and habitats affected by agriculture through agri-environment schemes and complete forest management plans for all public forests. • Achieve healthy fish stocks. • Improved management, control and management of invasive species. • Increase the EU's contribution to averting global biodiversity loss. • The strategy is intended to support the EU's 2050 goals of protecting and valuing all natural capital in the EU and restoring lost natural capital where appropriate.
Defra's Biodiversity Offsetting Metric (2013)	The biodiversity offsetting metric is a tool providing for a range of conservation activities that are designed to give biodiversity benefits to compensate for losses – ensuring that when a development damages nature (and this damage cannot be avoided or mitigated) new nature sites will be created. Where appropriate, biodiversity offsetting is an option available to developers to fulfil their obligations under the planning system's mitigation hierarchy.
Defra (2011) The Natural Choice: securing the value of nature. The Natural Environment White Paper	This Defra paper[99] summarises the issues surrounding the systematic undervaluing of nature in decision-making, recognising that markets for many ecosystem services are absent, and that environmental externalities are thus routinely not included in decisions. The paper sets out the government's vision for securing an environmentally sustainable future through protecting and enhancing the natural environment, developing a green economy, reconnecting people with nature, showing international leadership and investing in adequate monitoring and reporting mechanisms. The ecosystem services-related policy ambitions outlined in the paper include: • Publishing a new biodiversity strategy for England to help move from net biodiversity loss to net gain; • Establishing Local Nature Partnerships to facilitate local environmental leadership and collaborate with Local Enterprise Partnerships to develop the green economy; • Creating new Nature Improvement Areas to enhance nature and ecosystem service delivery; • Developing a strategic approach to planning that incorporates green infrastructure and natural networks; and • Including natural capital within the UK Environmental Accounts and setting up the Natural Capital Committee
Defra (2010) Delivering a Healthy Natural Environment. Ecosystem Approach Action Plan (updated)	The Ecosystem Approach Action Plan (EAAP) identifies that taking a whole-ecosystem approach to environmental issues can help deliver more efficient and effective environmental outcomes and encourage better decision-making. The EAAP aims to ensure that the value of ecosystem services is fully reflected in decision-making, and that environmental limits are acknowledged in the context of development.
Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services	This strategy[100] aims "*to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.*" The strategy is aims to achieve four main outcomes: • Maintain and enhance biodiversity and develop resilient ecological networks on land; • Achieve the same outcomes in the marine environment; • Achieve an improvement in the status of UK wildlife and prevent further UK extinctions; • Engage more people in biodiversity issues; • The strategy contains the following priority actions directly affecting the water industry: • *"Align measures to protect the water environment with action for biodiversity, including through the river basin planning approach under the EU Water Framework Directive"* • *"Continue to promote approaches to flood and erosion management which conserve the natural environment and improve biodiversity"*

[99] Defra (2011) The Natural Choice: securing the value of nature [online] @ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228842/8082.pdf. Accessed September 2016.
[100] Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services [online] @ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf. Accessed September 2016.

	• *"Reform the water abstraction regime. The new regime will provide clearer signals to abstractors to make the necessary investments to meet water needs and protect ecosystem functioning. We will also take steps to tackle the legacy of unsustainable abstraction more efficiently"*
Ofwat (2015) From catchment to customer	Ofwat's report[101] on the benefits of upstream catchment management in the water industry indicates that it supports the development of payment for ecosystem services schemes if it enables water companies to meet legal water quality standards at a reduced cost. It also supports customers paying for some of the benefits that catchment management bestows upon them, as long as they are protected from bearing the costs of catchment management in the event that the catchment-level strategy fails.

Source: Annex A

Baseline review

A review of the baseline status of the ecosystem services provided by the Affinity Water regions is presented below. For each region, high-level descriptions of the different habitat types and their spatial distributions are provided, and this is followed by overall summary tables summarising the ecosystem services provided and as assessment of the status of these services, using data from the National Character Area profiles. [102]

Central Region

The Central region contains the following National Character Areas:

- The Chilterns (NCA 110);
- Thames Valley (NCA 115);
- Northern Thames Basin (NCA 111); and
- Thames Basin Heaths (NCA 129).

The Central region covers a large area surrounding London encompassing farmland, semi-urban and urban areas and woodland. Grassland and woodland habitats are irregularly dispersed across the entire area, with the predominant concentrations of woodland in the south of the region, concentrated around Windsor Great Park and Maidenhead.

Southeast Region

The Southeast region contains the following National Character Areas:

- Romney Marshes (NCA 123);
- Wealden Greensand (NCA 120); and
- North Downs (NCA 119).

The Southeast region contains mostly farmland, although it also contains coastal and woodland habitats. There is a substantial area of coastal margin habitat, most notably coastal vegetated shingle concentrated on the coast southeast of Lydd, and coastal sand dunes east of Lydd. The woodland in the region is concentrated in the northeast of the region to the northwest of Dover and around Hythe. This woodland is nearly all broadleaf, and it is interspersed with ancient woodlands.

East Region

The East region contains the following National Character Areas:

- Northern Thames Basin (NCA 111);

[101] Ofwat (2015) From catchment to customer [online] @ http://www.ofwat.gov.uk/wp-content/uploads/2015/11/prs_inf_catchment.pdf. Accessed September 2016.
[102] Available online at https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles#ncas-in-south-east-england-and-london

- Greater Thames Estuary (NCA 81); and
- Suffolk Coast and Heaths (NCA 82).

The East region forms a diverse landscape ranging from the wooded Hertfordshire plateaux and river valleys, to the open landscape and predominantly arable area of the Essex heathlands, with areas of urbanisation mixed in throughout. The south of the region lies on the North Sea coast and is one of the driest parts of the country. The distinctive landscape character is a product of its underlying geology, shaped by the effects of the sea and the interactions of people.

Statements of Environmental Opportunity (SEO) are identified for each NCA and these are presented in **Table 11.2** below. Natural England have linked these SEOs to the ecosystem services they provide and **Table 11.3** identifies these services, and provides an assessment of their status.

Table 11.2: National Character Area Statements of Environmental Opportunity

NCA	SEO Reference	SEO
The Chilterns	SEO 1	Manage the wooded landscape, the woodlands (including internationally important Chilterns beechwoods), hedgerows, commons and parklands with the aims of conserving and enhancing biodiversity and the historic landscape and its significant features; maximising the potential for recreation; and securing sustainable production of biomass and timber.
	SEO 2	In pockets of historic land use where natural and cultural heritage are both particularly rich, aim to restore and strengthen the historic landscape, ecological resilience and heterogeneity, and to conserve soils. Ensure that species-rich habitats are conserved and extended, including internationally important species-rich Chiltern downland. Secure environmentally and economically sustainable management to ensure conservation in the long term
	SEO 3	Conserve the Chilterns' groundwater resource, River Thames and chalk streams by working in partnership to tackle inter-related issues at a catchment scale and also across the water supply network area. Seek to secure, now and in the future, sustainable water use and thriving flood plain landscapes that are valued by the public.
	SEO 4	Enhance local distinctiveness and create or enhance green infrastructure within existing settlements and through new development, particularly in relation to the urban fringe and growth areas such as Luton. Ensure that communities can enjoy good access to the countryside.
Thames Valley	SEO 1	Plan for the enhancement of the area's rivers, and the expansion of their operational flood plains and associated wetland habitats, aiding the regulation of water flow, improving water quality, benefiting biodiversity, and reinforcing cultural heritage and landscape.
	SEO 2	Plan for the landscape-scale enhancement of the area's extensive gravel workings and other open waterbodies (including reservoirs) forming part of the South-West London Waterbodies Special Protection Area, for their contribution to water supply and storage, for their important habitats and recreation facilities, and for their geological interest.
	SEO 3	Maintain existing greenspace and plan for the creation of green infrastructure associated with the significant projected growth of urban areas, to reduce the impact of development, to help reduce flooding issues, and to strengthen access and recreation opportunities. Seek links from urban areas to wider recreation assets such as the Thames Path National Trail, National Cycle Routes, and the river and canal network, and promote

		the incorporation of best practice environmental measures into any new development.
	SEO 4	Protect and manage the area's historic parklands, wood pastures, ancient woodland, commons, orchards and distinctive ancient pollards, and restore and increase woodland for carbon sequestration, noise and pollution reduction, woodfuel and protection from soil erosion, while also enhancing biodiversity, sense of place and history.
	SEO 5	Develop the recreational, educational and commercial tourism opportunities offered by public access to – and engagement with – the historic buildings and landscapes in the area, such as Hampton Court Palace, Windsor Castle and the Royal Botanic Gardens at Kew, for their contribution to a sense of place and to people's enjoyment and understanding of the area.
Northern Thames Basin	SEO 1	Manage rivers and river valleys to protect and improve water quality and help to alleviate flooding in the downstream urban areas, while also helping to improve aquifer recharge and provide a sufficient store of water to meet future need, especially with predicted climatic changes. Conserve the riparian landscapes and habitats, for their recreational and educational amenity for their internationally significant ecological value.
	SEO 2	Manage the agricultural landscape and diverse range of soils which allow the Northern Thames Basin to be a major food provider, using methods and crops that retain and improve soil quality, water availability and biodiversity.
	SEO 3	Protect and appropriately manage the historic environment for its contribution to local character and sense of identity and as a framework for habitat restoration and sustainable development, ensuring high design standards (particularly in the London Green Belt) which respect the open and built character of the Thames Basin. Enhance and increase access between rural and urban areas through good green infrastructure links to allow local communities recreational, health and wellbeing benefits.
	SEO 4	Manage and expand the significant areas of broadleaf woodland and wood pasture, and increase tree cover within urban areas, for the green infrastructure links and important habitats that they provide, for the sense of tranquillity they bring, their ability to screen urban influences and their role in reducing heat island effect and sequestering and storing carbon.
Thames Basin Heaths	SEO 1	At a catchment scale, manage and create woodlands, highway verges, field margins, reedbeds and other features in urban and rural settings to intercept run-off and to filter pollutants. In the heavily developed flood plains of the Blackwater and Thames, adapt the urban environment to manage floodwaters, and restore or enhance modified watercourses.
	SEO 2	Maximise the variety of ecosystem services delivered by wooded features – from wet woodlands in the Kennet Valley to the large conifer plantations around Camberley and new woodlands. Conserve soils, water, biodiversity and the sense of place and history; enhance timber and biomass production; and provide for recreation and tranquillity as appropriate.
	SEO 3	Enhance the sense of history and biodiversity by conserving, restoring and building the resilience of long-established habitats such as heathland, ancient woodland and meadows, and of archaeology such as hill forts. Work at a landscape scale to conserve and restore key attributes of the historic hunting forests (such as Eversley) and historic common land. Engage the public in enjoying this heritage.
	SEO 4	With a focus on the Blackwater Valley, Newbury and nearby major settlements such as Reading, provide good-quality green infrastructure

		(incorporating commons, woodlands and restored gravel pits) to facilitate people's sustainable engagement with the local landscape. In doing so, also seek benefits for wildlife, water quality, flood amelioration and climate regulation.
Romney Marshes	SEO 1	Maintain and enhance the distinctive character of the remote, open, low-lying Romney Marshes landscape, including the wealth of heritage assets and the settlement character; recognise the value they provide in contributing to the understanding of the landscape and its history, local distinctiveness and sense of place; and promote knowledge and understanding of these important resources for their recreation, health and socio-economic benefits.
	SEO 2	Maintain and enhance the coastal environment, including the internationally important shingle foreland at Dungeness, taking account of the dynamic nature of the coastal systems and future impacts of climate change, including flood risk management, while providing access, recreation and tourism opportunities that are sensitive to the character, habitats and species of the coastal zone.
	SEO 3	Manage and enhance the distinctive agricultural landscape to secure viable and sustainable farming, while protecting heritage assets, managing soils and water resources and supporting the diversity of species that are dependent on this area. Enhance biodiversity through improved connectivity of semi-natural habitats and by creating ecological networks that are resilient to environmental change.
	SEO 4	Protect the important water resources, including the Denge gravel aquifer, the River Rother, Brede Valley and the extensive ditch network with its associated wetlands; and manage the resources to bring about benefits for biodiversity, water quality and regulation of flooding, while safeguarding the quality and quantity of water supplies and utilising the open water network for appropriate access and recreational opportunities.
Wealdon Greensand	SEO 1	Protect and manage the nationally recognised and distinctive character of the landscape, conserving and enhancing historic landscape character, tranquillity, sense of place, and the rich historical and geological heritage of the Wealden Greensand. Enhance access provision where appropriate, to maintain public benefit from enjoyment of the area.
	SEO 2	Protect, manage and significantly enhance the mosaic and connectivity of semi-natural habitats within the mixed farmed landscape - particularly the internationally important woodland and heathland habitats - for the benefit of biodiversity, pollination, soil and water regulation, landscape character and enhanced adaptation to climate change.
	SEO 3	Manage and significantly enhance the quality of the characteristic wetland and water environment of the Greensand. This will contribute to sustainable flood risk management, will benefit the regulation of water quality and water availability, as well as enhancing the sense of place, biodiversity, recreation and wetland habitat adaptation to climate change.
	SEO 4	Plan to deliver a network of integrated, well managed green spaces in existing and developing urban areas, providing social, economic and environmental benefits, and reinforcing landscape character and local distinctiveness - particularly on or alongside the boundaries of the designated landscapes within the Wealden Greensand.
	SEO 1	Manage, conserve and enhance the distinctive rural character and historic environment of the North Downs, including the long-established settlement

North Downs		pattern, ancient routeways and traditional buildings. Protect the tranquillity of the landscape and sensitively manage, promote and celebrate the area's rich cultural and natural heritage, famous landmarks and views for future generations.
	SEO 2	Protect, enhance and restore active management to the diverse range of woodlands and trees of the North Downs, for their internationally and nationally important habitats and species, cultural heritage and recreational value and to help to deliver climate change mitigation and adaptation. Seek opportunities to establish local markets for timber and biomass to support the active management of local woods, while recognising their contribution to sense of place, sense of history and tranquillity.
	SEO 3	Manage and enhance the productive mixed farming landscape of the North Downs and the mosaic of semi-natural habitats including the internationally important chalk grassland. Promote sustainable agricultural practices to benefit soils, water resources, climate regulation, biodiversity, geodiversity and landscape character while maintaining food provision.
	SEO 4	Plan to deliver integrated, well managed multifunctional green space in existing and developing urban areas, providing social, economic and environmental benefits and reinforcing landscape character and local distinctiveness, particularly on or alongside the boundaries of the designated landscapes within the North Downs.
Greater Thames Estuary	SEO 1	Maintain and enhance the expansive, remote coastal landscape – with its drowned estuaries, low islands, mudflats, and broad tracts of tidal salt marsh and reclaimed grazing marsh – maintaining internationally important habitats and their wildlife, and underlying geodiversity, while addressing the impacts of coastal squeeze and climate change and considering dynamic coastal processes.
	SEO 2	Work with landowners and managers to incorporate measures to improve biodiversity, geodiversity, pollination, water quality, soil quality and climate adaptation and to prevent soil erosion in this important food-providing landscape, while maintaining its historic character.
	SEO 3	Ensure that the tranquil and remote character of the estuary is maintained by conserving and enhancing important coastal habitats and distinctive historic and geological features, while providing increased opportunities for recreation and enjoyment of the landscape.
	SEO 4	Encourage a strategic approach to development that is informed by and makes a positive contribution to local character, incorporates green infrastructure which provides ecosystem services where they are needed most, and promotes recreation and addresses climate change, while maintaining important open mosaic and coastal habitats, and historic and geological features.
Suffolk Coast and Heaths	SEO 1	Manage the nationally significant coastal landscapes, ensuring that coastal management decisions take full account of landscape, environmental and visual impacts as part of an integrated approach working with coastal processes. Improve people's understanding of the process of coastal change.
	SEO 2	Manage the components of characteristic productive agricultural landscapes to benefit food production, biodiversity and soil and water quality. Promote sustainable farming practices that are able to adapt to

	changing agricultural economics, the considerable challenges of climate change and water availability.
SEO 3	Increase and enhance public awareness and enjoyment of the distinctive assemblage of historic landscapes. Sustainably manage the agricultural, semi-natural, geological and rich archaeological and historic environment, as well as seeking opportunities for more integrated access to support recreation and education, while protecting the area's wildlife habitats and tranquillity.
SEO 4	Manage the forest plantations, to combine commercial forestry and fuel production with a mix of habitats for rare and endangered plants and animals, enhancing both their capability as a strategic recreational resource and their role in climate change adaptation and regulation.

Table 11.3. Baseline ecosystem services review of the Affinity Water Central, Southeast and East regions.

Key:

Dark Blue = National Importance

Mid-Blue = Regional Importance

Light Blue = Local Importance

↑ = increase

↗ = slight increase

⇔ = no change

↘ = slight decrease

↓ = decrease

Asterisks denote confidence in projection; *low, **medium, ***high

○ = insufficient information

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
Chilterns	1	⇔ ***	↗ **	↗ *	n/a	↑ **	↑ **	⇔ *	↗ **	↑ **	↑ **	↗ **	n/a	n/a	↑ ***	↗ ***	↘ *	↗ **	↗ **	⇔ ***
	2	⇔ *	⇔ **	↗ **	n/a	⇔ **	⇔ **	↗ **	↗ **	↑ **	↑ **	↗ ***	n/a	n/a	↑ ***	↑ ***	⇔ **	↑ **	↑ ***	↗ ***
	3	↘ *	⇔ ***	↑ **	n/a	⇔ **	↗ *	↑ ***	↑ ***	↑ ***	↑ ***	⇔ **	n/a	n/a	↑ ***	⇔ ***	⇔ ***	↑ ***	↑ ***	⇔ ***

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
	4	⇔ **	⇔ **	↗ *	n/a	○	↗ *	↗ **	↗ *	⇔ **	↗ **	↗ **	n/a	n/a	↑ ***	↗ *	↘ **	↑ ***	↗ *	↗ *

NCA	SEO	Food Provision	Timber provision	Biomass energy	Water availability	Genetic diversity	Regulating climate change	Regulating soil erosion	Regulating soil quality	Regulating water quality	Regulating water flow	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
Thames Valley	1	↗ **	↗ *	↗ **	↑ ***	⇔ *	↑ **	↗ **	↗ **	↑ ***	↑ ***	⇔ *	↗ *	n/a	↑ ***	↑ **	↗ ***	↑ ***	↑ ***	⇔ *
	2	↘ *	⇔ *	⇔ *	↑ ***	⇔ *	↑ ***	⇔ **	⇔ **	↑ ***	↑ ***	⇔ *	⇔ *	n/a	↗ **	⇔ **	↗ ***	↑ ***	↑ ***	⇔ *
	3	↘ **	⇔ **	⇔ **	↘ **	⇔ **	⇔ **	↗ **	⇔ **	⇔ **	↗ ***	↗ **	⇔ *	n/a	↑ ***	↑ ***	↑ **	↑ ***	↗ **	⇔ *
	4	⇔ **	↑ **	↑ **	⇔ *	↗ ***	↑ ***	↑ ***	↑ ***	↑ ***	↗ **	↑ ***	↗ **	n/a	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	*

	5	⇔ ***	⇔ ***	⇔ ***	⇔ ***	↗ *	⇔ ***	⇔ ***	⇔ ***	⇔ ***	⇔ ***	⇔ ***	⇔ ***	n/a	↑ ***	↑ ***	⇔ *	↑ ***	↗ *	↗ *

NCA	SEO	Food Provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
Northern Thames Basin	1	↘ *	↗ *	↑ ***	↗ *	↑ *	↑ ***	↑ **	↑ ***	↗ *	↗ **	↗ **	↗ **	n/a	↗ *	⇔ **	↗ **	↗ *	↑ **	↑ **
	2	↑ ***	⇔ **	↑ **	↗ *	⇔ ***	↗ **	↗ **	↗ *	↑ ***	↑ **	↗ ***	↗ ***	n/a	↗ *	↗ *	⇔ ***	↗ *	↗ ***	⇔ ***
	3	↗ *	↗ **	⇔ ***	↗ *	↗ *	↗ *	⇔ **	⇔ ***	⇔ ***	⇔ ***	↗ *	↗ *	n/a	↑ ***	↑ ***	↗ ***	↑ ***	↗ *	↗ *
	4	⇔ **	↑ ***	↗ **	⇔ ***	↑ ***	↑ **	↗ **	↗ *	↗ *	↗ *	↗ **	↗ **	n/a	↑ ***	↑ ***	↑ ***	↑ ***	↗ **	⇔ ***

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
Thames Basin Heaths	1	⇔ *	⇔ **	↗ ***	n/a	⇔ ***	↗ ***	↗ ***	↗ ***	↗ **	↗ ***	↗ *	↗ **	n/a	⇔ **	⇔ **	⇔ **	⇔ **	↗ ***	↗ ***
	2	↘ *	↗ ***	↗ **	n/a	↗ **	↗ **	↗ **	↗ ***	↗ **	↗ **	⇔ *	↗ ***	n/a	↗ ***	↗ **	↗ **	↗ **	↗ ***	⇔ ***
	3	⇔ **	↗ *	↗ *	↗ *	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ *	↗ **	n/a	↗ ***	↗ ***	↗ *	↗ *	↗ ***	↗ *
	4	⇔ ***	↗ *	↗ *	n/a	↗ *	↗ ***	↗ ***	↗ **	↗ **	↗ **	⇔ *	↗ ***	n/a	↗ ***	↗ ***	↗ *	↗ ***	↗ **	↗ **

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity

Romney Marshes	1	⇔ *	⇔ ***	⇔ *	n/a	⇔ ***	○	↗ *	↗ *	⇔ *	⇔ *	⇔ *	○	↗ *	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***
	2	⇔ *	⇔ ***	↗ *	n/a	⇔ ***	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	○	↑ **	↑ **	↑ **	↗ ***	↗ *	↑ ***	↑ ***
	3	○	⇔ ***	↗ *	n/a	⇔ ***	↗ *	↑ *	↑ *	↗ **	↗ *	⇔ *	↑ *	⇔ *	⇔ *	↑ *	↗ *	↗ *	↑ ***	⇔ **
	4	○	⇔ **	↑ **	n/a	⇔ **	↗ *	⇔ **	⇔ **	↗ *	↗ *	↗ *	↗ *	⇔ *	↑ *	↑ *	○	↑ *	↑ ***	⇔ ***

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
Weald on Green	1	○	↗ *	↗ *	⇔ *	↗ *	○	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	○	↗ *	↑ ***	↑ ***	↑ **	↑ ***	↗ *	↑ ***

2	○	↑ **	↗ *	↗ *	↗ **	↗ *	↗ **	↗ **	↗ **	↗ ***	↗ *	↗ *	⇔ **	↑ *	↑ *	↑ *	↗ *	↑ ***	↗ *
3	○	⇔ ***	↑ **	⇔ *	⇔ *	↗ **	↑ **	↑ **	⇔ *	↗ **	○ ***	○ ***	⇔ *	↗ **	↗ *	↗ *	↗ *	↑ **	⇔ *
4	⇔ *	↗ *	⇔ *	↗ *	↗ *	⇔ *	↗ *	↗ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	↗ *	↗ *	⇔ *	↗ **	↗ *	⇔ *

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
North Downs	1	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	⇔ *	○	↑ *	↑ **	↑ **	↑ **	↑ **	↗ **	↑ **
	2	⇔ **	↑ ***	↗ *	⇔ *	↑ ***	↑ **	↗ *	↗ *	↗ *	↗ *	↑ *	○	⇔ ***	↑ **	↑ **	↑ *	↑ *	↑ ***	⇔ *
	3	○	⇔ *	↗ **	↗ **	⇔ *	↗ *	↑ ***	↑ **	↑ **	↑ **	↑ **	○	⇔ ***	↑ **	↑ **	○	⇔ *	↑ ***	↗ *
	4	○	↗ *	○	⇔ *	↗ *	↗ **	↗ *	↗ *	○	○	↗ *	○	⇔ **	↗ *	↗ *	↗ *	↑ *	↗ **	↗ *

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
Greater Thames Estuary	1	↙ *	⇔ ***	⇔ **	n/a	⇔ ***	↑ ***	↗ **	⇔ **	⇔ **	↗ ***	↗ **	↗ **	↑ ***	↑ ***	↗ **	↑***	↗ **	↑ ***	↑ ***
	2	↗ **	⇔ ***	↑ **	n/a	⇔ ***	↑ ***	↑ **	↗ **	↗ **	↑ **	↗ **	↗ **	⇔ **	↑ **	↗ **	↗ **	⇔ **	↑ ***	↗ **
	3	⇔ **	⇔ **	⇔ **	n/a	⇔ **	↑ ***	↗ **	⇔ **	⇔ **	↗ **	↗ **	⇔ **	↗ **	↑ ***	↑ **	↗ **	↑ ***	↗ **	↑ ***
	4	⇔ **	↗ **	↑ **	n/a	↗ **	↑ ***	↑ ***	↑ **	⇔ **	↗ **	↗ **	⇔ **	↑ **	↑ **	↗ **	↗ **	↑ ***	↗ **	↗ **

NCA	SEO	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal [illegible]	Sense of place / [illegible]	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity

Suffolk Coast and Heaths	1	↗***	⇔***	↗***	↗***	⇔***	↑***	↑***	↑***	↗***	↑***	↑***	↑***	↑***	↑***	↑***	↑***	↑***	↑***	↑***
	2	↑***	⇔***	↑***	↑***	⇔***	↑**	↑***	↑***	↑***	↑***	↑***	↑***	↗***	↑***	↗**	↗***	↗***	↑***	↗**
	3	↑***	↗**	↗***	↗**	↗**	↑***	↑***	↗***	↑***	↑***	↑***	↑***	↗***	↑***	↑***	↑***	↑***	↑***	↑***
	4	⇔***	↗***	↗**	↗**	↑***	↑***	↗*	↗**	↗**	↗***	↑***	↑***	⇔***	↑***	↗***	↗***	↑***	↑***	↗***

Future environment without the rdWRMP2019

The baseline assessment suggests that within the Study Area the ecosystem services provided by a number of habitats are deteriorating. For example, water provision from wetlands and floodplains appears to be in decline in both the Thames Valley and Northern Thames Basin regions of Affinity's Central region, as does water quality in the Greater Thames Estuary. In addition, wetland biodiversity across all regions is deteriorating.

Climate change, population growth and land use change are likely to be key drivers of change in the provision of these ecosystems (water supply, water quality and biodiversity) in the future.

These ecosystem services are also key considerations within the National Environment Programme (NEP), which includes regulatory drivers such as the WFD and the UK Biodiversity Action Plan. As such, any changes to the NEP will affect the future environment without the rdWRMP2019.

Key issues

Given Affinity Water's remit and obligations under the NEP, water supply, water quality and biodiversity are considered to be key ecosystem services.

Annex A Policy, plan and programme review

SEA topic	International / national / regional policy or legislation
Population Economy and Human Health	**International**
	The EU Sustainable Development strategy (2006)
	The United Nations Economic Commission for Europe Aarhus Convention (1998)
	Natural Environment and Rural Communities Act 2006
	Defra (2011) Water for Life -Water White Paper
	Defra (2005) Securing the Future; Delivering UK Sustainable Development Strategy
	Defra, Environment Agency, Natural England, Forestry Commission England (2016) Creating a great place for living
	Environment Agency (2015) Creating a Better Place: Environment Agency Corporate Strategy 2014-2016
	Environment Agency (2010) Water Resources Strategy – A Regional Action Plan for Thames Region
	Environment Agency (2014) Corporate Plan 2014 – 2016
	National
	MHCLG (2018) The National Planning Policy Framework (NPPF)
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Regional
	Mayor of London (2011), The London Plan Spatial Development Strategy for Greater London. Minor Alterations to London Plan 2015
	Environment Agency (2006) River Thames Alliance Thames Waterways Plan 2006 –
	Environment Agency (2011) Enjoying Water - Strategic Priorities for Water Related
	Mayor of London (2011) Securing London's Water Future the Mayor's Water Strategy
	Public Rights of Way Improvement Plans (ROWIPs)
	Local level Green Infrastructure Plans and strategies, including The All London Green
Tourism and Recreation	**International**
	n/a
	National
	n/a
	Regional
	Local Development Plans[103]

[103] Rother District, Shepway District, Ashford District (B), Canterbury District (B), Dover District, Wycombe District, South Bucks District, Chiltern District, Aylesbury Vale District, South Cambridgeshire District, Brentwood District (B), Epping Forest District, Turtleford District, Chelmsford District, Braintree District, Harlow District, Three Rivers District, Hertsmere District (B), Broxbourne District (B), Dacorum District (B), East Hertfordshire District, St. Albans District (B), Welwyn Hatfield District, North

	The Chilterns AONB Management Plan 2014-2019
	Kent Downs AONB Management Plan 2014-2019
	Dedham Vale AONB Management Plan 2016-2021
	Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019
Material Assets	**International**
	United Nations (2002) Commitments arising from the World Summit on Sustainable Development, Johannesburg
	National
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Waste and Emissions Trading Act 2003
	Defra (2011) Government Review of Waste Policy in England 2011
	HM Treasury Infrastructure UK (2014) National Infrastructure Plan
	Defra (2018) Draft National Policy Statement for Water Resources Infrastructure
	Defra (2008) Future Water: the Government's water strategy for England
	Environment Agency (2009) Water Resources Strategy for England and Wales
	Environment Agency (2010) Water Resources Action Plan for England and Wales
	Environment Agency (2010) Water Resources Strategy – A Regional Action Plan for
	Environment Act 1995
	HM Treasury (2015) Fixing the Foundations: creating a more prosperous nation.
Biodiversity, Flora, Fauna	**International**
	United Nations (1992) Convention on Biological Diversity (CBD)
	European Commission, Birds Directive (2009/147/EC)
	European Commission, Fresh Water Fish Directive (2006/44/EC)
	European Commission, Directive on Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic
	European Commission, Habitats Directive (1992/43/EEC)
	The Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983)
	The Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979)
	Ramsar Convention The Convention on Wetlands of International Importance (1971)
	European Commission The Water Framework Directive (2000/60/EC)

Hertfordshire District, Watford District (B), Stevenage District (B), Woking District (B), Surrey Heath District (B), Runnymede District (B), Guildford District (B), Mole Valley District, Elmbridge District (B), Spelthorne District (B), Hounslow, Ealing, Havering, Hillingdon, Harrow, Brent, Barnet, Enfield, Redbridge, Camden, Haringey, Bracknell Forest (B), Central Bedfordshire, Luton (B), Slough (B), Windsor and Maidenhead (B), Tendring District, Colchester District (B), Babergh District

EU Biodiversity Strategy
National
MHCLG (2018) The National Planning Policy Framework (NPPF)
HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
Natural Environment White Paper
The UK post-2010 Biodiversity Framework
Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services
Defra (2010) Delivering a Healthy Natural Environment. Ecosystem Approach Action Plan (updated)
Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network
Defra (2011) UK National Ecosystem Assessment and Defra (2014) UK National Ecosystems Assessment Follow on, Synthesis of Key Findings
Defra (2015) The Great Britain Invasive Non-native Species Strategy
Defra (2008), England Biodiversity Strategy –climate change adaptation principles
Environment Agency (undated) Hydroecology: Integration for modern regulation
Environment Agency (undated) WFD River Basin Characterisation Project
Natural England's standing advice on protected species.
Conservation of Habitats and Species Regulations 2010 (as amended by the Conservation of Habitats and Species (Amendment) Regulations 2011 and 2012)
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
Natural Environment and Rural Communities Act 2006
Salmon and Freshwater Fisheries Act 1975
The Countryside and Rights of Way (CRoW) Act 2000
Wildlife and Countryside Act 1981 (as amended)
Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104
Regional
Thames River Basin Management Plan (including subsidiary documents)
South East River Basin Management Plan (including subsidiary documents)
South East England Biodiversity Forum (2009) South East Biodiversity Strategy
London Biodiversity Partnership (2009) London Biodiversity Action Plan
Environment Agency (2004) Thames Salmon Action Plan (SAP)
Natural England (2014) Site Improvement Plans (SIPs) for Natura 2000 Sites
Natural England National Character Area (NCA) Profiles

	Kent Environment Strategy
Landscape, Townscape and Visual Amenity	**International**
	European Landscape Convention (2006)
	National
	MHCLG (2018) The National Planning Policy Framework (NPPF)
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper
	Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network
	Regional
	The Chilterns AONB Management Plan (2014)
	Kent Downs AONB Management Plan (2014
	Dedham Vale AONB Management Plan (2016)
Air Quality and Noise	**International**
	European Commission (2002) Environmental Noise Directive (2002/49/EC)
	European Commission (2008) Ambient Air Quality Directive (2008/50/EC)
	European Commission (2005) Thematic Strategy on Air Pollution
	National
	MHCLG (2018) The National Planning Policy Framework (NPPF)
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Defra (2007) The Air Quality Strategy for England, Scotland and Wales
	Regional
	n/a
Climate	**International**
	Kyoto Protocol on Climate Change
	European Commission (2009) Promotion of the use of energy from renewable sources Directive (2009/28/EC)
	National
	The UK Climate Change Programme
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	MHCLG (2018) The National Planning Policy Framework (NPPF)
	Defra (2013) The National Adaptation Programme: Making the country resilient to a changing climate

	Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report
	Defra (2008), England Biodiversity Strategy –climate change adaptation principles
	The Climate Change Act 2008
	The Energy Act 2013
	UKCIP (2009) UK Climate Projections UKCP09 (2009)
	Environment Agency (2010) Essex and South Suffolk Shoreline Management Plan 2
	Canterbury County Council (2010) Isle of Grain to South Foreland SMP Review
	Shepway District Council (2006) South Foreland to Beachy Head SMP
	Regional
	Mayor of London (2011) Managing Risks and Increasing Resilience The Mayor's Climate Change Adaptation Strategy
	London Climate Change Partnership (2009) Adapting to Climate Change, Creating
	Defra (2015) Climate adaptation reporting second round: South East Water
Surface Water	**International**
	European Commission Floods Directive (2007/60/EC)
	European Commission The Water Framework Directive (2000/60/EC)
	Urban Waste Water Treatment Directive
	European Commission Drinking Water Directive (1998/83/EC) (amended 2015)
	European Commission Environmental Liability Directive (2004/35/EC)
	European Commission Revised Bathing Water Quality Directive (76/160/EEC)
	European Commission Urban Waste Water Treatment Directive (91/271/EEC)
	European Commission Nitrates Directive (91/676/EEC)
	National
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Defra (2018) Draft National Policy Statement for Water Resources Infrastructure
	Defra (2005) Making Space for Water
	Defra (2012)The UK Climate Change Risk Assessment 2012 Evidence Report
	Defra (2011) Water for Life - Water White Paper
	Environment Agency (2011) National Flood and Coastal Risk Management Strategy for England
	Environment Agency (2010) Water Resources Action Plan for England and Wales
	Environment Agency (2009) Water Resources Strategy for England and Wales

	Environment Agency (2013) Managing Water Abstraction
	Flood and Water Management Act (2010)
	The Water Act (2003)
	Water Industry Act 1991 (as amended by the commencement of Section 36 of the Flood and Water Management Act 2010)
	Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104
	Defra (2016) Guiding principles for water resources planning for water companies operating wholly or mainly
	Regional
	Thames River Basin Management Plan (including subsidiary documents)
	South East River Basin Management Plan (including subsidiary documents)
	Catchment Abstraction Management Strategies
	Environment Agency (2016) Anglian River Basin District Flood Risk Management Plan
	Environment Agency (2016) South East River Basin District Flood Risk Management
	Environment Agency (2016) Thames River Basin District Flood Risk Management Plan
	Environment Agency Drought Plans (various)
	Environment Agency (2011) Water Resources Strategy – A Regional Action Plan for
	Mayor of London (2011) Securing London's Water Future The Mayor's Water Strategy
	South East Marine Plan (forthcoming) Marine Management Organisation
	Water Resources in the South East (WRSE) Group (2014 and forthcoming) Regional
Groundwater	**International**
	Directive 2006/118EC of the European Parliament and of the council of 12 December 2006 on the protection of groundwater against pollution and deterioration
	European Commission The Water Framework Directive (2000/60/EC)
	Urban Waste Water Treatment Directive
	European Commission Drinking Water Directive (1998/83/EC) (amended 2015)
	European Commission Urban Waste Water Treatment Directive (91/271/EEC)
	European Commission Nitrates Directive (91/676/EEC)
	Habitats Directive Review of Consents
	National
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Defra (2018) Draft National Policy Statement for Water Resources Infrastructure
	Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report

	Defra (2011) Water for Life - Water White Paper
	Environment Agency (2010) Water Resources Action Plan for England and Wales
	Environment Agency (2009) Water Resources Strategy for England and Wales
	Environment Agency (2013) Managing Water Abstraction
	The Water Act (2003)
	The Water Environment (WFD) (England and Wales) Regulations 2003
	Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104
	Defra (2016) Guiding principles for water resources planning for water companies operating wholly or mainly
	Regional
	Anglian River Basin Management Plan (including subsidiary documents)
	Thames River Basin Management Plan (including subsidiary documents)
	South East River Basin Management Plan (including subsidiary documents)
	Environment Agency (2016) Anglian River Basin District Flood Risk Management Plan
	Environment Agency (2016) South East River Basin District Flood Risk Management
	Environment Agency (2016) Thames River Basin District Flood Risk Management Plan
	Catchment Abstraction Management Strategies (including subsidiary documents)
	Mayor of London (2011) Securing London's Water Future The Mayor's Water Strategy
Cultural Heritage and Archaeology	
	International
	The Convention for the protection of the architectural heritage of Europe (Granada Convention)
	The European Convention on the protection of archaeological heritage (Valletta Convention)
	National
	MHCLG (2018) The National Planning Policy Framework (NPPF)
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Ancient Monuments and Archaeology Act (1979)
	Statement on the Historic Environment for England
	Historic England (2015) The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3
	Historic England (2013) Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment
	Regional
	n/a

Geology and Soils	International
	Council of Europe (2003) European Soils Charter
	European Commission (2006) Thematic Strategy for Soil Protection
	National
	HM Gov (2018) A Green Future: our 25 Year Plan to Improve the Environment
	Defra (2009) Safeguarding our Soils – A Strategy for England
	Defra (2011) The Natural Choice: Securing the value of nature, The Natural Environment White Paper
	The Countryside and Rights of Way (CROW) Act 2000
	Defra (2004) The First Soil Action Plan for England
	Environment Agency (2007) Soil a precious resource: Strategy for protecting, managing and restoring soil
	Defra (2004) Rural Strategy 2004
	Defra (2006) Sustainable Farming and Food Strategy: Forward Look
	HMSO (1990) Environmental Protection Act
	Wildlife and Countryside Act 1981 (as amended)
	Regional
	Natural England - National Character Area (NCA) profiles

Annex B National / International designated sites (update)

Special Protection Areas		
Site	**Interest features**	**Potential Environmental Vulnerabilities Linked to Affinity Water Constrained Options**
Dungeness, Romney Marsh and Rye Bay	The SPA is designated for its Annex I bird species: Wintering: • Bewick's swan (*Cygnus columbianus bewickii*) • Bittern (*Botaurus stellaris*) • Hen harrier (*Circus cyaneus*) • Golden plover (*Pluvialis apricaria*) • Ruff (*Philomachus pugnax*) • Shoveler (*Anas clypeata*) Passage: • Aquatic warbler (*Acrocephalus paludicola*) Breeding: • Marsh harrier (*Circus aeruginosus*) • Avocet (*Recurvirostra avosetta*) • Mediterranean gull (*Larus melanocephalus*) • Sandwich tern (*Sterna sandvicensis*) • Common tern (*Sterna hirundo*) • Little tern (*Sterna albifrons*) And for its waterfowl assemblages The Extension is designated for foraging populations of Annex I species: • Sandwich tern (*Sterna sandvicensis*) • Common tern (*Sterna hirundo*) • •Little tern (*Sterna albifrons*)	• Water pollution • Human induced changes to hydraulic conditions • Disturbance to designated features from construction and operational activities • Loss of supporting habitat
Lee Valley	Qualifies as a SPA due to its population of wintering bittern (*Botaurus stellaris*) as well as migratory populations of Gadwell (*Anas strepera*) and Shoveler (*Anas clypeata*).	• Pollution to groundwater • Human induced changes to hydraulic conditions • Disturbance to designated features from construction and operational activities • Loss of supporting habitat
South West London Water Bodies	Qualifies as a SPA due to its population of wintering birds including Gadwell	• Invasive species • Abiotic natural processes

	(*Anas strepera*) and Shoveler (*Anas clypeata*). In addition, the site supports nationally important numbers of cormorant *Phalacrocorax carbo*, great crested grebe *Podiceps cristatus*, tufted duck *Aythya fuligula*, pochard *Aythya ferina* and coot *Fulica atra*.	• Changes in biotic condition • Outdoor sports and leisure activities • Marine and freshwater aquaculture
Thames Basin Heaths	The site qualifies as a SPA as it is regularly used by or more of the Great Britain populations of Nightjar *Caprimulgus europaeus*, Woodlark *Lullula arborea* and Dartford warbler *Sylvia undata*.	• Air pollution • Human intrusions and disturbances • Biocenotic evolution, succession • Outdoor sports and leisure activities • Forest and plantation management and use
Thursley, Hankley and Frensham Commons	Qualified as a site of international importance as it supports summer breeding populations of Nightjar *Caprimulgus europaeus*, Woodlark *Lullula arborea* and Dartford warbler *Sylvia undata*. The site also supports breeding kingfisher *Alcedo atthis* and wintering hen harriers *Circus cyaneus*.	• Outdoor sports and leisure activities • Air pollution • Biocenotic evolution, succession • Human intrusions and disturbances
Special Areas of Conservation		
Site	**Interest features**	**Potential Environmental Vulnerabilities Linked to Affinity Water Constrained Options**
Chilterns Beechwoods	Designated as an SAC for its Annex I habitats: • *Asperulo-Fagetum* beech forests – representing a very extensive tract of this habitat in the centre of the habitat's UK range Annex I habitats present as a qualifying feature: • Semi-natural dry grasslands and scrubland facies on calcareous substrates Annex II species present as a qualifying feature: • Stag beetle (*Lucanus cervus*)	• Forest and Plantation management and use • Problematic native species • Invasive non-native species • Interspecific floral relations
Cothill Fen SAC	Designated as an SAC for its Annex I habitats: • Alkaline fens • Alluvial forests with Alnus glutinosa and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	• Water pollution • Hydrological changes • Atmospheric pollution (atmospheric nitrogen deposition)

Dungeness	Designated as an SAC for its Annex I habitats: • Annual vegetation and drift lines • Perennial vegetation of stony banks Designated as an SAC for its Annex II species: • Great crested newt (*Triturus cristatus*)	• Human induced changes to hydraulic conditions • Water pollution • Disturbance to designated features from construction and operational activities • Loss of supporting habitat
Folkestone to Etchinghill Escarpment	Qualifies as a SAC due to the extensive areas of semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*). Also includes important orchid sites.	• Biocenotic evolution, succession • Air pollution, air-borne pollutants • Grazing
Epping Forest	Qualifies as an SAC due to the presence of the following: Annex I habitats: • *Atlantic acidophilous* beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) • Northern Atlantic wet heaths with *Erica tetralix* • European dry heaths Annex II species: • Stag beetle (*Lucanus cervus*)	• Atmospheric pollution • Changes in species distribution • Disturbance to designated features from construction and operational activities • Human induced changes to hydraulic conditions (water levels) • Water pollution • Invasive species
Hackpen Hill	Qualifies as an SAC due to the presence of the following: Annex I habitats: • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) Annex II species: • Early gentian (Gentianella anglica)	The Natural England Site Improvement Plan does not identify any issue or threats of relevance to the SAC
Lydden and Temple Ewell Downs	Qualifies as a SAC due to the extensive areas of semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*). Also includes important orchid sites. The site includes outstanding assemblages of plants and invertebrates.	• Loss of habitat • Air pollution, air-borne pollutants • Grazing • Outdoor sports and leisure activities, recreational activities
Little Wittenham	Qualifies as an SAC due to the presence of the following: Annex II species: • Great crested newt (*Triturus cristatus*)	• Invasive species • Public access/ disturbance
Oxford Meadows	Qualifies as an SAC due to the presence of the following:	• Hydrological changes

	Annex I habitats: • Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) Annex II species: • Creeping marshwort (*Apium repens*)	• Invasive species
Windsor Forest and Great Park	Designated as an SAC for its Annex I habitats: • Old acidophilous oak woods with *Quercus robur* on sandy plains Annex I habitats present as a qualifying feature: • Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer Designated as an SAC for its Annex II species: • Violet click beetle (*Limoniscus violaceus*)	• Forest and Plantation management and use • Air pollution, air-borne pollutants • Invasive non-native species • Interspecific floral relations
Burnhman Beeches	Designated as an SAC for its Annex I habitats: • *Asperulo-Fagetum* beech forests – within central southern England. Formerly beech wood-pasture with associated *Fagus sylvatica* and Oak species *Quercus spp*. • Epiphytic community – retaining nationally important moss communities including *Zygodon forsteri.*	• Forest and Plantation management and use • Problematic native species • Invasive non-native species • Interspecific floral relations
Dover to Kingsdown Cliffs	Designated as an SAC for its Annex I habitats: • Vegetated sea cliffs (Atlantic and Baltic Coasts) – supporting rich maritime cliff communities found in chalk substrate. Annex I habitats present as a qualifying feature: • Semi-natural dry grasslands and scrubland facies: on calcareous substrates.	• Human induced changes to hydraulic conditions • Disturbance to designated features from construction and operational activities • Loss of supporting habitat
Thursley, Ash,Pirbright and Chobham	Designated as an SAC for its Annex I habitats: • Northern Atlantic wet heaths with *Erica tetralix* – supporting a mosaic of habitats including lowland heathland, valley bog and dry heathland. • European dry heath – large fragments of heathland; selected as	• Air pollution • Biocenotic evolution, succession • Human intrusions and disturbances

	a key representative of NVC type H2 *Calluna vulgari.* • Depressions on peat substrates of the *Rhynchosporion*- peat vegetation species assoictaed with natural bog, patterned valley mire and disturbed peat (trackways and peat- cuttings).	
Parkgate Down	Designated as an SAC for its Annex I habitats: • Semi-natural dry grasslands and scrubland facies on calcareous substrates- supports priority habitat: orchid rich sites (*Festuco-Brometalia*) and consisting of NVC type CG4 *Brachypodium pinnatum* grassland.	• Human induced changes to hydraulic conditions • Disturbance to designated features from construction and operational activities • Loss of supporting habitat
Wormley-Hoddesdonpark Woods	Designated as an SAC for its Annex I habitats: • *Carpinion betuli* Sub-Atlantic and medio-European oak or oak-hornbeam forests - supporting a variety of broad-leaved trees and a local bryophyte community.	• Forest and Plantation management and use • Problematic native species • Invasive non-native species • Interspecific floral relations
Ramsar sites		
Site	**Interest features**	**Potential Environmental Vulnerabilities Linked to Affinity Water Constrained Options**
Dungeness, Romney Marsh and Rye Bay	Qualifies under Criterion 1 because it contains representative, rare, or unique examples of natural or near-natural wetland types: • Annual vegetation of drift lines and the coastal fringes of perennial vegetation of stony banks • Natural shingle wetlands: saline lagoons, freshwater pits and basin fens Qualifies under Criterion 2 because it supports threatened ecological communities: • Bryophytes: wetland thread-mosses *Bryum* species • Vascular plants: species associated with grazing marsh and saltmarsh (including brackish ditches and wetlands associated with low-lying depressions within shingle areas). Saltmarshes and other brackish wetlands are particularly rich, with at least eight nationally scarce species, including the vulnerable sea barley (*Hordeum marinum*),	• Water pollution • Human induced changes to hydraulic conditions • Disturbance to designated features from construction and operational activities • Loss of supporting habitat

	Borrer's saltmarsh-grass (*Puccinellia fasciculata*) and slender hare's-ear (*Bupleurum tenuissimum*), and the near-threatened sea-heath (*Frankenia laevis*). Grazing marshes support the nationally rare (and critically endangered) sharp-leaved pondweed (*Potamogeton acutifolius*) and at least six nationally scarce species, including the vulnerable divided sedge (*Carex divisa*) and rootless duckweed (*Wolffia arrhizal*). The remaining species are chiefly associated with gravel pits and their margins, saline lagoons, shingle beaches and fens • Invertebrates: Site supports a rich water beetle assemblage, including reed beetles (*Donacia*), snail-killing flies (*Sciomyzidae*) and soldierflies (*Stratiomyidae*) that are typical of coastal marshes.	
Lee Valley	Qualifies as a Ramsar site under Ramsar Criterion 2 and 6. Ramsar Criterion 2 stats that 'A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.' Ramsar criterion 2 The site supports the nationally scarce plant species whorled water-milfoil *Myriophyllum verticillatum* and the rare/vulnerable invertebrate *Micronecta minutissima* (a water-boatman). Ramsar criterion 6 Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: • Northern shoveler (*Anas clypeata*) Species with peak counts in winter: • Gadwall (*Anas strepera strepera*)	• Pollution to groundwater • Human induced changes to hydraulic conditions • Disturbance to designated features from construction and operational activities • Loss of supporting habitat
South West London Waterbodies	Qualifies as a Ramsar site under Ramsar Criterion 6 which states that 'A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.' Ramsar criterion 6	• Invasive species • Abiotic natural processes • Changes in biotic conditions • Outdoor sports and leisure activities • Marine and freshwater aquaculture

	Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: • Northern shoveler (*Anas clypeata*) Species with peak counts in winter: • Gadwall (*Anas strepera strepera*)

Marine Conservation Zones	
Site	**Interest features**
Dover to Folkestone	• Low energy intertidal rock • Moderate energy intertidal rock • High energy intertidal rock • Intertidal coarse sediment • Intertidal sand and muddy sand • Intertidal underboulder communities • Littoral chalk communities • Moderate energy infralittoral rock • Subtidal coarse sediment • Subtidal mixed sediments • Subtidal sand • Subtidal mud • Native oyster • Folkestone Warren
Dover to Deal	• Low energy intertidal rock • Moderate energy intertidal rock • High energy intertidal rock • Intertidal coarse sediment • Intertidal sand and muddy sand • Intertidal underboulder communities • Littoral chalk communities • Moderate energy infralittoral rock • Subtidal chalk • Subtidal mixed sediments • Subtidal sand • Native oyster
Folkestone Pomerania	• High energy circalittoral rock • Subtidal coarse sediment • Subtidal sand • Fragile sponge and anthozoan communities

	• Honeycomb worm (*Sabellaria alveolata*) reefs • Ross worm (*Sabellaria spinulosa*) reefs
Blackwater, Crouch, Roach and Colne Estuaries	• Intertidal mixed sediments • Native oyster (*Ostrea edulis*) beds • Native oyster (*Ostrea edulis*) • Clacton Cliffs and Foreshore

Recommended Marine conservation Zones (rMCZ)	
Site	Interest features
Hythe Bay	• Subtidal mud • Mud habitats in deep water • Sea pen and burrowing megafauna communities
Goodwin Sands	• Moderate energy infralittoral rock • Moderate energy circalittoral rock • Subtidal coarse sediment • Subtidal sand • Blue mussel beds • Rossworm Reer (*Sabellaria spinulosa*) • Eastern English Channel outburst flood features

Sites of Special Scientific Interest	
Site	**Interest features**
Alpine Meadow (1 - Misbourne)	• CG3 - Bromus erectus lowland calcareous grassland • CG6 - Dry grassland/ scrub transitions (MG1-related, CG2d-related)
Ashridge Commons and Woods (1 - Misbourne)	• Assemblages of breeding birds - Mixed: Scrub, Woodland • U4 - *Festuca ovina* - *Agrostis capillaris* - *Galium saxatile* grassland • Variety of breeding bird species (70) • W12 - *Fagus sylvatica* - *Mercurialis perennis* woodland • W14 - *Fagus sylvatica* - *Rubus fruticosus* woodland
Black Park (1 - Misbourne)	• H2 - *Calluna vulgaris* - *Ulex minor* heath • M16 - *Erica tetralix* - *Sphagnum compactum* wet heath • M25 - *Molinia caerulea* - *Potentilla erecta* mire • W6 - *Alnus glutinosa* - *Urtica dioica* woodland
Bradenham Woods, Park Wood & The Coppice	• CG3 - *Bromus erectus* lowland calcareous grassland • Populations of nationally scarce butterfly species - *Hamearis lucina*, Duke of Burgundy • W12 - Fagus sylvatica - Mercurialis perennis woodland

Sites of Special Scientific Interest	
Site	**Interest features**
(1 - Misbourne)	• W14 - Fagus sylvatica - Rubus fruticosus woodland
Froghall Brickworks (1 - Misbourne)	• ED - Quaternary of the Thames
Frogmore Meadows (1 - Misbourne)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • MG8 - *Cynosurus cristatus - Caltha palustris* grassland • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland
Harefield Pit (1 - Misbourne)	• ED - Palaeogene
Hodgemoor Wood (1 - Misbourne)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W15 - *Fagus sylvatica - Deschampsia flexuosa* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Kingcup Meadows and Oldhouse Wood (1 - Misbourne)	• M23 - *Juncus effusus/acutiflorus - Galium palustre* rush pasture • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W5 - *Alnus glutinosa - Carex paniculata* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Little Heath Pit (1 - Misbourne)	• ED - Quaternary of the Thames
Mid Colne Valley (1 - Misbourne)	• Aggregations of breeding birds - Tufted Duck, *Aythya fuligula* • Assemblages of breeding birds - Mixed: Lowland damp grassland, Scrub, Woodland • CG3 - Bromus erectus lowland calcareous grassland • Variety of breeding bird species (70) • Variety of wintering bird species (90)
Naphill Common (1 - Misbourne)	• W12 - *Fagus sylvatica - Mercurialis perennis* woodland • W14 - *Fagus sylvatica - Rubus fruticosus* woodland
Old Park Wood (1 - Misbourne)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W14 - *Fagus sylvatica - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Old Rectory Meadows (1 - Misbourne)	• M23 - *Juncus effusus/acutiflorus - Galium palustre* rush pasture • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • W6 - *Alnus glutinosa - Urtica dioica* woodland
Roughdown Common	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland

Sites of Special Scientific Interest	
Site	**Interest features**
(1 - Misbourne)	
Ruislip Woods (1 - Misbourne)	• Invertebrate assemblage • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Sarratt Bottom (1 - Misbourne)	• MG8 - *Cynosurus cristatus - Caltha palustris* grassland
Stoke Common (1 - Misbourne)	• H2 - *Calluna vulgaris - Ulex minor* heath
Westwood Quarry (1 - Misbourne)	• ED - Quaternary of the Thames
Whippendell Wood (1 - Misbourne)	• Invertebrate assemblage • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Bentley Priory (2 - Colne)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W21 - *Crataegus monogyna - Hedra helix* scrub • W23 - *Ulex europaeus - Rubus fruticosus* scrub
Bricket Wood Common (2 - Colne)	• H1 - *Calluna vulgaris - Festuca ovina* heath • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland
Croxley Common Moor (2 - Colne)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland
Harrow Weald (2 - Colne)	• ED - Quaternary of the Thames • FB - Quaternary of the Thames
Moor Mill Quarry, West (2 - Colne)	• FB - Quaternary of the Thames
Redwell Wood (2 - Colne)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland
Ruislip Woods (2 - Colne)	• Invertebrate assemblage • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland

Sites of Special Scientific Interest	
Site	**Interest features**
	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Ashwell Springs (3 - Lee)	• Springs
Barton Hills (3 - Lee)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG3 - *Bromus erectus* lowland calcareous grassland • Vascular plant assemblage • W12 - *Fagus sylvatica - Mercurialis perennis* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Benington High Wood (3 - Lee)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Blagrove Common (3 - Lee)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow
Blow's Down (3 - Lee)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG3 - *Bromus erectus* lowland calcareous grassland • CG6 - Dry grassland/ scrub transitions (MG1-related, CG2d-related) • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland
Castle Lime Works Quarry (3 - Lee)	• IK - Karst
Dunstable and Whipsnade Downs (3 - Lee)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG3 - *Bromus erectus* lowland calcareous grassland • CG7a,b,d,e - *Festuca ovina - Hieracium pilosella - Thymus preaecox* grassland • Vascular plant assemblage
Galley and Warden Hills (3 - Lee)	• CG3 - *Bromus erectus* lowland calcareous grassland • Population of declining plant species and species at the edge of their range - *Bunium bulbocastanum, Greater pignut*
Great Hormead Park (3 - Lee)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Houghton Regis Marl Lakes (3 - Lee)	• CG7a,b,d,e - *Festuca ovina - Hieracium pilosella - Thymus preaecox* grassland • Great crested newt, *Triturus cristatus* • Outstanding dragonfly assemblage • Standing waters

Sites of Special Scientific Interest	
Site	**Interest features**
Kensworth Chalk Pit (3 - Lee)	• EA - Cenomanian-Maastrichtian
Knebworth Woods (3 - Lee)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Moor Hall Meadows (3 - Lee)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • MG8 - *Cynosurus cristatus - Caltha palustris* grassland
Northaw Great Wood (3 - Lee)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland
Oughtonhead Lane (3 - Lee)	• FB - Quaternary of East Anglia
Redwell Wood (3 - Lee)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland
Sherrardspark Wood (3 - Lee)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Tewinbury (3 - Lee)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • MG8 - *Cynosurus cristatus - Caltha palustris* grassland • S4 - *Phragmites australis* swamp and reed-beds • S5 - *Glyceria maxima* swamp • S6 - *Carex riparia* swamp • W7 - *Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum* woodland
Therfield Heath (3 - Lee)	• Butterflies which have experienced substantial declines - *Lysandra coridon,* Chalkhill Blue • CG3 - *Bromus erectus* lowland calcareous grassland • Invertebrate assemblage • Vascular plant assemblage • W12 - *Fagus sylvatica - Mercurialis perennis* woodland
Totternhoe Chalk Quarry (3 - Lee)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG3 - *Bromus erectus* lowland calcareous grassland • CG4 - *Brachypodium pinnatum* lowland calcareous grassland

Sites of Special Scientific Interest	
Site	**Interest features**
	• Vascular plant assemblage
Totternhoe Knolls (3 - Lee)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG3 - *Bromus erectus* lowland calcareous grassland • Vascular plant assemblage
Totternhoe Stone Pit (3 - Lee)	• EA - Mesozoic - Tertiary Fish/Amphibia
Wain Wood (3 - Lee)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Water End Swallow Holes (3 - Lee)	• IA - Fluvial Geomorphology • IK - Karst
Wormley-Hoddesdonpark Wood South (3 - Lee)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Wormley-Hoddesdonpark Woods North (3 - Lee)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Brent Reservoir (4 - Pinn)	• Assemblages of breeding birds - Lowland open waters and their margins
Denham Lock Wood (4 - Pinn)	• S6 - *Carex riparia* swamp • S7 - *Carex acutiformis* swamp • W6 - *Alnus glutinosa - Urtica dioica* woodland
Fray's Farm Meadows (4 - Pinn)	• S7 - *Carex acutiformis* swamp
Hampstead Heath Woods (4 - Pinn)	• M23 - *Juncus effusus/acutiflorus - Galium palustre* rush pasture • M5 - *Carex rostrata - Sphagnum squarrosum* mire • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W14 - *Fagus sylvatica - Rubus fruticosus* woodland
Kingcup Meadows and Oldhouse Wood (4 - Pinn)	• M23 - *Juncus effusus/acutiflorus - Galium palustre* rush pasture • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W5 - *Alnus glutinosa - Carex paniculata* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Mid Colne Valley	• Aggregations of breeding birds - Tufted Duck, *Aythya fuligula*

Sites of Special Scientific Interest	
Site	**Interest features**
(4 - Pinn)	• Assemblages of breeding birds - Mixed: Lowland damp grassland, Scrub, Woodland • CG3 - *Bromus erectus* lowland calcareous grassland • Variety of breeding bird species (70) • Variety of wintering bird species (90)
Ruislip Woods (4 - Pinn)	• Invertebrate assemblage • U1e - *Festuca ovina - Agrostis capillaris - Rumex acetosella* lowland acid grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Wraysbury & Hythe End Gravel Pits (4 - Pinn)	• Aggregations of non-breeding birds - Gadwall, *Anas strepera* • Aggregations of non-breeding birds - Goosander, *Mergus merganser* • Aggregations of non-breeding birds - Tufted Duck, *Aythya fuligula* • Assemblages of breeding birds - Lowland open waters and their margins
Wraysbury No. 1 Gravel Pit (4 - Pinn)	• Aggregations of non-breeding birds - Gadwall, *Anas strepera*
Amwell Quarry (5 - Stort)	• Aggregations of non-breeding birds - Bittern, *Botaurus stellaris* • Aggregations of non-breeding birds - Gadwall, *Anas strepera* • Aggregations of non-breeding birds - Shoveler, *Anas clypeata* • Assemblages of breeding birds - Lowland open waters and their margins • Outstanding dragonfly assemblage
Ashdon Meadows (5 - Stort)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • MG8 - *Cynosurus cristatus - Caltha palustris* grassland
Curtismill Green (5 - Stort)	• MG13 - *Agrostis stolonifera - Alopecurus geniculatus* grassland • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland
Debden Water (5 - Stort)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • MG8 - *Cynosurus cristatus - Caltha palustris* grassland
Downfield Pit, Westmill (5 - Stort)	• ED - Quaternary of the Thames • FB - Quaternary of the Thames
Elsenham Woods (5 - Stort)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Epping Forest (5 - Stort)	• Amphibian assemblage • Assemblages of breeding birds - Woodland • Combinations of species - Bryophytes • H1 - *Calluna vulgaris - Festuca ovina* heath

Sites of Special Scientific Interest	
Site	**Interest features**
	• Invertebrate assemblage • M16 - *Erica tetralix - Sphagnum compactum* wet heath • Outstanding dragonfly assemblage • Population of RDB moss - *Zygodon forsteri*, Knothole Moss • Population of Schedule 5 beetle - *Lucanus cervus*, Stag Beetle • U1 b,c,d,f - *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W14 - *Fagus sylvatica - Rubus fruticosus* woodland • W15 - *Fagus sylvatica - Deschampsia flexuosa* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland
Garnetts Wood / Barnston Lays (5 - Stort)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Hainault Forest (5 - Stort)	• Assemblages of breeding birds - Mixed: Scrub, Woodland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Hales and Shadwell Woods (5 - Stort)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Hall's Quarry (5 - Stort)	• ED - Quaternary of the Thames
Harlow Woods (5 - Stort)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Hatfield Forest (5 - Stort)	• MG13 - *Agrostis stolonifera - Alopecurus geniculatus* grassland • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • MG8 - *Cynosurus cristatus - Caltha palustris* grassland • S22 - *Glyceria fluitans* water-margin vegetation • U1 b,c,d,f - *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W6 - *Alnus glutinosa - Urtica dioica* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
High Wood, Dunmow (5 - Stort)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Hildersham Wood (5 - Stort)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Hillcollins Pit	• FM - Quaternary of the Thames

Sites of Special Scientific Interest	
Site	**Interest features**
(5 - Stort)	
Hunsdon Mead (5 - Stort)	• MG4 - *Alopecurus pratensis - Sanguisorba officinalis* grassland • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland
Langley Wood (5 - Stort)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Little Hallingbury Marsh (5 - Stort)	• S14 - *Sparganium erectum* swamp • S5 - *Glyceria maxima* swamp • S7 - *Carex acutiformis* swamp
Nunn Wood (5 - Stort)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Patmore Heath (5 - Stort)	• U1 b,c,d,f - *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland • U2 - *Deschampsia flexuosa* grassland
Plashes Wood (5 - Stort)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Quendon Wood (5 - Stort)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Rye Meads (5 - Stort)	• Aggregations of breeding birds - Tufted Duck, *Aythya fuligula* • Aggregations of non-breeding birds - Bittern, *Botaurus stellaris* • Aggregations of non-breeding birds - Gadwall, *Anas strepera* • Aggregations of non-breeding birds - Shoveler, *Anas clypeata* • Aggregations of non-breeding birds - Tufted Duck, *Aythya fuligula* • *Agrostis - Carex* inland wet grassland • Isolated bird colony - Common tern, *Sterna hirunda* • S25 - *Phragmites australis - Eupatorium cannabinum* tall-herb fen • S4 - *Phragmites australis* swamp and reed-beds • S7 - *Carex acutiformis* swamp
Sawbridgeworth Marsh (5 - Stort)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • S4 - *Phragmites australis* swamp and reed-beds • S5 - *Glyceria maxima* swamp • S7 - *Carex acutiformis* swamp
The Coppice, Kelvedon Hatch (5 - Stort)	• W5 - *Alnus glutinosa - Carex paniculata* woodland
Thorley Flood Pound (5 - Stort)	• *Agrostis - Carex* inland wet grassland • S28 - *Phalaris arundinacea* tall-herb fen • S5 - *Glyceria maxima* swamp

Sites of Special Scientific Interest	
Site	**Interest features**
	• S6 - *Carex riparia* swamp
West Wood, Little Sampford (5 - Stort)	• W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Ash to Brookwood Heaths (6 - Wey)	• Assemblages of breeding birds - Lowland heath • Combinations of species - Bryophytes • H2 - *Calluna vulgaris - Ulex minor* heath • Invertebrate assemblage • M16 - *Erica tetralix - Sphagnum compactum* wet heath • M21 - *Narthecium ossifragum - Sphagnum papillosum* mire • Population of Schedule 8 plant - *Eriophorum gracile*, Slender Cottongrass • Smooth snake, *Coronella austriaca*
Basingstoke Canal (6 - Wey)	• H2 - Calluna vulgaris - Ulex minor heath • Invertebrate assemblage • M16 - *Erica tetralix - Sphagnum compactum* wet heath • Outstanding dragonfly assemblage • S10 - *Equisetum fluviatile* swamp • S12 - *Typha latifolia* swamp • S13 - *Typha angustifolia* swamp • S14 - *Sparganium erectum* swamp • S16 - *Sagittaria sagittifolia* swamp • S19 - *Eleocharis palustris* swamp • S22 - *Glyceria fluitans* water-margin vegetation • S26 - *Phragmites australis - Urtica dioica* tall-herb fen • S28 - *Phalaris arundinacea* tall-herb fen • S4 - *Phragmites australis* swamp and reed-beds • S5 - *Glyceria maxima* swamp • S6 - *Carex riparia* swamp • S7 - *Carex acutiformis* swamp • S8 - *Scirpus lacustris ssp. lacustris* swamp • Standing waters • Vascular plant assemblage
Broadmoor to Bagshot Woods and Heaths (6 - Wey)	• Aggregations of breeding birds - Dartford Warbler, *Sylvia undata* • Aggregations of breeding birds - Hobby, *Falco subbuteo* • Aggregations of breeding birds - Nightjar, *Caprimulgus europaeus* • Aggregations of breeding birds - Woodlark, *Lullula arborea* • H2 - *Calluna vulgaris - Ulex minor* heath

Sites of Special Scientific Interest	
Site	**Interest features**
	• M16 - *Erica tetralix - Sphagnum compactum* wet heath • M21 - *Narthecium ossifragum - Sphagnum papillosum* mire • M25 - *Molinia caerulea - Potentilla erecta* mire • Outstanding dragonfly assemblage
Chawridge Bourne (6 - Wey)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Chobham Common (6 - Wey)	• Aggregations of breeding birds - Dartford Warbler, *Sylvia undata* • Aggregations of breeding birds - Nightjar, *Caprimulgus europaeus* • Aggregations of breeding birds - Woodlark, *Lullula arborea* • Assemblages of breeding birds - Lowland heath • H2 - *Calluna vulgaris - Ulex* minor heath • H3 - *Ulex minor - Agrostis curtisii* heath • Invertebrate assemblage • M16 - *Erica tetralix - Sphagnum compactum* wet heath • M21 - *Narthecium ossifragum - Sphagnum papillosum* mire • Population of RDB aculeate - *Formica rufibarbis*, Red Barbed Ant • Vascular plant assemblage • W4 - *Betula pubescens - Molinia caerulea* woodland • W5 - *Alnus glutinosa - Carex paniculata* woodland
Colony Bog and Bagshot Heath (6 - Wey)	• Aggregations of breeding birds - Dartford Warbler, *Sylvia undata* • Aggregations of breeding birds - Nightjar, *Caprimulgus europaeus* • Aggregations of breeding birds - Woodlark, *Lullula arborea* • H1 - *Calluna vulgaris - Festuca ovina* heath • H2 - *Calluna vulgaris - Ulex minor* heath • H3 - *Ulex minor - Agrostis curtisii* heath • Invertebrate assemblage • M14 - *Schoenus nigricans - Narthecium ossifragum* mire • M16 - *Erica tetralix - Sphagnum compactum* wet heath • M2 - *Sphagnum cuspidatum/recurvum (fallax*) bog pool community • M21 - *Narthecium ossifragum - Sphagnum papillosum* mire • M23 - *Juncus effusus/acutiflorus - Galium palustre* rush pasture • M24 - *Molinia caerulea - Cirsium dissectum* fen meadow • M25 - *Molinia caerulea - Potentilla erecta* mire • M6 - *Carex echinata - Sphagnum recurvum (fallax) /auriculatum (denticulatum*) mire • W4 - *Betula pubescens - Molinia caerulea* woodland

Sites of Special Scientific Interest	
Site	**Interest features**
	• W5 - *Alnus glutinosa - Carex paniculata* woodland
Dumsey Meadow (6 - Wey)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland
Englemere Pond (6 - Wey)	• M5 - *Carex rostrata - Sphagnum squarrosum* mire • S4 - *Phragmites australis* swamp and reed-beds
Horsell Common (6 - Wey)	• Assemblages of breeding birds - Lowland heath • H2 - *Calluna vulgaris - Ulex minor* heath • Invertebrate assemblage • M16 - *Erica tetralix - Sphagnum compactum* wet heath • Populations of nationally scarce butterfly species - *Plebejus argus*, Silver-studded Blue
Knight & Bessborough Reservoirs (6 - Wey)	• Aggregations of non-breeding birds - Shoveler, *Anas clypeata*
Langham Pond (6 - Wey)	• Assemblages of breeding birds - Woodland • Invertebrate assemblage • MG8 - *Cynosurus cristatus - Caltha palustris* grassland • Nationally rare and scarce dragonfly species - *Coenagrion pulchellum*, Variable Damselfly • Standing waters
Ockham and Wisley Commons (6 - Wey)	• H2 - *Calluna vulgaris - Ulex minor* heath • Invertebrate assemblage • M16 - *Erica tetralix - Sphagnum compactum* wet heath • M2 - *Sphagnum cuspidatum/recurvum (fallax)* bog pool community • M21 - *Narthecium ossifragum - Sphagnum papillosum* mire • M25 - *Molinia caerulea - Potentilla erecta* mire • M6 - *Carex echinata - Sphagnum recurvum (fallax) /auriculatum (denticulatum*) mire • Outstanding dragonfly assemblage
Papercourt (6 - Wey)	• Assemblages of breeding birds - Lowland fen without open water • Assemblages of breeding birds - Mixed: Scrub, Woodland • S3 - *Carex paniculata* swamp • S5 - *Glyceria maxima* swamp • S6 - *Carex riparia* swamp • Variety of breeding bird species (70) • Variety of wintering bird species (90) • Vascular plant assemblage

Sites of Special Scientific Interest	
Site	**Interest features**
Sheepleas (6 - Wey)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG3 - *Bromus erectus lowland* calcareous grassland • FM - Quaternary of the Thames • W12 - *Fagus sylvatica - Mercurialis perennis* woodland
Smart's and Prey Heaths (6 - Wey)	• H2 - *Calluna vulgaris - Ulex minor* heath • M16 - *Erica tetralix - Sphagnum compactum* wet heath
Staines Moor (6 - Wey)	• Aggregations of non-breeding birds - Goosander*, Mergus merganser* • Aggregations of non-breeding birds - Pochard, *Aythya ferina* • Aggregations of non-breeding birds - Shoveler, *Anas clypeata* • Aggregations of non-breeding birds - Tufted Duck, *Aythya fuligula* • Flowing waters - Type III: base-rich, low-energy lowland rivers and streams, generally with a stable flow regime • MG13 - *Agrostis stolonifera - Alopecurus geniculatus* grassland • MG5 - *Cynosurus cristatus - Centaurea nigra* grassland • S22 - *Glyceria fluitans* water-margin vegetation • Vascular plant assemblage
Swinley Park and Brick Pits (6 - Wey)	• Invertebrate assemblage • Outstanding dragonfly assemblage
Thorpe Hay Meadow (6 - Wey)	• MG5 - *Cynosurus cristatus - Centaurea nigra* grassland
Thorpe Park No. 1 Gravel Pit (6 - Wey)	• Aggregations of non-breeding birds - Gadwall, *Anas strepera*
Upper Common Pits (6 - Wey)	• ED - Quaternary of the Thames
Whitmoor Common (6 - Wey)	• Assemblages of breeding birds - Lowland heath • H2 - *Calluna vulgaris - Ulex minor* heath • M16 - *Erica tetralix - Sphagnum compactum* wet heath • M21 - *Narthecium ossifragum - Sphagnum papillosum* mire • M25 - *Molinia caerulea - Potentilla erecta* mire • Standing waters • Vascular plant assemblage • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W16 - *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland

Sites of Special Scientific Interest	
Site	**Interest features**
	• W2 - *Salix cinerea - Betula pubescens - Phragmites australis* woodland • W5 - *Alnus glutinosa - Carex paniculata* woodland
Windsor Forest and Great Park (6 - Wey)	• Combinations of species - other groups (fungi and algae) • Invertebrate assemblage • Population of Schedule 5 beetle - *Limoniscus violaceus*, Violet click Beetle • U4 - *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W14 - *Fagus sylvatica - Rubus fruticosus* woodland • W15 - *Fagus sylvatica - Deschampsia flexuosa* woodland
Alkham, Lydden and Swingfield Woods (7 - Dour)	• CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland • CG4 - *Brachypodium pinnatum* lowland calcareous grassland • Vascular plant assemblage • W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W12 - *Fagus sylvatica - Mercurialis perennis* woodland • W14 - *Fagus sylvatica - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Dover to Kingsdown Cliffs (7 - Dour)	• Aggregations of breeding birds - Lesser black-backed Gull, *Larus fuscus* • Assemblages of breeding birds - Mixed: Scrub, Woodland • CG4 - *Brachypodium pinnatum* lowland calcareous grassland • CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland • EC - Cenomanian-Maastrichtian • IA - Coastal Geomorphology • Invertebrate assemblage • Isolated bird colony - Fulmar, *Fulmarus glacialis* • Isolated bird colony - Kittiwake, *Rissa tridactyla* • MC1 - *Crithmum maritimum - Spergularia rupicola* maritime rock-crevice community • MC11 - *Festuca rubra - Daucus carota ssp. gummifer* maritime grassland • MC4 - *Brassica oleracea* maritime cliff-ledge community • MC8 - *Festuca rubra - Armeria maritima* maritime grassland • Rare bird species or feature (cliff nesting) - House martin, *Hirundo urbica* • Reefs • Vascular plant assemblage
Dungeness, Romney Marsh and Rye Bay (7 - Dour)	• >20,000 Non-breeding waterbirds • Aggregations of breeding birds - Avocet, *Recurvirostra avosetta* • Aggregations of breeding birds - Bearded Tit, *Panurus biarmicus*

Sites of Special Scientific Interest	
Site	**Interest features**
	• Aggregations of breeding birds - Black-headed Gull, *Larus ridibundus*
	• Aggregations of breeding birds - Cetti's Warbler, *Cettia cetti*
	• Aggregations of breeding birds - Common Tern, *Sterna hirundo*
	• Aggregations of breeding birds - Cormorant, *Phalacrocorax carbo*
	• Aggregations of breeding birds - Gadwall, *Anas strepera*
	• Aggregations of breeding birds - Garganey, *Anas querquedula*
	• Aggregations of breeding birds - Little Grebe, *Tachybaptus ruficollis*
	• Aggregations of breeding birds - Little Tern, *Sterna albifrons*
	• Aggregations of breeding birds - Mediterranean Gull, *Larus melanocephalus*
	• Aggregations of breeding birds - Pochard, *Aythya ferina*
	• Aggregations of breeding birds - Sandwich Tern, *Sterna sandvicensis*
	• Aggregations of breeding birds - Shoveler, *Anas clypeata*
	• Aggregations of breeding birds - Tufted Duck, *Aythya fuligula*
	• Aggregations of breeding birds - Water Rail, *Rallus aquaticus*
	• Aggregations of non-breeding birds - Aquatic Warbler, *Acrocephalus paludicola*
	• Aggregations of non-breeding birds - Bewick's Swan, *Cygnus columbianus bewickii*
	• Aggregations of non-breeding birds - Bittern, *Botaurus stellaris*
	• Aggregations of non-breeding birds - Common Sandpiper, *Actitis hypoleucos*
	• Aggregations of non-breeding birds - Coot, *Fulica atra*
	• Aggregations of non-breeding birds - Cormorant, *Phalacrocorax carbo*
	• Aggregations of non-breeding birds - Gadwall, *Anas strepera*
	• Aggregations of non-breeding birds - Golden Plover, *Pluvialis apricaria*
	• Aggregations of non-breeding birds - Great crested Grebe, *Podiceps cristatus*
	• Aggregations of non-breeding birds - Hen Harrier, *Circus cyaneus*
	• Aggregations of non-breeding birds - Little Grebe, *Tachybaptus ruficollis*
	• Aggregations of non-breeding birds - Mute Swan, *Cygnus olor*
	• Aggregations of non-breeding birds - Pochard, *Aythya ferina*
	• Aggregations of non-breeding birds - Ruff, *Philomachus pugnax*
	• Aggregations of non-breeding birds - Sanderling, *Calidris alba*
	• Aggregations of non-breeding birds - Shoveler, *Anas clypeata*
	• Aggregations of non-breeding birds - Teal, *Anas crecca*
	• Aggregations of non-breeding birds - Whimbrel, *Numenius phaeopus*
	• Aggregations of non-breeding birds - White-fronted Goose, *Anser albifrons*
	• Aggregations of non-breeding birds - Wigeon, *Anas penelope*
	• Assemblages of breeding birds - Lowland open waters and their margins
	• Assemblages of breeding birds - Sand-dunes and saltmarshes

Sites of Special Scientific Interest	
Site	**Interest features**
	• Great crested newt, *Triturus cristatus* • IA - Coastal Geomorphology • Invertebrate assemblage • IS - Coastal Geomorphology • Lowland ditch systems • Percolated saline lagoons • Population of pRDB moth - *Coleophora galbulipennella*, a micro moth • Population of pRDB moth - *Ethmia terminella*, a micro moth • Population of pRDB moth - *Lasiocampa trifolii flava*, Pale Grass Eggar • Population of pRDB true bug - *Aphrodes duffieldi*, a leafhopper • Population of RDB beetle - *Dibolia cynoglossi*, a flea beetle • Population of RDB beetle - *Melanotus punctolineatus*, a click beetle • Population of RDB beetle - *Omophron limbatum*, a ground beetle • Population of RDB moss - *Bryum warneum*, Warne's Thread-moss • Population of RDB moth - *Hadena albimacula*, White-spot • Population of RDB moth - *Hydraecia osseola hucherardi*, Marsh Mallow Moth • Population of RDB spider - *Apostenus fuscus*, a spider • Population of RDB spider - *Euophrys browningi*, a jumping spider • Population of RDB spider - *Pellenes tripunctatus*, a jumping spider • Population of Schedule 5 leech - *Hirudo medicinalis*, Medicinal Leech • Population of Schedule 5 moth - *Thalera fimbrialis*, Sussex Emerald • Population of Schedule 8 plant - *Gnaphalium luteoalbum*, Jersey Cudweed • Population of Schedule 8 plant - *Himantoglossum hircinum*, Lizard Orchid • Population of Schedule 8 plant - *Lactuca saligna*, Least Lettuce • Population of Schedule 8 plant - *Ophrys sphegodes*, Early Spider-orchid • S27 - *Carex rostrata - Potentilla palustris* swamp • S4 - *Phragmites australis* swamp and reed-beds • SD1 - *Rumex crispus - Glaucium flavum* shingle community • SD11 - *Carex arenaria - Cornicularia aculeata* dune community • SD12 - *Carex arenaria - Festuca ovina - Agrostis capillaris* dune grassland • SD2 - *Honkenya peploides - Cakile maritima* strandline community • SD4 - *Elymus farctus ssp. Boreali-atlanticus* foredune community • SD5 - *Leymus arenarius* mobile dune community • SD6 - *Ammophila arenaria* mobile dune community • SD7 - *Ammophila arenaria - Festuca rubra* semi-fixed dune community • SD8 - *Festuca rubra - Galium verum* fixed dune grassland • SD9 - *Ammophila arenaria - arrhenatherum elatius* dune grassland

Sites of Special Scientific Interest	
Site	**Interest features**
	• SM10 - Transitional low marsh vegetation with *Puccinellia maritima*, annual *Salicornia* species and *Suaeda maritima* • SM11 - *Aster tripolium var. discoides* - saltmarsh • SM12 - *Rayed Aster tripolium* on saltmarsh • SM13a - *Puccinellia maritima* saltmarsh, *Puccinellia maritima* dominant sub-community • SM16b - *Festuca rubra* saltmarsh *Juncus gerardii* sub-community • SM16d - *Festuca rubra* saltmarsh tall *Festuca rubra* sub-community • SM17 - *Artemisia maritima* saltmarsh • SM24 - *Elytrigia atherica* saltmarsh • SM28 - *Elytrigia repens* saltmarsh • SM4 - *Spartina maritima* • SM5 - *Spartina alterniflora* • SM6 - *Spartina anglica* saltmarsh • SM7 - *Sarcocornia perennis* • SM8 - *Annual Salicornia* saltmarsh • SM9 - *Suaeda maritima* saltmarsh • Standing waters • Vascular plant assemblage • Water vole, *Arvicola terrestris*
Folkestone to Etchinghill Escarpment (7 - Dour)	• Assemblages of breeding birds - Mixed: Scrub, Woodland • CG4 - *Brachypodium pinnatum* lowland calcareous grassland • CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland • Combinations of species - Lichens • FB - Quaternary of South-East England • FM - Quaternary of South-East England • Invertebrate assemblage • Population of Schedule 8 plant - *Ophrys fuciflora*, Late Spider-orchid • Population of Schedule 8 plant - *Ophrys sphegodes*, Early Spider-orchid • Population of Schedule 8 plant - *Orobanche caryophyllacea*, Bedstraw Broomrape • Populations of nationally scarce butterfly species - *Polyommatus bellargus*, Adonis Blue • Vascular plant assemblage • W7 - *Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Folkestone Warren	• CG4 - *Brachypodium pinnatum* lowland calcareous grassland

Sites of Special Scientific Interest	
Site	**Interest features**
(7 - Dour)	• CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland • EC - Aptian - Albian • EC - Cenomanian-Maastrichtian • EC - Jurassic - Cretaceous Reptilia • IA - Mass Movement • Invertebrate assemblage • MC1 - Crithmum maritimum - Spergularia rupicola maritime rock-crevice community • MC11 - *Festuca rubra - Daucus carota ssp. gummifer* maritime grassland • MC4 - *Brassica oleracea* maritime cliff-ledge community • MC8 - *Festuca rubra - Armeria maritima* maritime grassland • Population of Schedule 5 moth - *Bembecia chrysidiformis*, Fiery Clearwing • Reefs • Vascular plant assemblage
Gibbin's Brook (7 - Dour)	• M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • M23 - *Juncus effusus/acutiflorus - Galium palustre* rush pasture • U4 - *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland • W5 - *Alnus glutinosa - Carex paniculata* woodland
Great Shuttlesfield Down (7 - Dour)	• CG4 - *Brachypodium pinnatum* lowland calcareous grassland • CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland • Population of Schedule 8 plant - *Ophrys fuciflora,* Late Spider-orchid • Populations of nationally scarce butterfly species - *Polyommatus bellargus*, Adonis Blue
Ileden and Oxenden Woods (7 - Dour)	• Assemblages of breeding birds - Mixed: Scrub, Woodland • W12 - *Fagus sylvatica - Mercurialis perennis* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Lydden and Temple Ewell Downs (7 - Dour)	• CG4 - *Brachypodium pinnatum* lowland calcareous grassland • CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland • Invertebrate assemblage • Population of nationally rare butterfly species - *Hesperia comma*, Silver-spotted Skipper • Vascular plant assemblage
Lympne Escarpment (7 - Dour)	• CG4 - *Brachypodium pinnatum* lowland calcareous grassland • M22 - *Juncus subnodulosus - Cirsium palustre* fen meadow • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland

Sites of Special Scientific Interest	
Site	**Interest features**
Lynsore Bottom (7 - Dour)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland
Otterpool Quarry (7 - Dour)	• ED - Aptian - Albian
Parkgate Down (7 - Dour)	• CG4 - *Brachypodium pinnatum* lowland calcareous grassland • CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland • Vascular plant assemblage
Seabrook Stream (7 - Dour)	• Invertebrate assemblage • M27 - *Filipendula ulmaria - Angelica sylvestris* mire • U1 b,c,d,f - *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland • W6 - *Alnus glutinosa - Urtica dioica* woodland
Ardleigh Gravel Pit (8 - Brett)	• ED - Quaternary of the Thames
Bullock Wood (8 - Brett)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Cattawade Marshes (8 - Brett)	• Assemblages of breeding birds - Lowland damp grasslands
Clacton Cliffs & Foreshore (8 - Brett)	• EC - Quaternary of the Thames • FB - Quaternary of the Thames
Colne Estuary (8 - Brett)	• Aggregations of breeding birds - Little Tern, *Sterna albifrons* • Aggregations of non-breeding birds - Black-tailed Godwit, *Limosa islandica* • Aggregations of non-breeding birds - Brent Goose (Dark-bellied), *Branta bernicla* • Aggregations of non-breeding birds - Dunlin, *Calidris alpina* • Aggregations of non-breeding birds - Grey Plover, *Pluvialis squatarola* • Aggregations of non-breeding birds - Redshank, *Tringa totanus* • Aggregations of non-breeding birds - Ringed Plover, *Charadrius hiaticula* • Aggregations of non-breeding birds - Sanderling, *Calidris alba* • EC - Quaternary of the Thames • IA - Saltmarsh Morphology • Invertebrate assemblage • Outstanding dragonfly assemblage • SD2 - *Honkenya peploides - Cakile maritima* strandline community

Sites of Special Scientific Interest	
Site	**Interest features**
	• SM13a - *Puccinellia maritima* saltmarsh, *Puccinellia maritima* dominant sub-community • SM14 - *Atriplex portulacoides* saltmarsh • Vascular plant assemblage
Hamford Water (8 - Brett)	• Aggregations of breeding birds - Little Tern, *Sterna albifrons* • Aggregations of breeding birds - Ringed Plover, *Charadrius hiaticula* • Aggregations of non-breeding birds - Black-tailed Godwit, *Limosa islandica* • Aggregations of non-breeding birds - Brent Goose (Dark-bellied), *Branta bernicla* • Aggregations of non-breeding birds - Curlew, *Numenius arquata* • Aggregations of non-breeding birds - Dunlin, *Calidris alpina* • Aggregations of non-breeding birds - Grey Plover, *Pluvialis squatarola* • Aggregations of non-breeding birds - Pintail, *Anas acuta* • Aggregations of non-breeding birds - Redshank, *Tringa totanus* • Aggregations of non-breeding birds - Ringed Plover, *Charadrius hiaticula* • Aggregations of non-breeding birds - Sanderling, *Calidris alba* • Aggregations of non-breeding birds - Shelduck, *Tadorna* • Aggregations of non-breeding birds - Teal, *Anas crecca* • Aggregations of non-breeding birds - Wigeon, *Anas penelope* • SD2 - *Cakile maritima-Honkenya peploides* strandline community • SM13a - *Puccinellia maritima* saltmarsh, *Puccinellia maritima* dominant sub-community • SM14 - *Atriplex portulacoides* saltmarsh • Vascular plant assemblage
Harwich Foreshore (8 - Brett)	• EC - Tertiary Palaeobotany
Holland Haven Marshes (8 - Brett)	• Lowland ditch systems • Vascular plant assemblage
Holland On Sea Cliff (8 - Brett)	• EC - Quaternary of the Thames
Little Oakley Channel Deposit (8 - Brett)	• FB - Quaternary of the Thames
Riddles Wood (8 - Brett)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland

Sites of Special Scientific Interest	
Site	**Interest features**
St Osyth Pit (8 - Brett)	• ED - Quaternary of the Thames
Stour and Copperas Woods, Ramsey (8 - Brett)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland
Stour Estuary (8 - Brett)	• Aggregations of non-breeding birds - Black-tailed Godwit, *Limosa islandica* • Aggregations of non-breeding birds - Brent Goose (Dark-bellied), *Branta bernicla* • Aggregations of non-breeding birds - Cormorant, *Phalacrocorax carbo* • Aggregations of non-breeding birds - Curlew, *Numenius arquata* • Aggregations of non-breeding birds - Dunlin, *Calidris alpina* • Aggregations of non-breeding birds - Great crested Grebe, *Podiceps cristatus* • Aggregations of non-breeding birds - Grey Plover, *Pluvialis squatarola* • Aggregations of non-breeding birds - Knot, *Calidris canutus* • Aggregations of non-breeding birds - Mute Swan, *Cygnus olor* • Aggregations of non-breeding birds - Pintail, *Anas acuta* • Aggregations of non-breeding birds - Redshank, *Tringa totanus* • Aggregations of non-breeding birds - Ringed Plover, *Charadrius hiaticula* • Aggregations of non-breeding birds - Shelduck, *Tadorna* • EC - Pleistocene Vertebrata • EC - Quaternary of East Anglia • EC - Tertiary Palaeobotany • Population of Schedule 5 annelid worm - *Alkmaria romijni*, Tentacled Lagoon-worm • Population of Schedule 5 sea anemone - *Nematostella vectensis*, Starlet Sea Anemone • Sheltered muddy shores (including estuarine muds) • Vascular plant assemblage
The Naze (8 - Brett)	• EC - Aves • EC - Quaternary of East Anglia • EC - Tertiary Palaeobotany
Upper Colne Marshes (8 - Brett)	• Lowland ditch systems • Vascular plant assemblage
Weeleyhall Wood (8 - Brett)	• W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland • W7 - *Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum* woodland • W8 - *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland

Sites of Special Scientific Interest	
Site	**Interest features**
Wivenhoe Gravel Pit (8 - Brett)	• ED - Quaternary of the Thames

Annex C heritage assets at risk

Name	Type
The Greenway, Uxbridge	Conservation Area
Harmondsworth Village, Heathrow Villages	Conservation Area
Black Jacks Lock and Copper Mill Lock, Harefield	Conservation Area
Botwell (Thorn/EMI), Hayes	Conservation Area
Botwell (Nestles), Hayes	Conservation Area
Longford Village, Heathrow Villages	Conservation Area
Morford Way, Eastcote, Ruislip	Conservation Area
Cranford Park, Cranford	Conservation Area
Bulls Bridge, Hayes	Conservation Area
Harlington Village, Heathrow Villages	Conservation Area
Brooklands, Byfleet	Conservation Area
Norwood Green, Southall	Conservation Area
Hanwell Village Green, Hanwell W7	Conservation Area
Cuckoo Estate, Hanwell W7	Conservation Area
College Farm, Finchley N3	Conservation Area
High Town Road	Conservation Area
Plaiters Lea, Town Centre	Conservation Area
Northwood Town Centre, Green Lane, Northwood	Conservation Area
Wormley	Conservation Area
Hanwell flight of locks and brick boundary wall of St Bernard's Hospital	Scheduled Monument
Moated site at Sudbury golf course, Wembley	Scheduled Monument
Linear earthworks in Pear Wood, west of Watling Street	Scheduled Monument
Moated site, west bank of River Pinn, near Ickenham (1/2 mile (800m) north west of church)	Scheduled Monument
Manor Farm moat, Ickenham	Scheduled Monument
Grim's Ditch: section north of Blythwood House	Scheduled Monument
Windmill Bridge	Scheduled Monument
Romano-British site 1000yds (910m) west of East Bedfont parish church	Scheduled Monument
Double ditched enclosure beside A30 road 500yds (460m) west of East Bedfont parish church	Scheduled Monument
Grim's Ditch: section extending 1500yds (1370m) north east from Oxhey Lane	Scheduled Monument
Site of Waltham Hall, Takeley	Scheduled Monument
The Aubreys camp, Redbourn	Scheduled Monument
Wheathampstead earthwork incorporating Devils Dyke and the Slad, Wheathampstead / Sandridge	Scheduled Monument
Grim's Ditch: four linear sections between Uxbridge Road and Oxhey Lane	Scheduled Monument
Triple ditches at Galley Hill, Sandon / Kelshall	Scheduled Monument
Ring ditch and enclosure, Newnham	Scheduled Monument
Dunstable Priory, Dunstable	Scheduled Monument
Settlement site north east of Letty Green, Hertingfordbury	Scheduled Monument
Roman site near railway station, Braughing / Standon	Scheduled Monument
Moated site at Down Barns Farm	Scheduled Monument
Roman villa 1000yds (910m) north east of Ashwell village, Guilden Morden	Scheduled Monument
Stansted Castle: a ringwork and associated bailey 100m north of Elms Farm, Stansted Mountfitchet	Scheduled Monument

Two bowl barrows at Bygrave, 650m east of Park Wood, Bygrave	Scheduled Monument
Thundridgebury moated enclosure and associated remains of Thundridgebury House, St Mary and All Saints' Church and graveyard, Thundridge	Scheduled Monument
Wymondley Priory, barn, moat, associated earthworks, enclosures, platforms, hollow-way and conduit head, Wymondley	Scheduled Monument
Roman fort, Roman town, Roman and Anglo-Saxon cemeteries at Great Chesterford, Great Chesterford	Scheduled Monument
Roman villa 500m north east of Harlowbury	Scheduled Monument
Romano-British small town and late Iron Age settlement at Baldock	Scheduled Monument
Slight univallate hillfort on Wilbury Hill, Letchworth Garden City / Ickleford	Scheduled Monument
Romano-Celtic temple 400m south of Dell's Farm, Great Chesterford	Scheduled Monument
Brockley Hill Romano-British pottery and settlement	Scheduled Monument
A London mobilisation centre known as the North Weald Redoubt, North Weald Bassett / Bobbingworth	Scheduled Monument
Pinner deer park, Pinner Park Farm	Scheduled Monument
Totternhoe Castle: a motte and bailey castle, medieval quarries and cultivation terraces, Totternhoe	Scheduled Monument
Ruins of Church of St Etheldreda, Chesfield, Graveley	Scheduled Monument
Minsden Chapel, Whitwell Road, Langley	Scheduled Monument
Walls of moated site at Grove Farm, Ashley Green	Scheduled Monument
Bury Hill, Castle Lane, Saffron Walden	Scheduled Monument
Remains of St Mary and All Saints, Old Church Lane, Thundridge	Scheduled Monument
Latton Priory, London Road, North Weald Bassett	Scheduled Monument
Essex Redoubt at Ongar Radio Station, North Weald Bassett / Bobbingworth	Scheduled Monument
The Benedictine Priory of St Mary (Sopwell Priory) and the post-medieval mansions known as Sopwell House or Lee Hall	Scheduled Monument
The Railway Straight-Brooklands Motor Racing Circuit, Byfleet	Scheduled Monument
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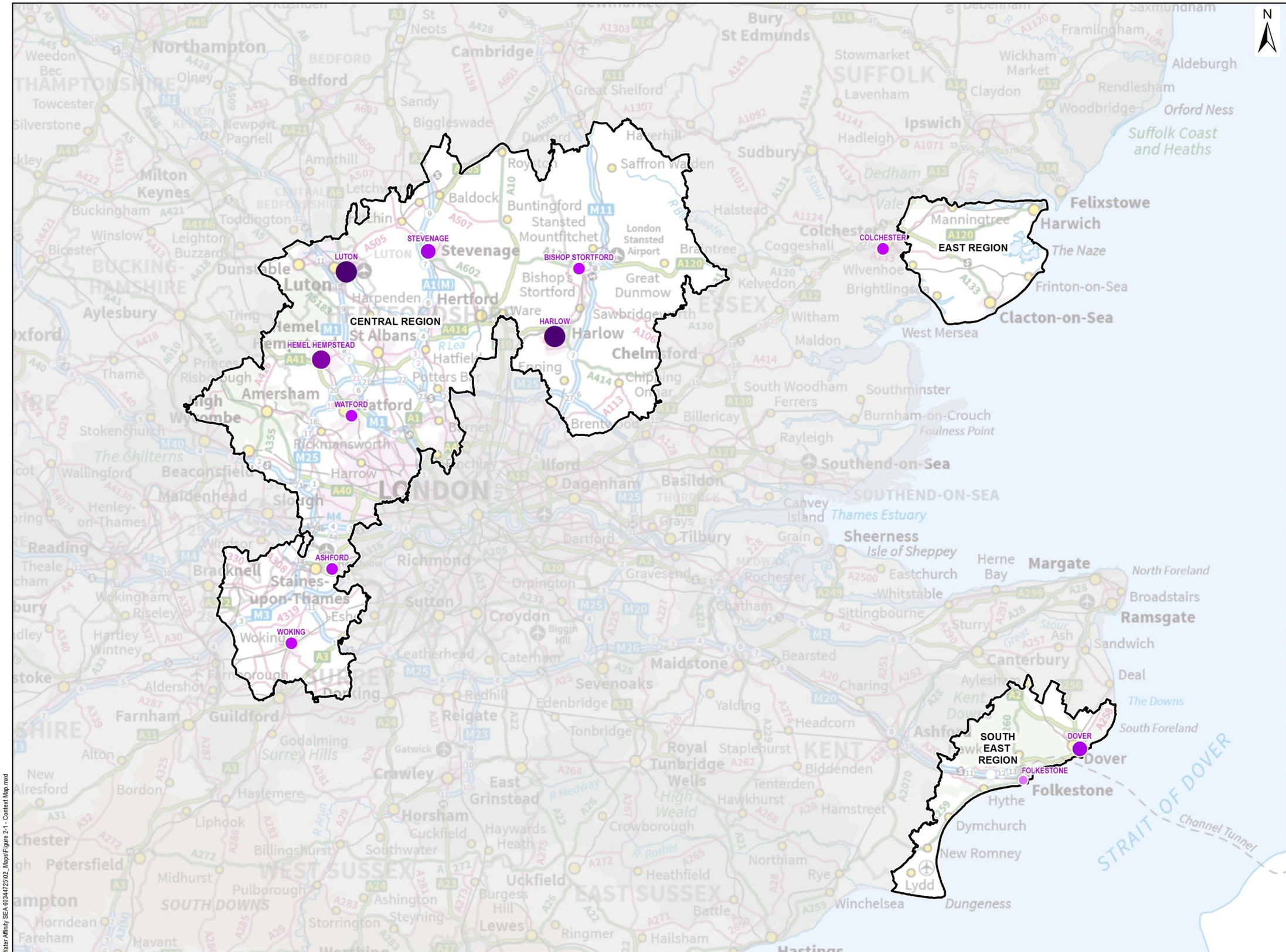
Bury Hill, Castle Lane, Saffron Walden	Scheduled Monument
Remains of St Mary and All Saints, Old Church Lane, Thundridge	Scheduled Monument
Latton Priory, London Road, North Weald Bassett	Scheduled Monument
Essex Redoubt at Ongar Radio Station, North Weald Bassett / Bobbingworth	Scheduled Monument
The Benedictine Priory of St Mary (Sopwell Priory) and the post-medieval mansions known as Sopwell House or Lee Hall	Scheduled Monument
The Railway Straight-Brooklands Motor Racing Circuit, Byfleet	Scheduled Monument
Old Stanmore Church, Church Road, Stanmore	Listed Building
Parish Church of All Saints, Church Lane, Little Munden	Listed Building
Church of St Mary the Virgin, The Street, High Ongar	Listed Building
Parish Church of St Christopher Willingale Doe, Village Street, Willingale	Listed Building
Church of St Michael and All Angels, Church Lane, Sunninghill, Sunninghill and Ascot	Listed Building
Church of St Nicholas, Church Square, Shepperton	Listed Building
Church of St Mary the Virgin, The Street, Manuden	Listed Building
Church of St Andrew, St Andrew Street, Hertford	Listed Building
Church of St Nicholas, Willingale Road, Fyfield	Listed Building
Church of St Faith, Barton Road, Hexton	Listed Building
Church of St Mary, Church Street, Baldock	Listed Building
Church of St Mary Magdalene, Squires Bridge Road, Sunbury	Listed Building
Barn at Little Canfield Hall, Little Canfield	Listed Building
College Farm Dairy, Fitzalan Road N3	Listed Building
Physic Well, Well Approach	Listed Building
Remains of old church tower of St Mary and All Saints Church, Thundridge	Listed Building
Southall Manor House, The Green, Southall	Listed Building

St Bernard's Hospital, Uxbridge Road, Southall	Listed Building
Twyford Abbey, Twyford Abbey Road NW10	Listed Building
Norwood Hall, Norwood Green Road, Southall	Listed Building
Boundary wall fronting road (Hill House), 173, Stanmore Hill (West Side), Stanmore	Listed Building
Brick Kiln to south east of the Kiln, Common Road, Stanmore	Listed Building
Pinner Park Farmhouse, George V Avenue, Pinner	Listed Building
Cannons Farm Barn, Hereford Gardens, Pinner	Listed Building
Garden wall to Bernays Gardens, Old Church Lane, Stanmore	Listed Building
Langley Farm Barn, Breakspear Road North, Harefield, Northwood	Listed Building
Nurses Home in grounds of Hillingdon Hospital, Pield Heath Road, Hillingdon	Listed Building
Cranford House Stables, Roseville Road, Cranford	Listed Building
Breakspear House, Breakspear Road North, Harefield	Listed Building
Mount Vernon Hospital, Rickmansworth Road, Northwood	Listed Building
Benlow Works, Silverdale Road, Hayes	Listed Building
Harefield Park (annexe to Harefield Hospital), Hill End Road, Harefield	Listed Building
The Dower House, 393, High Street, Harlington	Listed Building
Former King Henry public house and stables, 456, Bath Road, Longford	Listed Building
Round House, the village lock up, High Street	Listed Building
Lych gate to south of Church of St Mary, Church Walk, Hayes	Listed Building
Garden walls to Church Gardens Nursery, Church Hill, Harefield	Listed Building
Wall in front of numbers 30 to 36 (even), Church Road, Hillingdon	Listed Building
Railway Hotel including sign in front and former off-sales building to west, Station Road, Edgware	Listed Building
Knebworth House, Knebworth	Listed Building
North Hertfordshire Masonic Lodge (the Cloisters), Barrington Road, Letchworth Garden City	Listed Building
Tilty Mill, Tilty	Listed Building
Barn at rear of the George Public House, High Street, Great Missenden	Listed Building
Langleybury House, Langleybury, Abbots Langley	Listed Building
Paine Bridge at Brocket Hall, Marford Road, Lemsford, Hatfield	Listed Building
Little Cassiobury and former stable block, Hempstead Road, Watford	Listed Building
Frogmore House, High Street (north east side), Watford	Listed Building
West Barn at Rectory Farm, Shillington Road, Pirton	Listed Building
Harefield Grove, Rickmansworth Road, Harefield	Listed Building
Feltham House, Elmwood Avenue, Feltham	Listed Building
Walls to east and south of garden of number 28 (Coombe House), Church Road, Hillingdon	Listed Building
Front garden wall, The Beeches, High Street, Cowley	Listed Building
Boundary wall fronting road from Nos 118-128, Stanmore Hill (east side), Stanmore	Listed Building
Enterprise House, Blyth Road, Hayes	Listed Building
Monument to Major John Cartwright, St Mary at Finchley Churchyard, Hendon Lane N3	Listed Building
Cellars of former Cranford House, Roseville Road, Cranford	Listed Building
The stable block, north east of Harefield Park, (annexe to Harefield Hospital), Hill End Road, Harefield	Listed Building
Hubbard's Farm Barn and outbuildings, West Drayton Road, Colham Green, Uxbridge	Listed Building

Headstone Manor, Pinner View, Harrow	Listed Building
Barn to the west of Weekly House, Bath Road, Harmondsworth	Listed Building
Walls in front of numbers 52-58 (even) and along west end of property, Church Road, Hillingdon	Listed Building
Littlebury Farmhouse, Romford Road, Stanford Rivers	Listed Building
Kingsmoor House, Paringdon Road	Listed Building
Wall in front of numbers 40 to 50 (even), Church Road, Hillingdon	Listed Building
The stable block, south east of Harefield Park, (annexe to Harefield Hospital), Hill End Road, Harefield	Listed Building
The Cedars, 66, High Street, Uxbridge	Listed Building
Gatehouse at Hillingdon-Uxbridge Cemetery, Uxbridge Road	Listed Building
College Farm - main building, Fitzalan Road N3	Listed Building
Silo, Fitzalan Road, College Farm N3	Listed Building
Toll Gate House, Spaniards Road, Highgate NW3	Listed Building
The Water Tower, East End Road, Finchley N3	Listed Building
The Bothy, East End Road, Finchley N3	Listed Building
Harrow Magistrates Court, Rosslyn Crescent, Wealdstone	Listed Building
Cinema, RAF Uxbridge, Grays Road, Uxbridge	Listed Building
The Rayners public house, 23, Village Way East	Listed Building
The Belvedere, Waldershare Park, Shepherdswell with Coldred	Listed Building
Spring Valley Mill, Spring Valley Lane, Ardleigh	Listed Building
Naze Tower, the Naze, Frinton and Walton	Listed Building
Church of St Peter, The Durlocks, Folkestone	Listed Building
Church of St Michael, The Street, Frinton and Walton	Listed Building
Church of St George, Badley Hall Road, Great Bromley	Listed Building
Bowl barrow 150m north east of Red House Farm, Swingfield	Scheduled Monument
Bowl barrow at Minnis Beeches, Swingfield	Scheduled Monument
Motte and Bailey Castle 200m north west of Stowting Church, Stowting	Scheduled Monument
Fort Burgoyne, Connaught Barracks, Guston / Dover	Scheduled Monument
St Radegunds Abbey, Abbey Road, Hougham Without	Scheduled Monument
Martello Tower No. 5, Sandgate	Scheduled Monument
Martello Tower no 6, Shorncliffe Camp, Sandgate	Scheduled Monument
Martello Tower no 7, Shorncliffe Camp, Sandgate	Scheduled Monument
Martello Tower No. 9, Shorncliffe Camp, Sandgate / Hythe	Scheduled Monument
Dymchurch Redoubt, Hythe Ranges, Hythe	Scheduled Monument
Martello Tower No. 4, The Leas, Folkestone	Scheduled Monument
The Western Heights fortifications, Dover	Scheduled Monument
Crop mark site south of Ardleigh, Ardleigh	Scheduled Monument
Beacon Hill Fort: a late 19th and 20th century coastal artillery fortification, Harwich	Scheduled Monument
St Osyth's Priory, St. Osyth	Scheduled Monument
Martello Tower "D", 450 metres south-south-west of Clubhouse, Clacton Golf Course, Clacton on Sea	Scheduled Monument
Martello Tower "E", 300 metres south west of junction of Marine Parade West and Wash Lane, Clacton on Sea	Scheduled Monument
Martello Tower "K", Kirby Road, Walton on the Naze, Frinton and Walton	Scheduled Monument
Beacon Hill Fort, Harwich	Conservation Area

London Road, Dover, Dover	Conservation Area
Western Heights, Dover, Dover	Conservation Area
Clacton Seafront, Clacton-on-Sea	Conservation Area
Dovercourt, Harwich	Conservation Area
St Osyth, St. Osyth	Conservation Area
Thorpe-le-Soken Station and Maltings, Thorpe-le-Soken	Conservation Area

Annex D Scoping figures



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

Affinity Water Regions

Expected Growth in Dwelling per Settlement

- < 2,500
- 2,501 - 5,000
- 5,001 - 7,500
- 7,501 - 10,000
- > 10,000

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

AFFINITY WATER OPERATING AREA AND MAIN AREAS OF HOUSING GROWTH

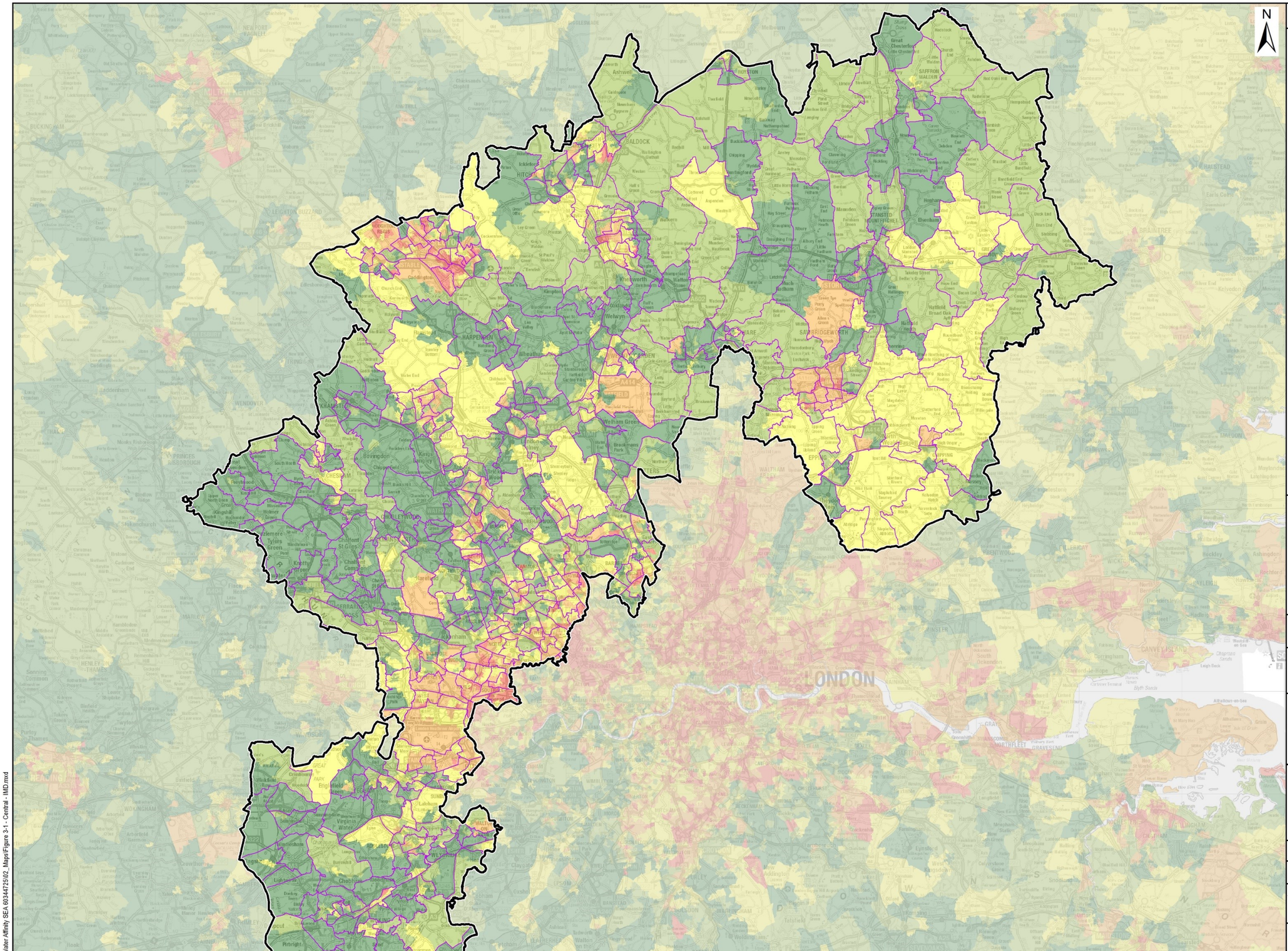
Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:600,000

AECOM
Scott House
Alencon Link, Basingstoke
Hampshire, RG21 7PP

AECOM

Z:\Projects\60344725\02_Maps\Figure 2-1 - Context Map.mxd



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

Affinity Water Regions

Ward Boundary

Indices of Multiple Deprivation by Lower Level Super Output Area (LLSOA)

- 0 - 20% (Most Deprived)
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100% (Least Deprived)

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

INDEX OF MULTIPLE DEPRIVATION (2015)
CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

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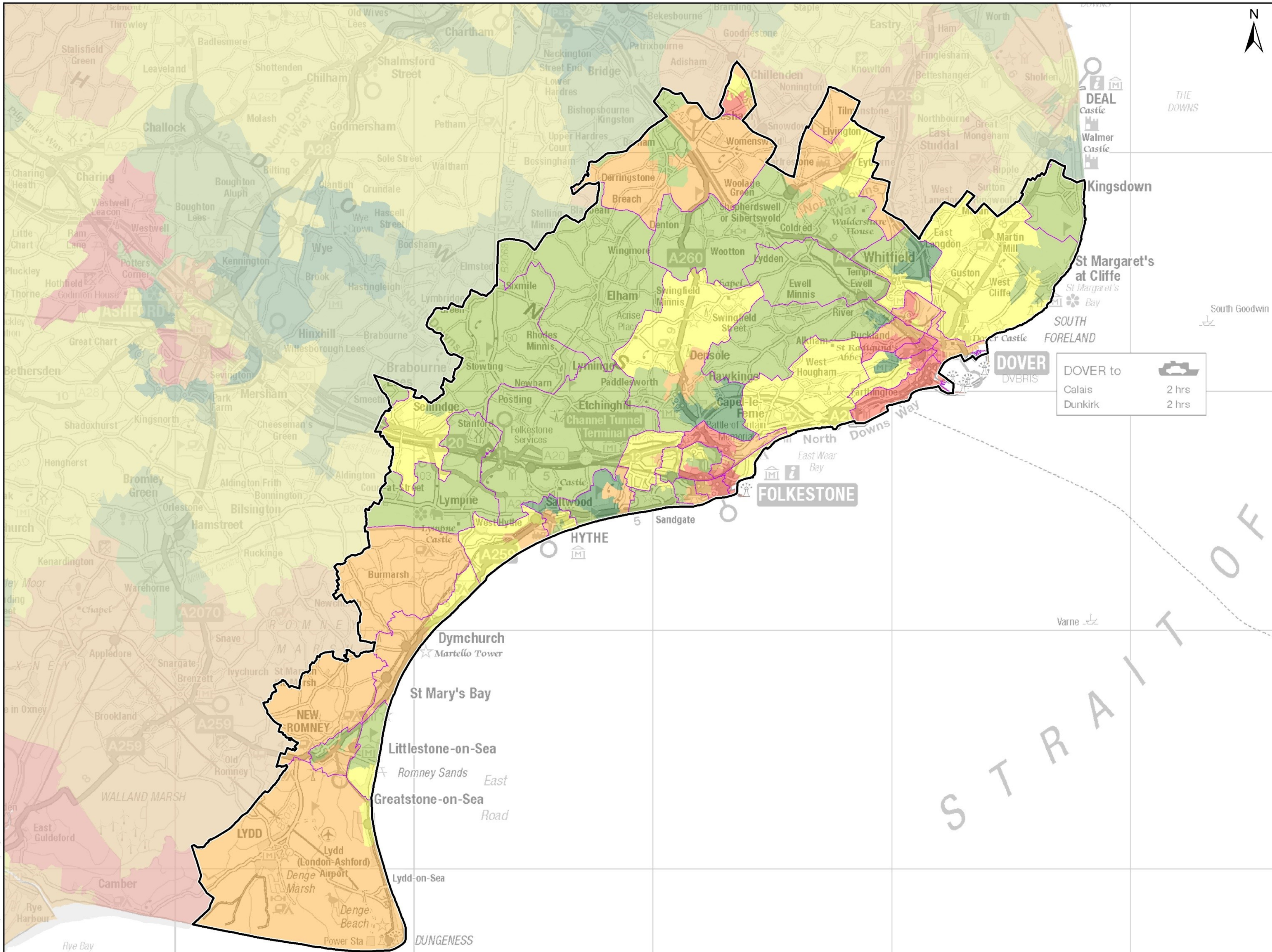
Alençon Link, Basingstoke
Hampshire, RG21 7PP

AECOM

Q:\Projects\60344725\02_Maps\Figure 3-1 - Central - IMD.mxd



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Ward Boundary

Indices of Multiple Deprivation by Lower Level Super Output Area (LLSOA)

- 0 - 20% (Most Deprived)
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100% (Least Deprived)

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
INDEX OF MULTIPLE DEPRIVATION (2015)
SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

AECOM
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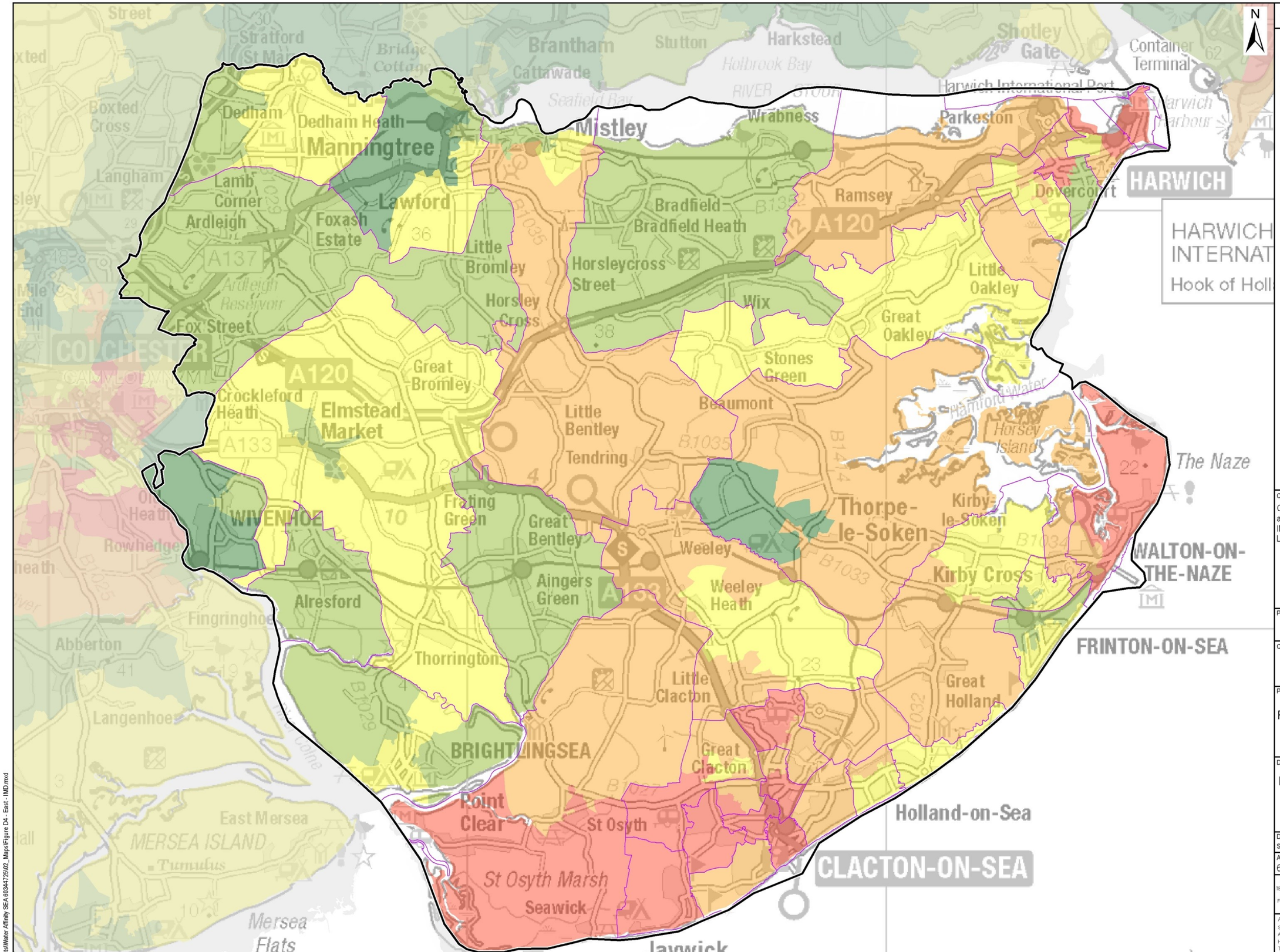
Alençon Link, Basingstoke
Hampshire, RG21 7PP

AECOM

sWater Affinity SEA 60344725\02_Maps\Figure D3 - South East - IMD.mxd



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Ward Boundary

Indices of Multiple Deprivation by Lower Level Super Output Area (LLSOA)

- 0 - 20% (Most Deprived)
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100% (Least Deprived)

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

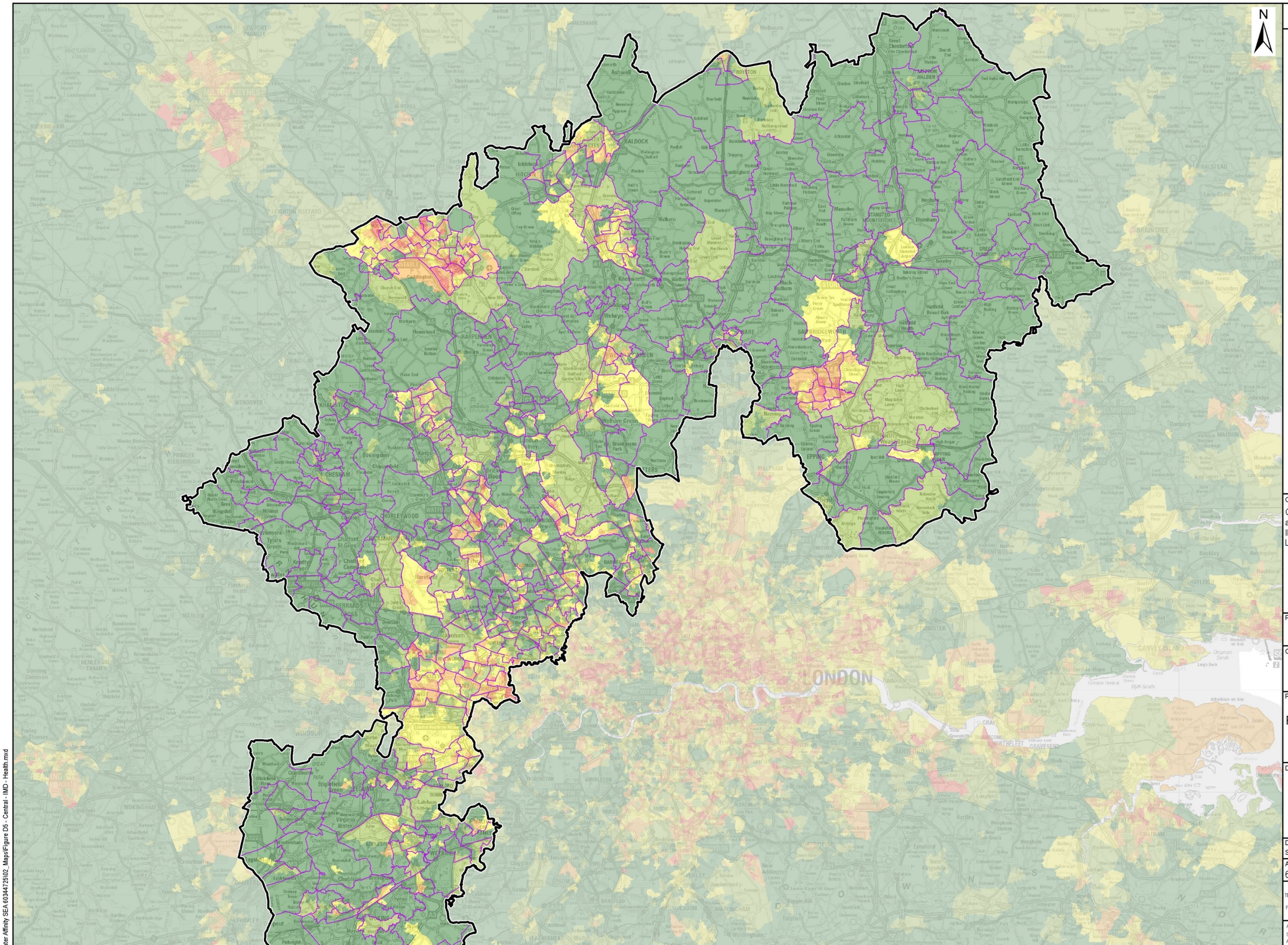
Drawing Title
INDEX OF MULTIPLE DEPRIVATION (2015)
EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	09/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:85,000

AECOM
Scott House
Alencon Link, Basingstoke
Hampshire, RG21 7PP
Telephone (01256) 310200

AECOM



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Ward Boundary

Health Deprivation and Disability by Lower Level Super Output Area (LLSOA)

- 0 - 20% (Most Deprived)
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100% (Least Deprived)

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

HEALTH DEPRIVATION AND DISABILITY (2015) CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

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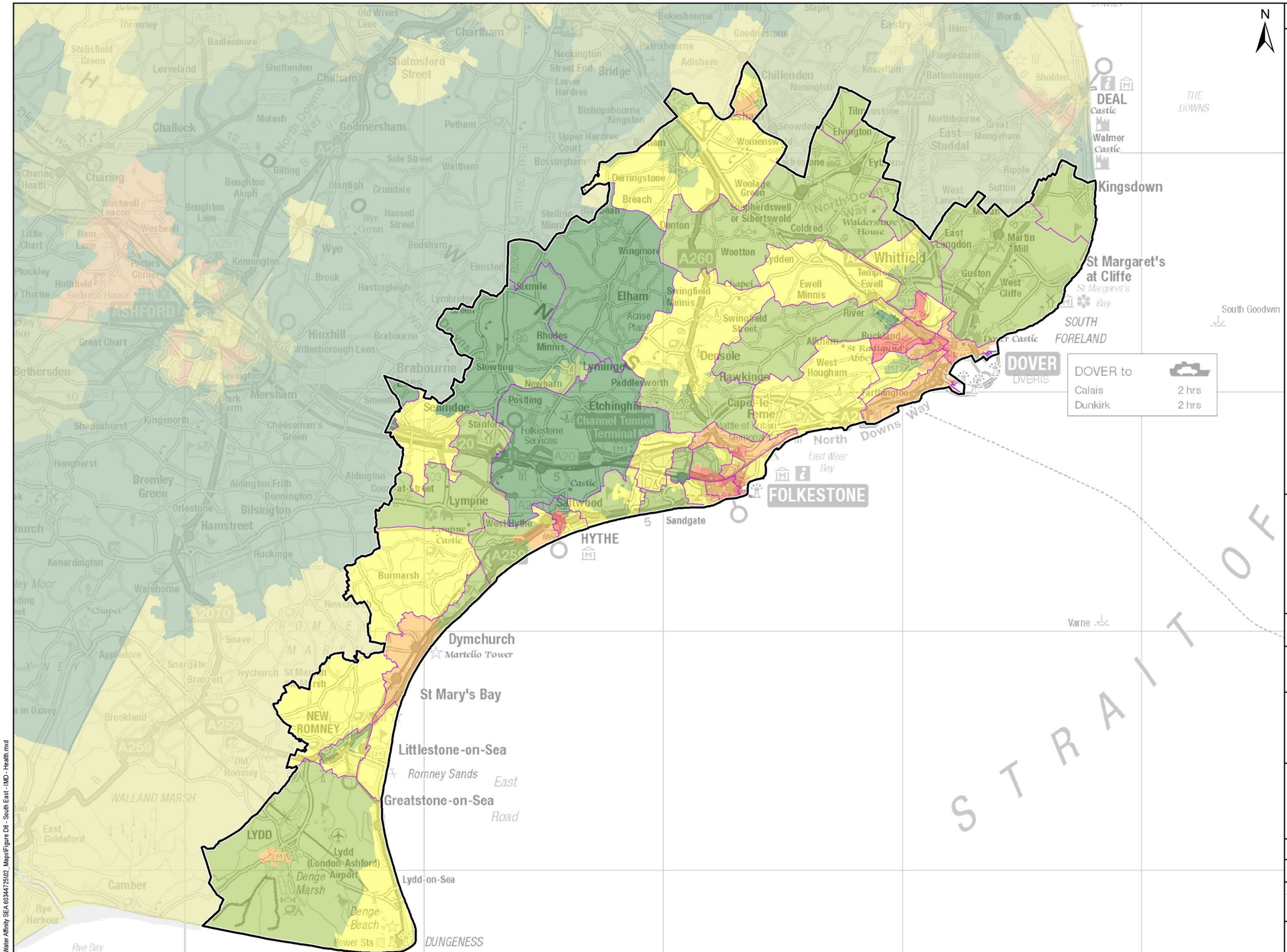
M:\Projects\60344725 Water Affinity SEA 60344725\02_Maps\Figure D5 - Central - IMD - Health.mxd



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Ward Boundary

Health Deprivation and Disability by Lower Level Super Output Area (LLSOA)

- 0 - 20% (Most Deprived)
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100% (Least Deprived)

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

HEALTH DEPRIVATION AND DISABILITY (2015) SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

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Alençon Link, Basingstoke
Hampshire, RG21 7PP

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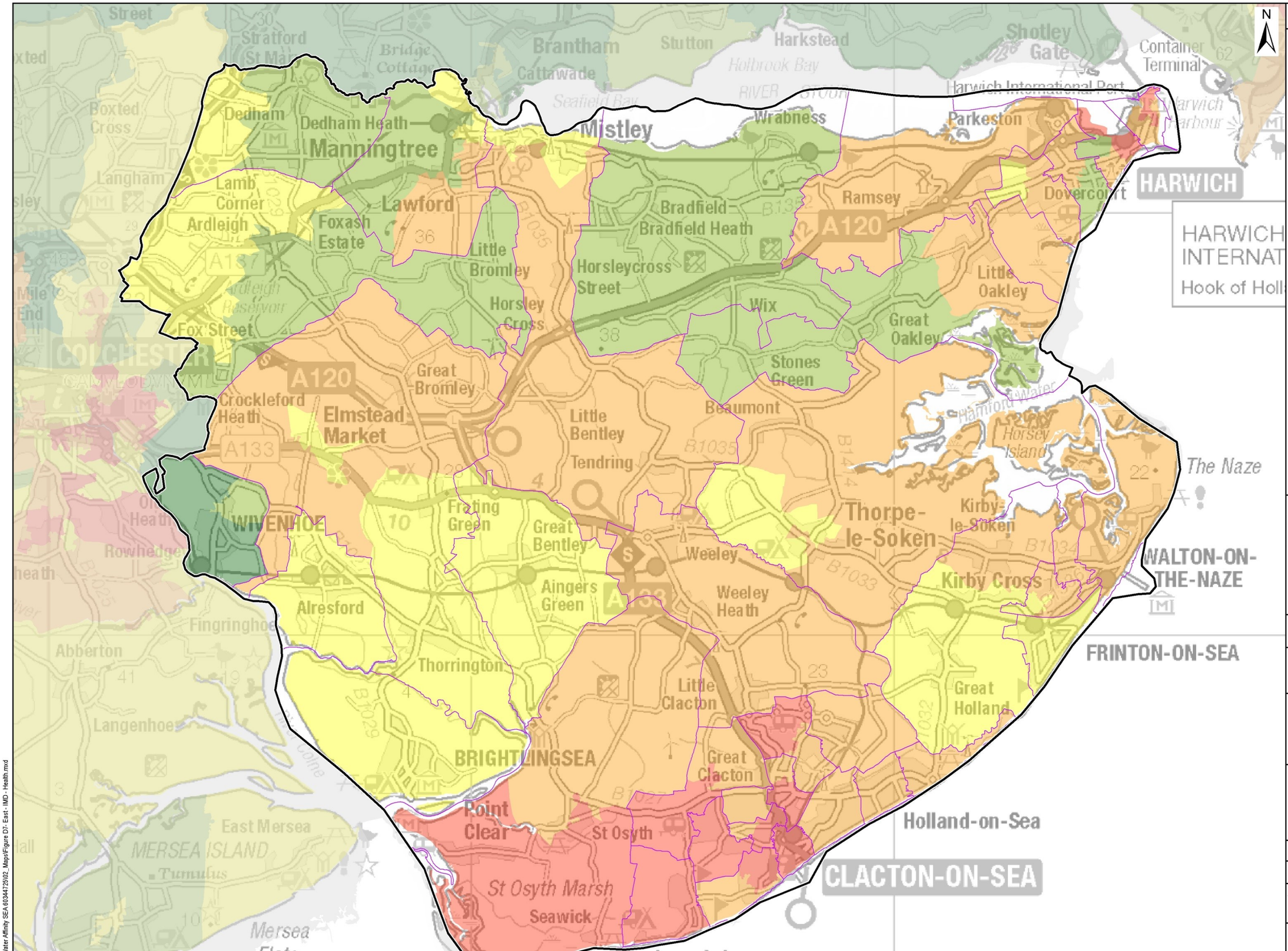

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Ward Boundary

Health Deprivation and Disability by Lower Level Super Output Area (LLSOA)

- 0 - 20% (Most Deprived)
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100% (Least Deprived)

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
HEALTH DEPRIVATION AND DISABILITY (2015) EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:85,000

AECOM
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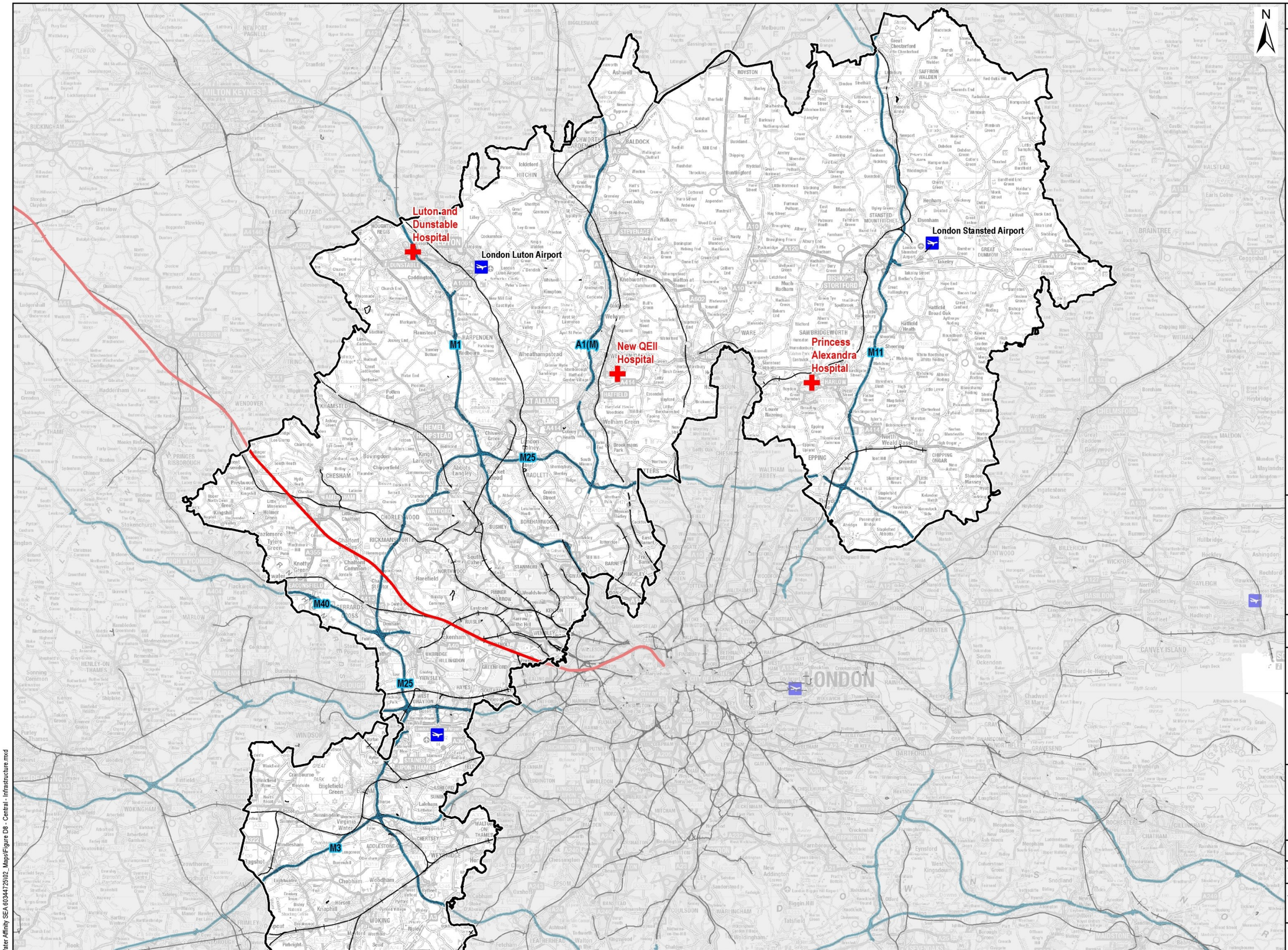
Alençon Link, Basingstoke
Hampshire RG21 7PP

Z:\Projects\60344725\02_Maps\Figure D7- East - IMD - Health.mxd



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- High Speed Rail 2 Alignment
- Rail
- Airport
- Motorway
- Hospital

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

INFRASTRUCTURE CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

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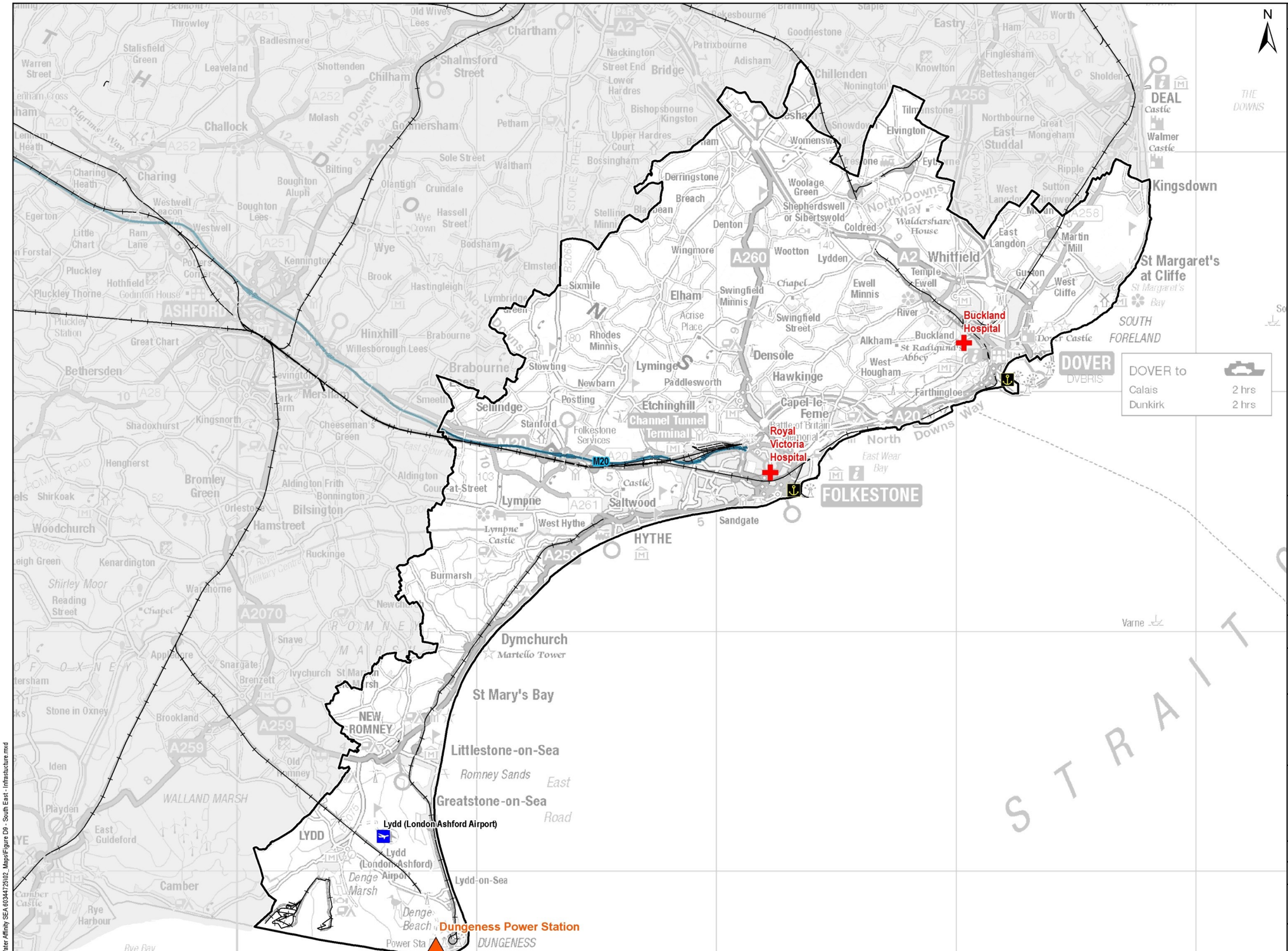
AECOM

Z:\Projects\60344725 Affinity SEA 60344725\02_Maps\Figure D8 - Central - Infrastructure.mxd



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Rail
- Airport
- Motorway
- Port
- Hospital
- Power Station

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
INFRASTRUCTURE
SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

AECOM
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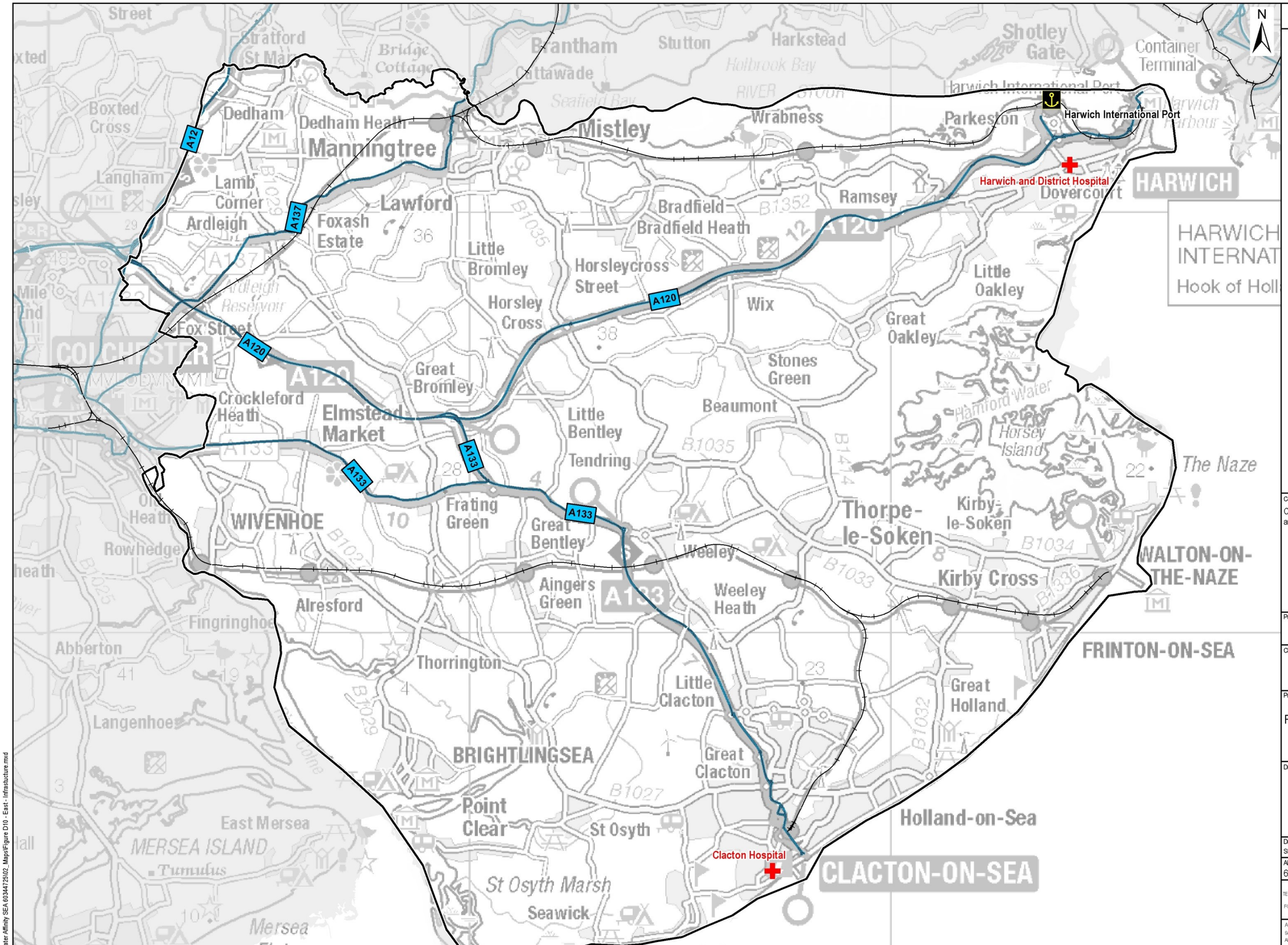

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Rail
- A Road
- Port
- Hospital

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
INFRASTRUCTURE
EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:85,000

AECOM
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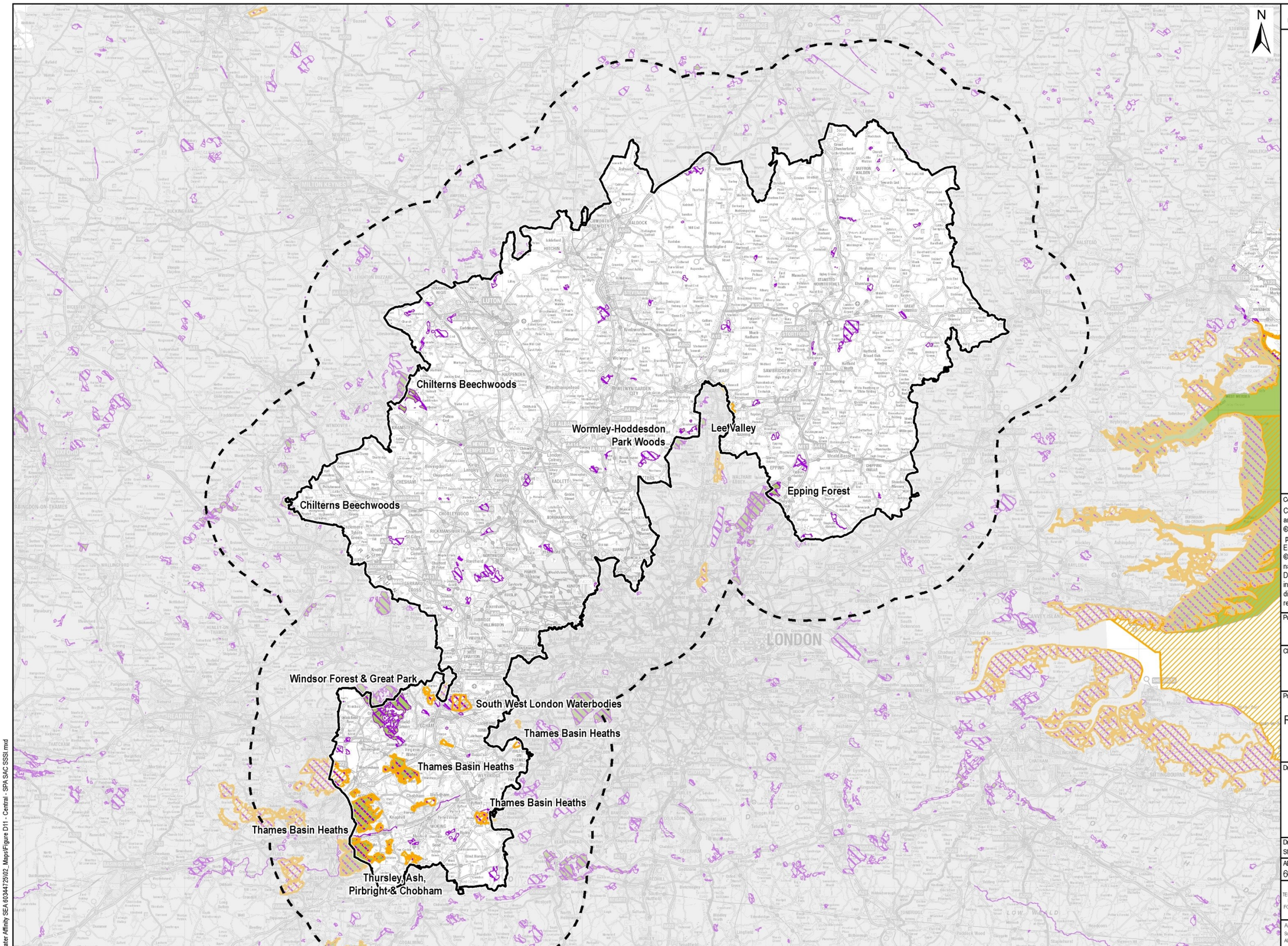
Alençon Link, Basingstoke



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Affinity Water Regions - 10km Buffer
- Special Protection Area (SPA)
- Site of Special Scientific Interest
- Special Area of Conservation (SAC)

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

BIODIVERSITY DESIGNATIONS CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:450,000

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Z:\Projects\60344725\Water Affinity SEA 60344725\02_Maps\Figure D11 - Central - SPA SAC SSSI.mxd

Lydden & Temple Ewell Downs

Parkgate Down

Dover to Kingsdown Cliffs

Folkestone to Etchinghill Escarpment

Dungeness, Romney Marsh and Rye Bay

DOVER to
Calais 2 hrs
Dunkirk 2 hrs

N

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Affinity Water Regions - 10km Buffer
- Special Protection Area (SPA)
- Site of Special Scientific Interest
- Special Area of Conservation (SAC)

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
BIODIVERSITY DESIGNATIONS SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:225,000

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Alencon Link, Basingstoke

Stour Estuary

Stour Estuary

Harwich Foreshore

Stour and Copperas Woods, Ramsey

Little Oakley Channel Deposit

Ardleigh Gravel Pit

Bullock Wood

Hamford Water

Wivenhoe Gravel Pit

Upper Colne Marshes

Weeleyhall Wood

Holland Haven Marshes

Riddles Wood

Colne Estuary

St. Osyth Pit

Holland On Sea Cliff

Clacton Cliffs & Foreshore

Outer Thames Estuary

N

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Affinity Water Regions - 10km Buffer
- Special Protection Area (SPA)
- Site of Special Scientific Interest
- Special Area of Conservation (SAC)

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

BIODIVERSITY DESIGNATIONS EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	11/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:85,000

AECOM
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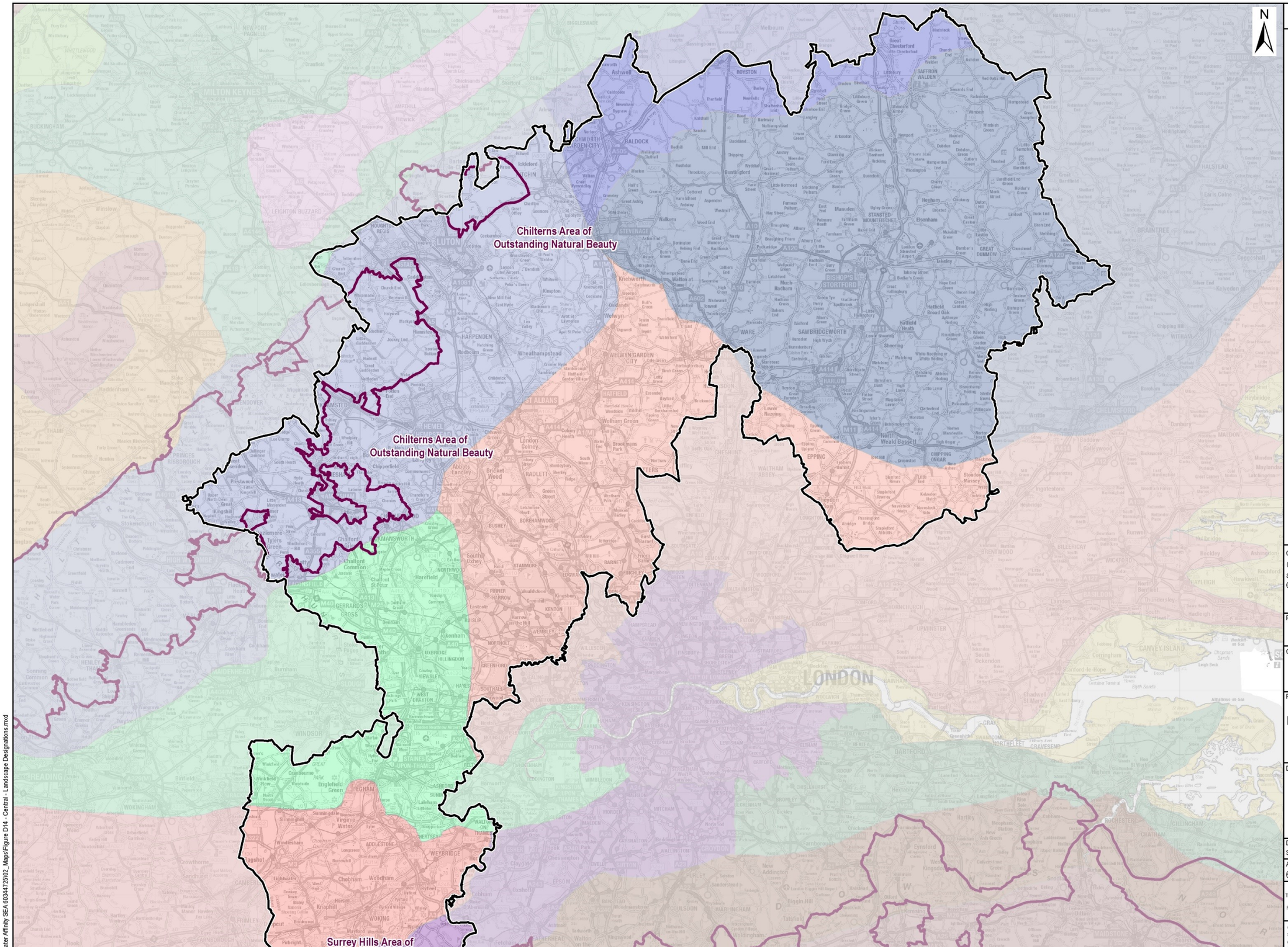
Alencon Link, Basingstoke

AECOM



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Area of Outstanding Natural Beauty (AONB)

Landscape Character Areas

- Bedfordshire and Cambridgeshire Claylands
- Chilterns
- East Anglian
- Inner London
- North Downs
- Northern Thames Basin
- South Suffolk and North Essex Clayland
- Thames Basin Heaths
- Thames Basin Lowlands
- Thames Valley

Purpose of Issue
FINAL

Client
AFFINITY WATER

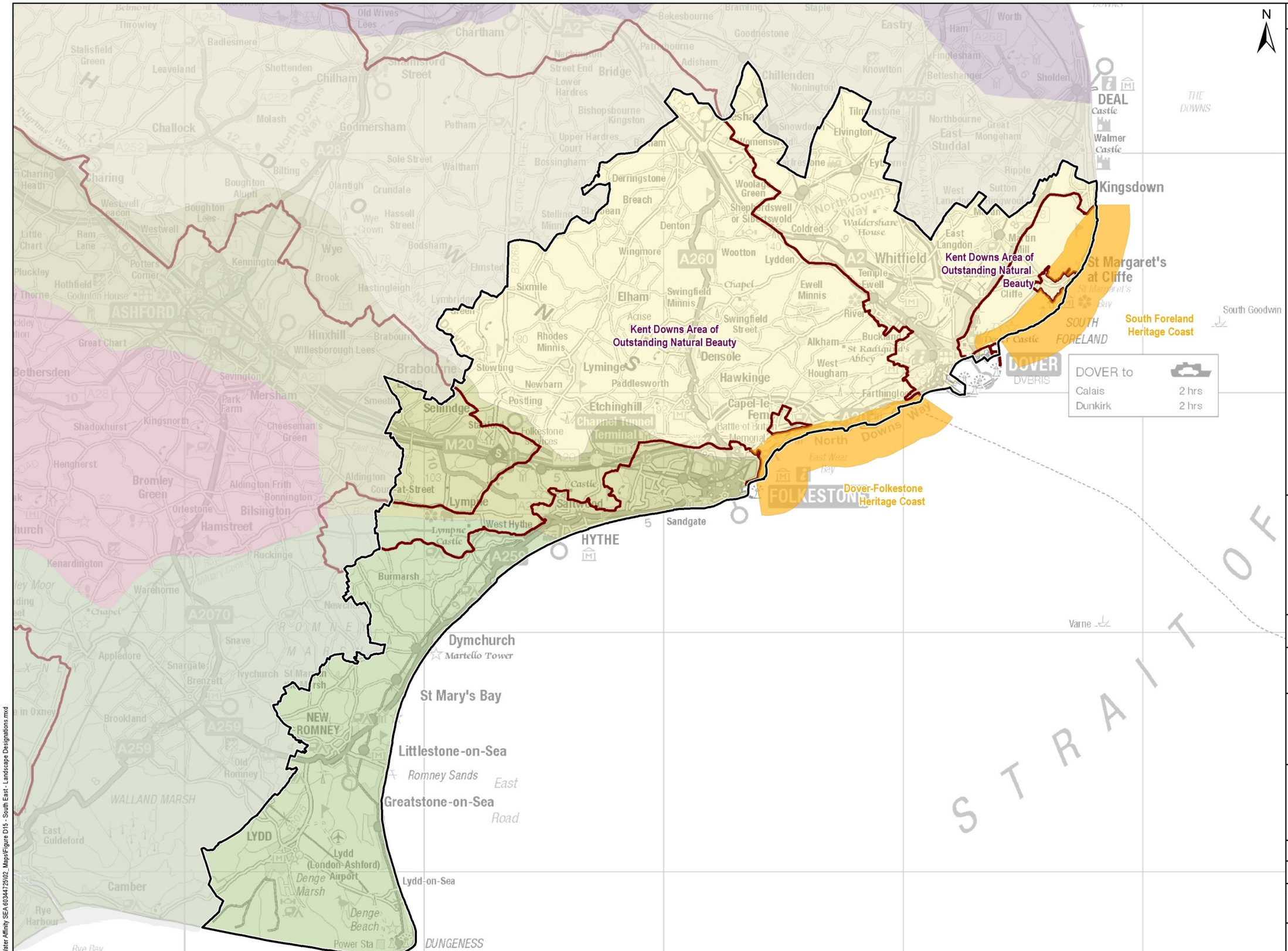
Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
LANDSCAPE DESIGNATIONS CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

AECOM
Scott House
Alençon Link, Basingstoke



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Heritage Coasts
- Area of Outstanding Natural Beauty

Landscape Character

- North Downs
- Romney Marshes
- Wealden Greensand

Purpose of Issue
FINAL

Client
AFFINITY WATER

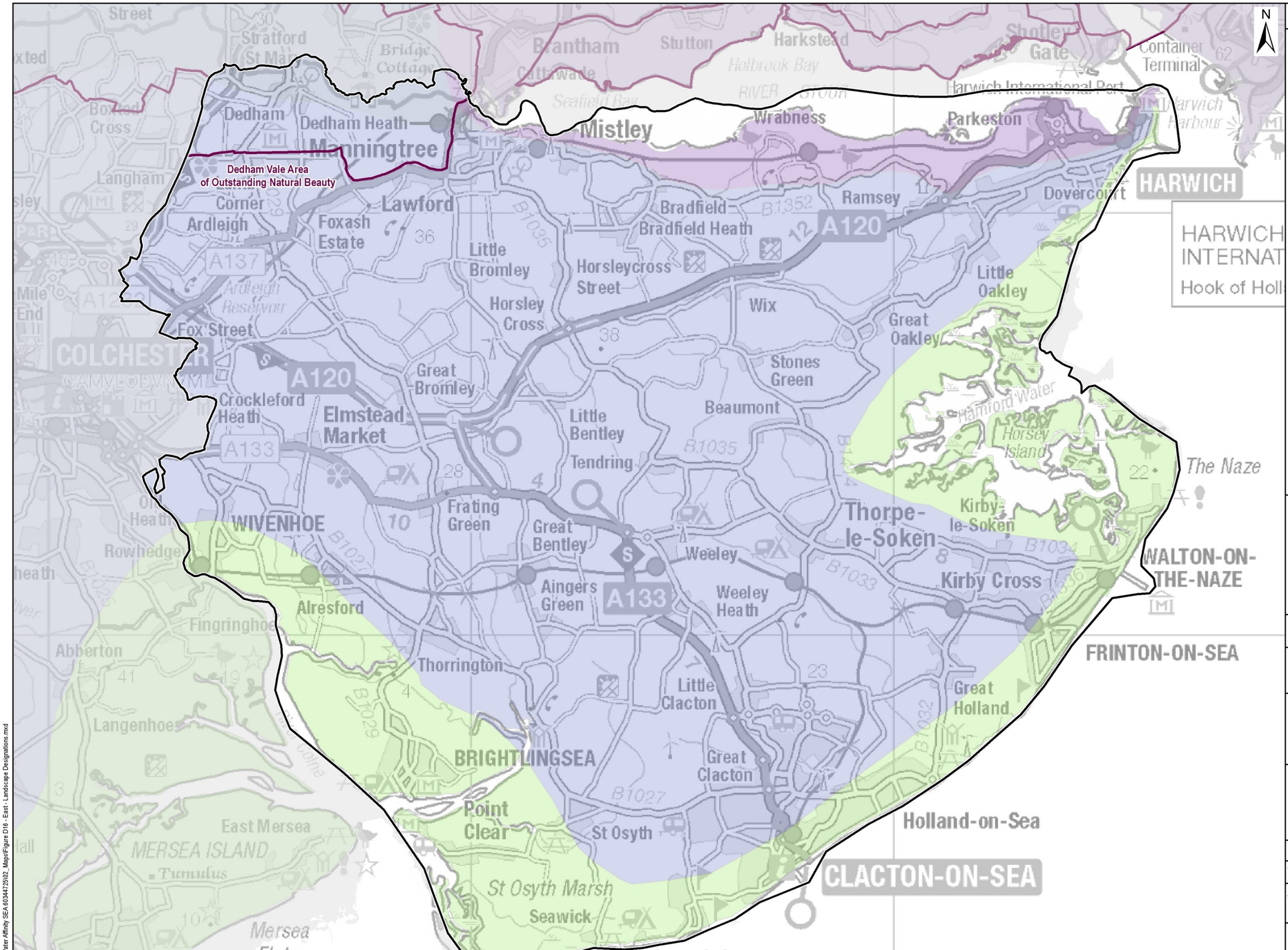
Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
LANDSCAPE DESIGNATIONS SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

AECOM
Scott House
Alençon Link, Basingstoke



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Area of Outstanding Natural Beauty

Character Areas

- Greater Thames Estuary
- Northern Thames Basin
- South Suffolk and North Essex Clayland
- Suffolk Coast and Heaths

Purpose of Issue
FINAL

Client
AFFINITY WATER

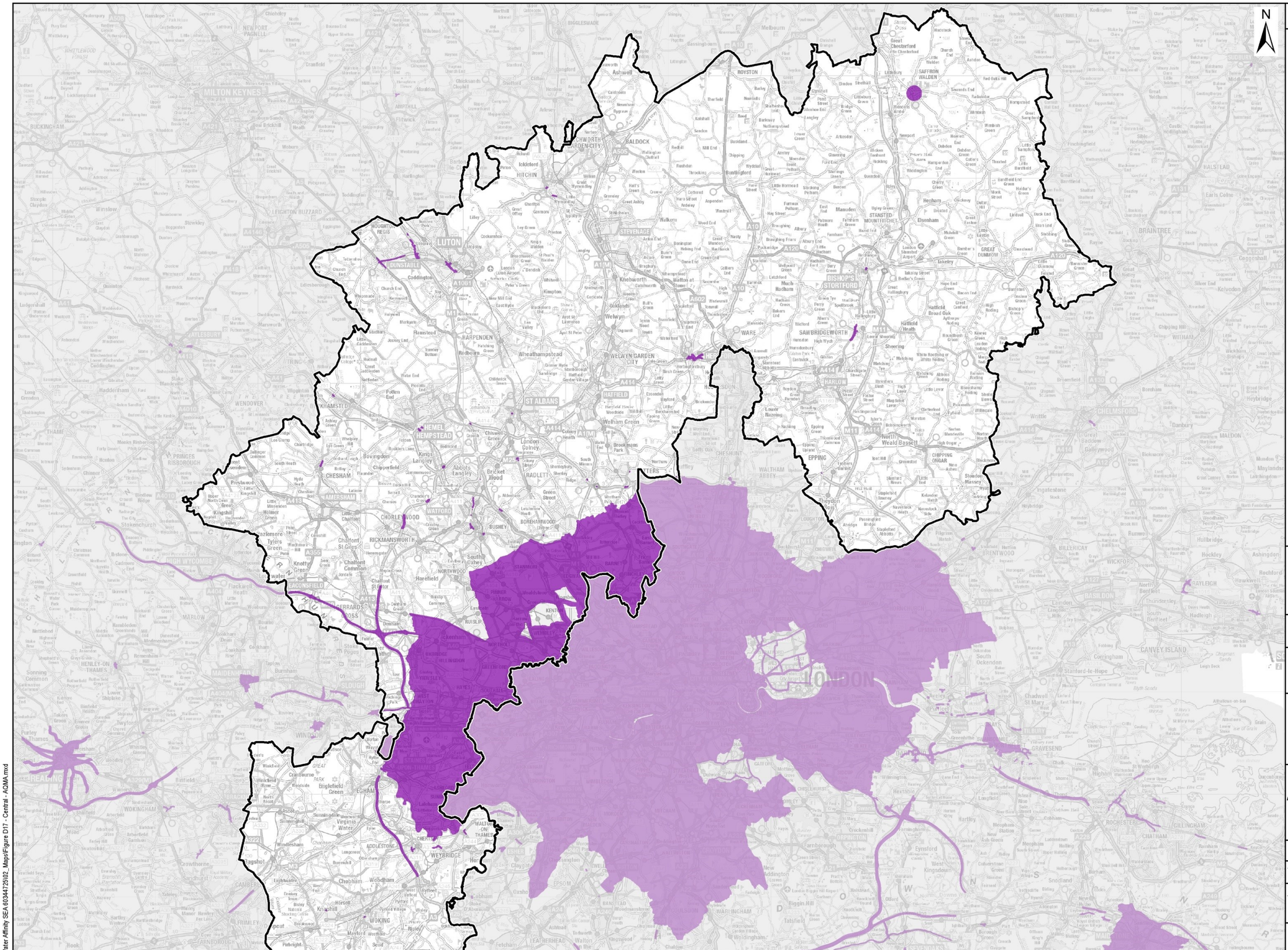
Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
LANDSCAPE DESIGNATIONS EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	10/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:85,000

AECOM
Scott House
Alençon Link, Basingstoke



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Air Quality Management Areas

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

AIR QUALITY MANAGEMENT AREAS CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

AECOM
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Alençon Link, Basingstoke

AECOM

G:\Projects\Water Affinity SEA 60344725\02_Maps\Figure D17 - Central - AQMA.mxd

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Affinity Water Regions
- Air Quality Management Areas

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
AIR QUALITY MANAGEMENT AREAS SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

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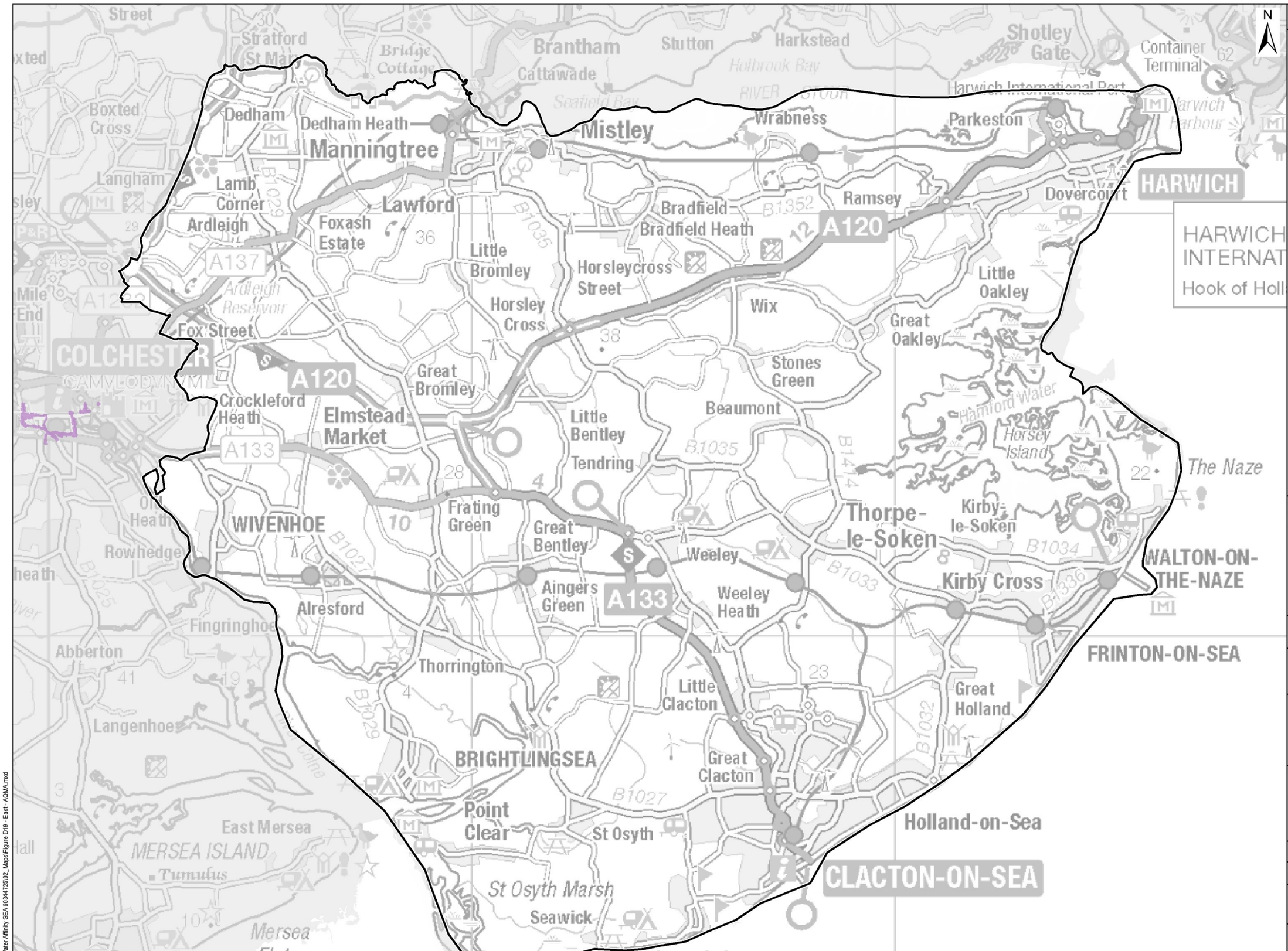

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LEGEND

- Affinity Water Regions
- Air Quality Management Areas

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
AIR QUALITY MANAGEMENT AREAS EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019
AECOM Internal Project No. 60344725		Scale @ A4 1:85,000	

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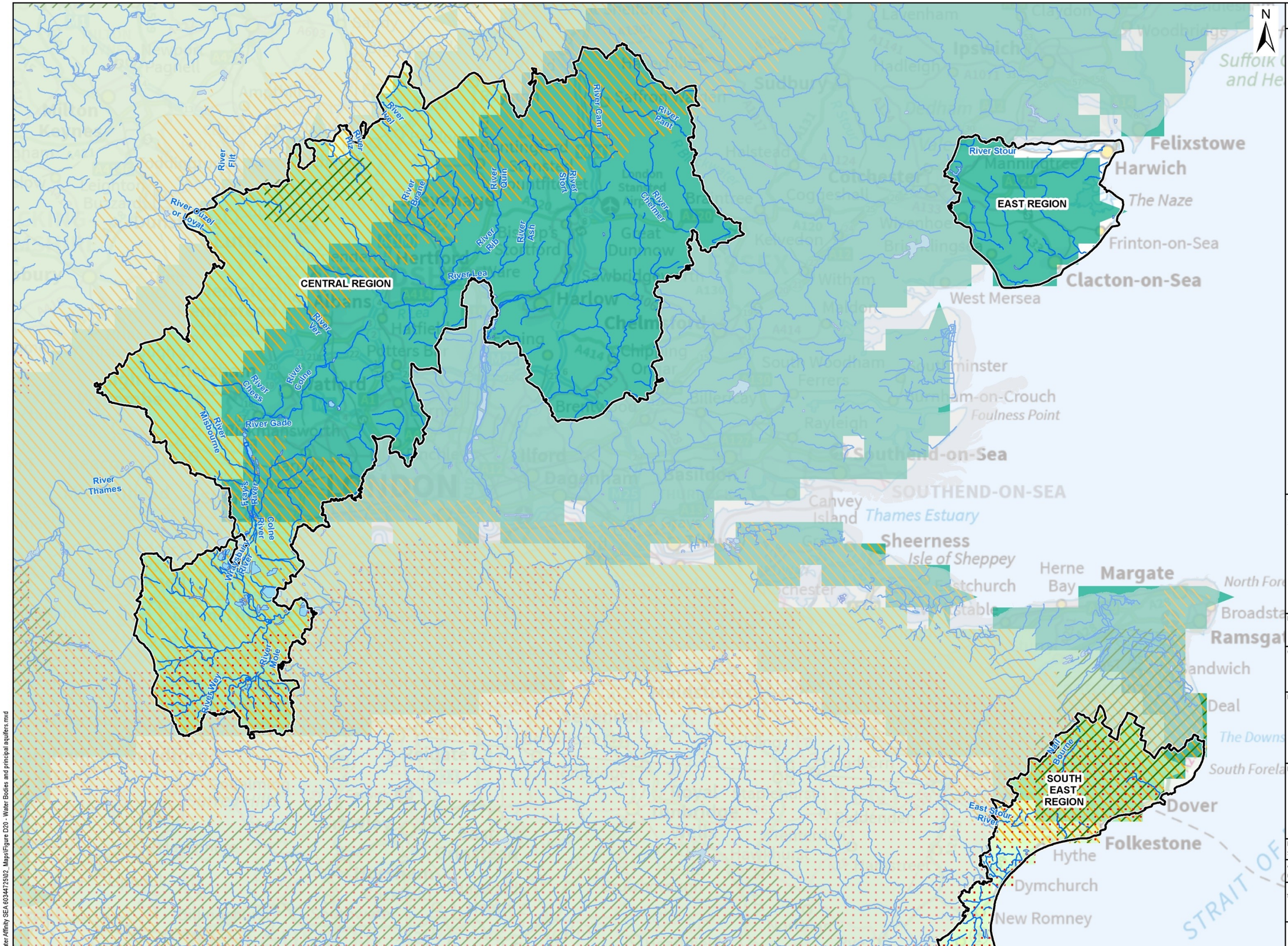

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LEGEND

- Affinity Water Regions
- Environment Agency Rivers
- Lakes and Reservoirs

Principal Aquifers

- Corallian Limestones
- Carboniferous Limestone
- Lower Greensand
- Oolites
- Chalk

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

WATER BODIES AND PRINCIPAL AQUIFERS

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
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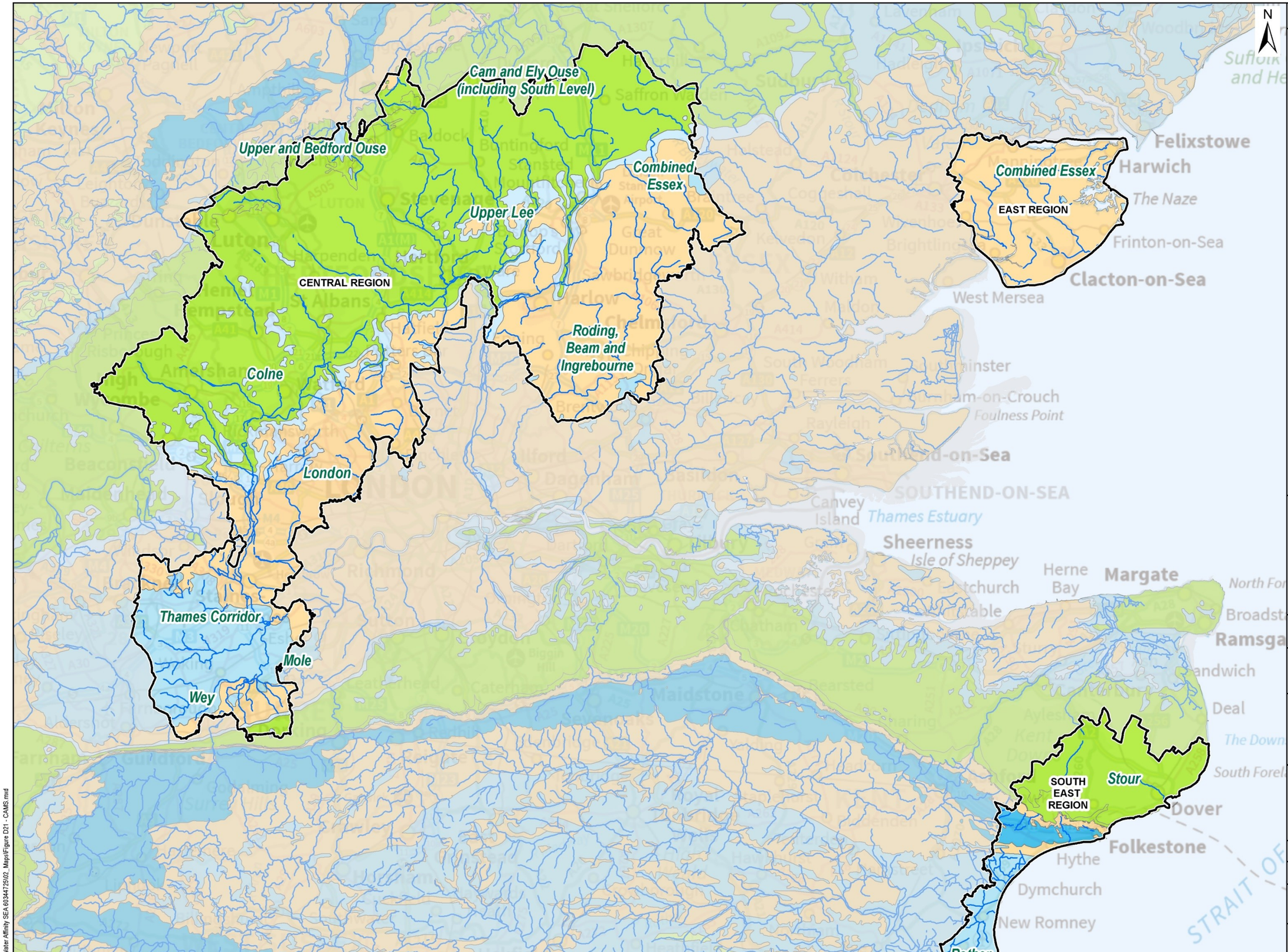

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LEGEND

- Affinity Water Regions
- Environment Agency Rivers
- Catchment Abstraction Management Strategies (CAMS)

Aquifers with Significant Intergranular Flow

- Aquifers with significant intergranular flow
- Highly productive aquifer
- Moderately productive aquifer
- Low productivity aquifer

Aquifers in which Flow is Virtually all through Fractures and other Discontinuities

- Highly productive aquifer
- Moderately productive aquifer
- Rocks with essentially no groundwater

Purpose of Issue: FINAL

Client: AFFINITY WATER

Project Title: AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title: CAMS AND GROUNDWATER AVAILABILITY

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
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Alençon Link, Basingstoke
Hampshire, RG21 7PP

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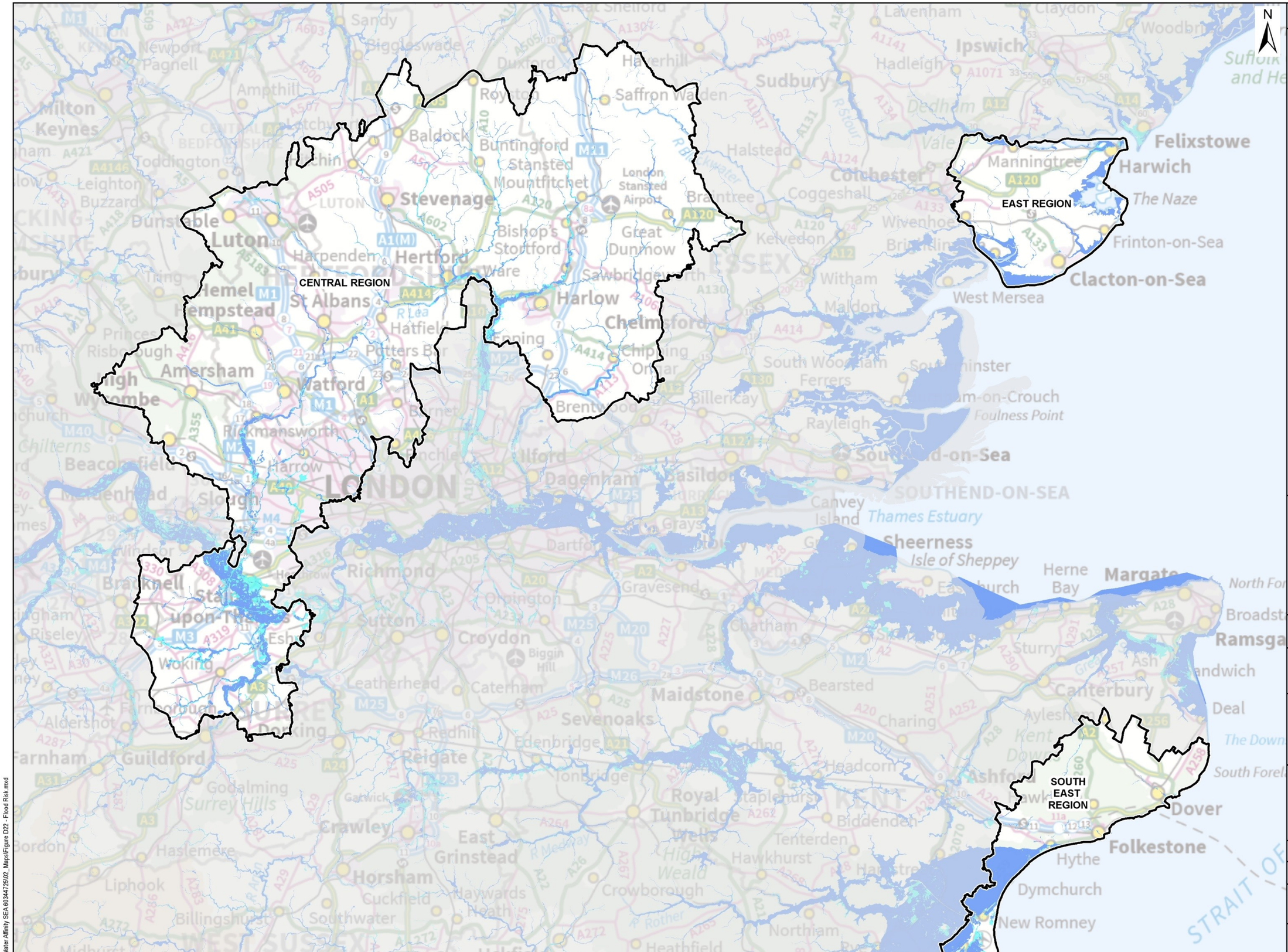
Water Affinity SEA 60344725\02_Maps\Figure D21 - CAMS.mxd



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LEGEND

- Affinity Water Regions
- Flood Zone 3
- Flood Zone 2

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

FLOOD RISK

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
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Hampshire, RG21 7PP

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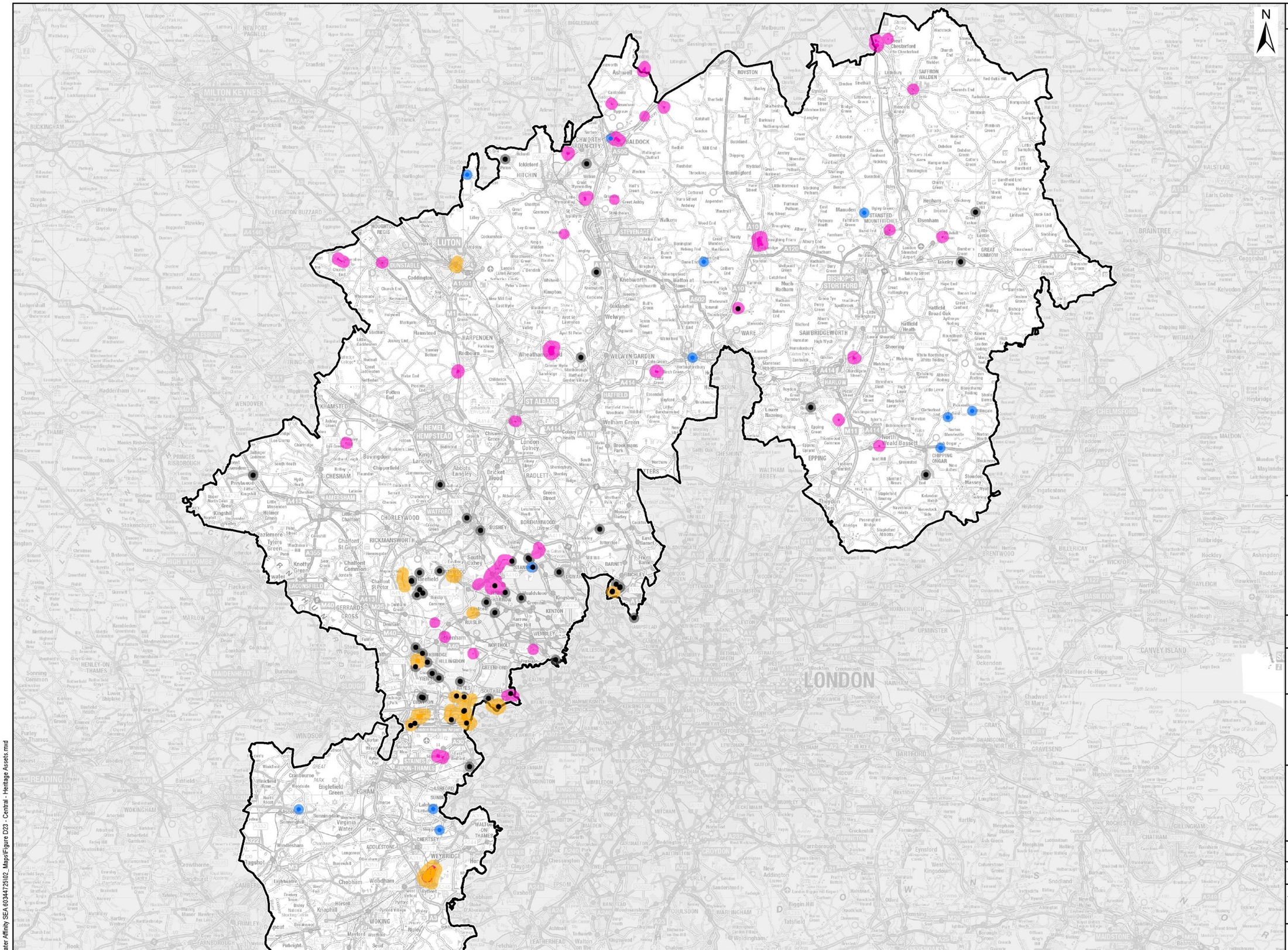
G:\Projects\60344725\02_Maps\Figure D22 - Flood Risk.mxd



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LEGEND

- Affinity Water Regions
- Heritage Assets at Risk - Listed Building
- Heritage Assets at Risk - Listed Building - 500m Buffer
- Heritage Assets at Risk - Place of Worship
- Heritage Assets at Risk - Place of Worship - 500m Buffer
- Heritage Assets at Risk - Scheduled Monument
- Heritage Assets at Risk - Scheduled Monument - 500m Buffer
- Heritage Assets at Risk - Conservation Area
- Heritage Assets at Risk - Conservation Areas - 500m Buffer

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

HERITAGE ASSETS AT RISK CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/10/2016

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

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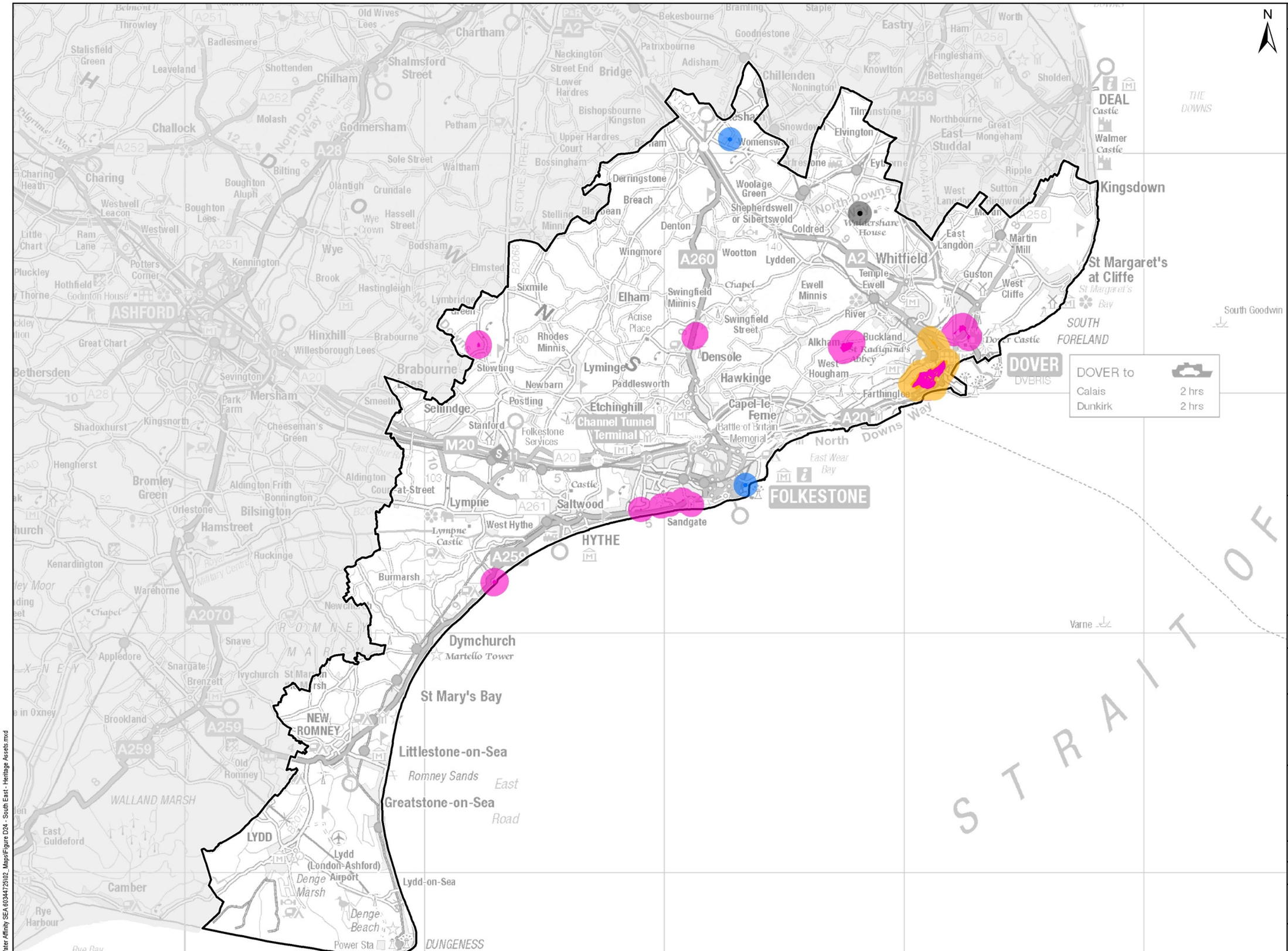

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LEGEND

- Affinity Water Regions
- Heritage Assets at Risk - Listed Building
- Heritage Assets at Risk - Listed Building - 500m Buffer
- Heritage Assets at Risk - Place of Worship
- Heritage Assets at Risk - Place of Worship - 500m Buffer
- Heritage Assets at Risk - Scheduled Monument
- Heritage Assets at Risk - Scheduled Monument - 500m Buffer
- Heritage Assets at Risk - Conservation Area
- Heritage Assets at Risk - Conservation Areas - 500m Buffer

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

HERITAGE ASSETS AT RISK SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

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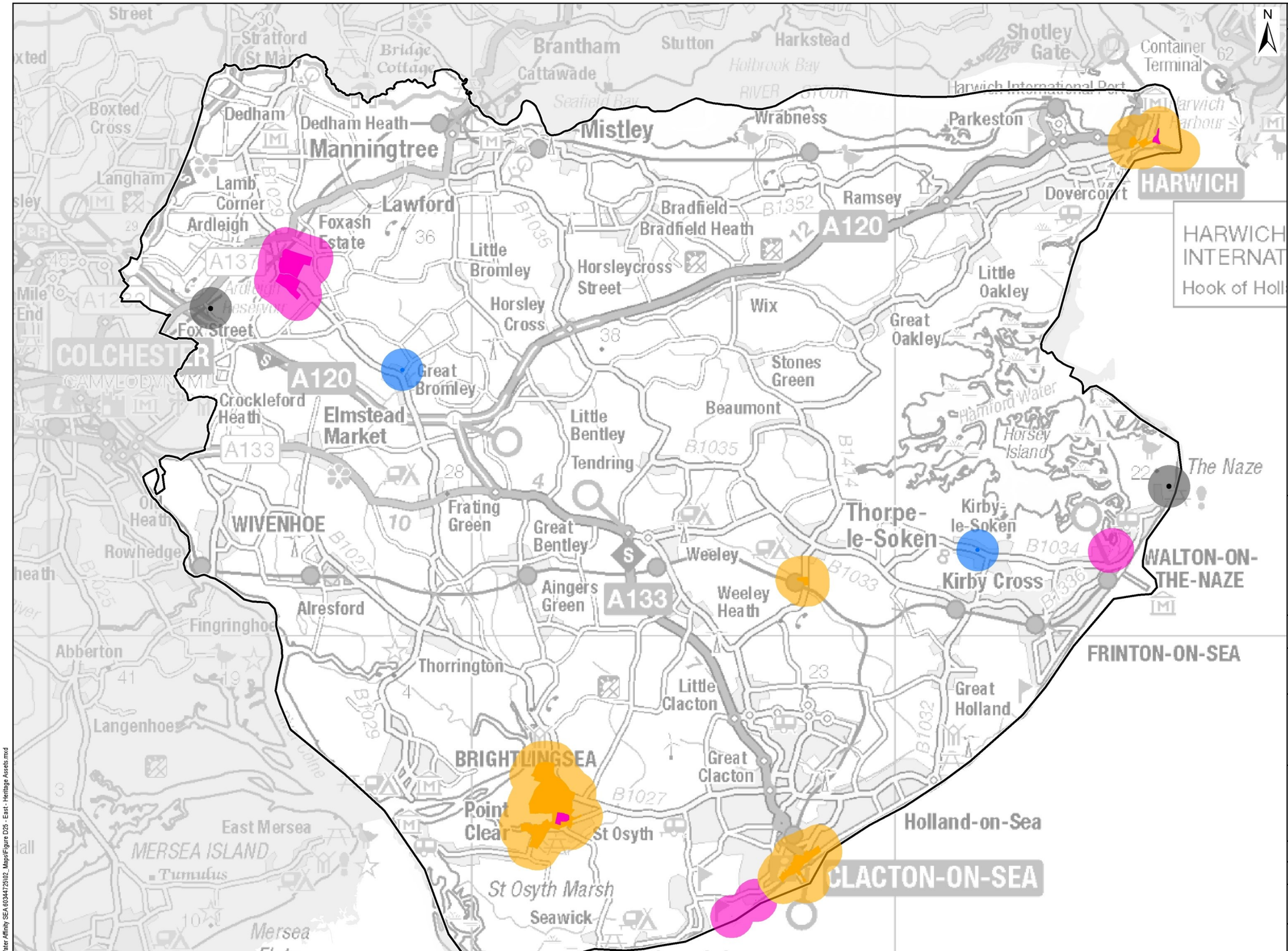
Water Affinity SEA 60344725\02_Maps\Figure D24 - South East - Heritage Assets.mxd



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LEGEND

- Affinity Water Regions
- Heritage Assets at Risk - Listed Building
- Heritage Assets at Risk - Listed Building - 500m Buffer
- Heritage Assets at Risk - Place of Worship
- Heritage Assets at Risk - Place of Worship - 500m Buffer
- Heritage Assets at Risk - Scheduled Monument
- Heritage Assets at Risk - Scheduled Monument - 500m Buffer
- Heritage Assets at Risk - Conservation Area
- Heritage Assets at Risk - Conservation Areas - 500m Buffer

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

HERITAGE ASSETS AT RISK
EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:85,000

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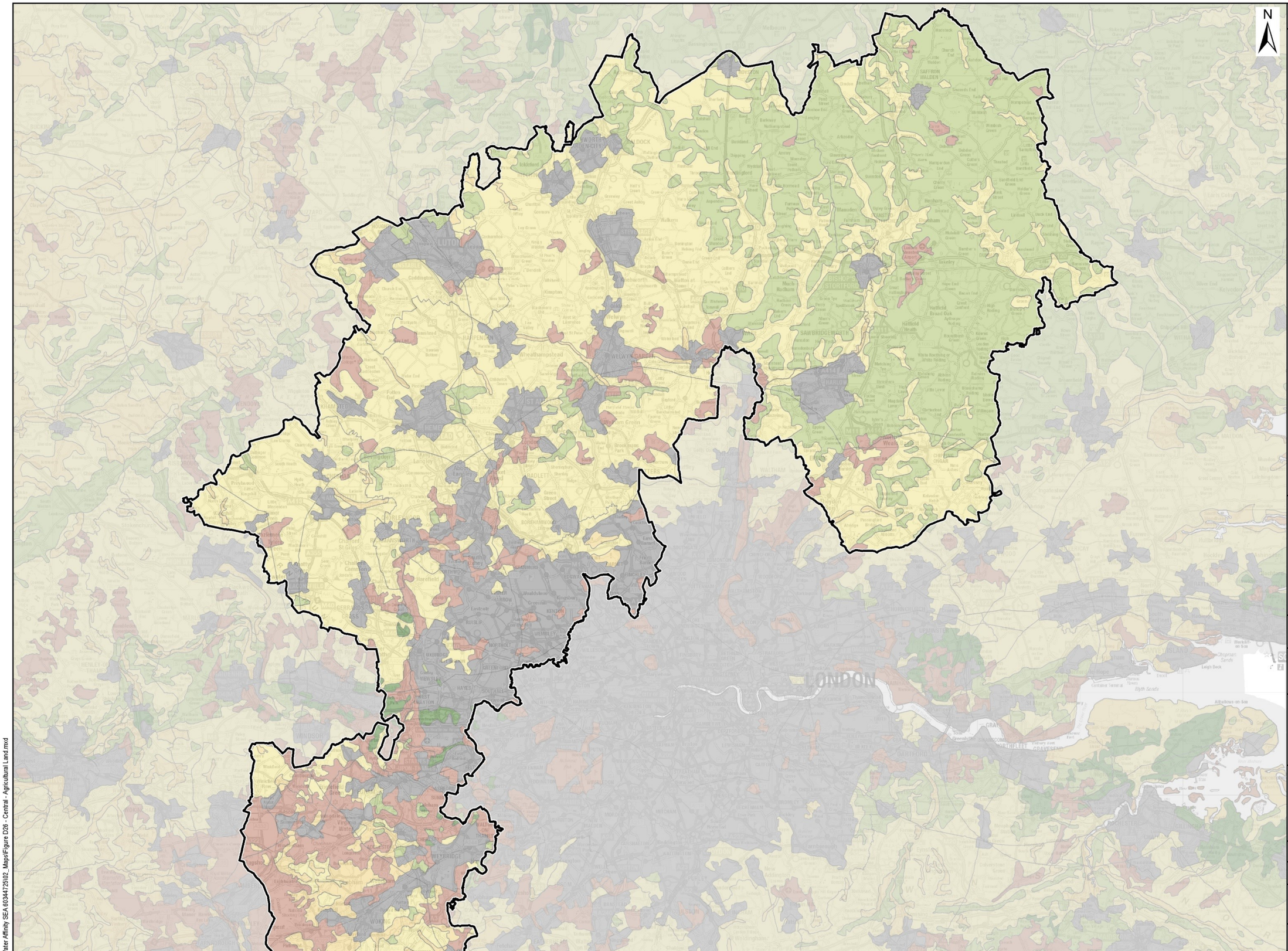

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LEGEND

Affinity Water Regions

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban
- Exclusion

Purpose of Issue

FINAL

Client

AFFINITY WATER

Project Title

AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title

AGRICULTURAL LAND CLASSIFICATION CENTRAL REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:350,000

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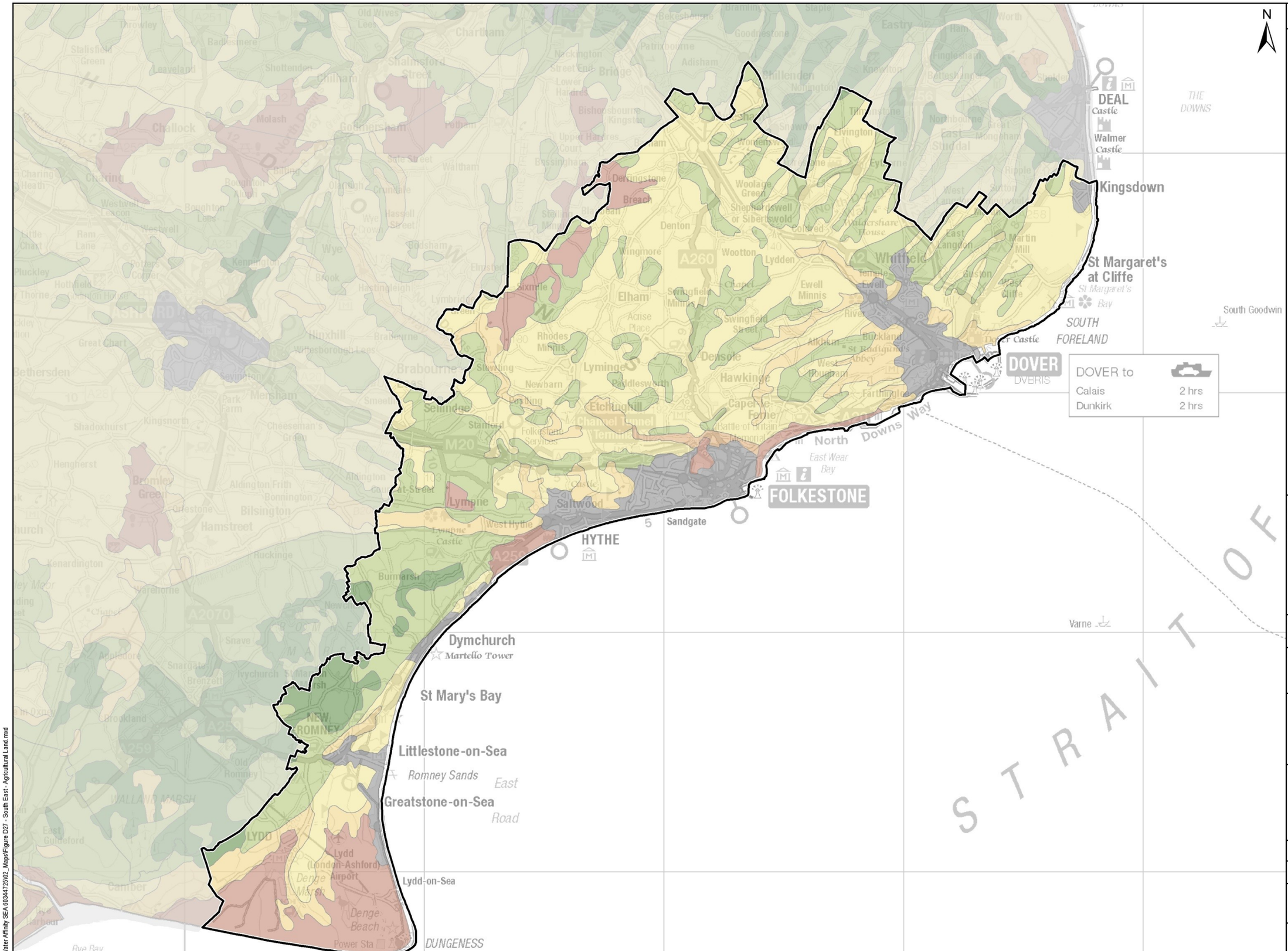
Z:\Projects\60344725\02_Maps\Figure D26 - Central - Agricultural Land.mxd



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LEGEND

- Affinity Water Regions

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban
- Exclusion

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
AGRICULTURAL LAND CLASSIFICATION SOUTH EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
60344725	1:150,000

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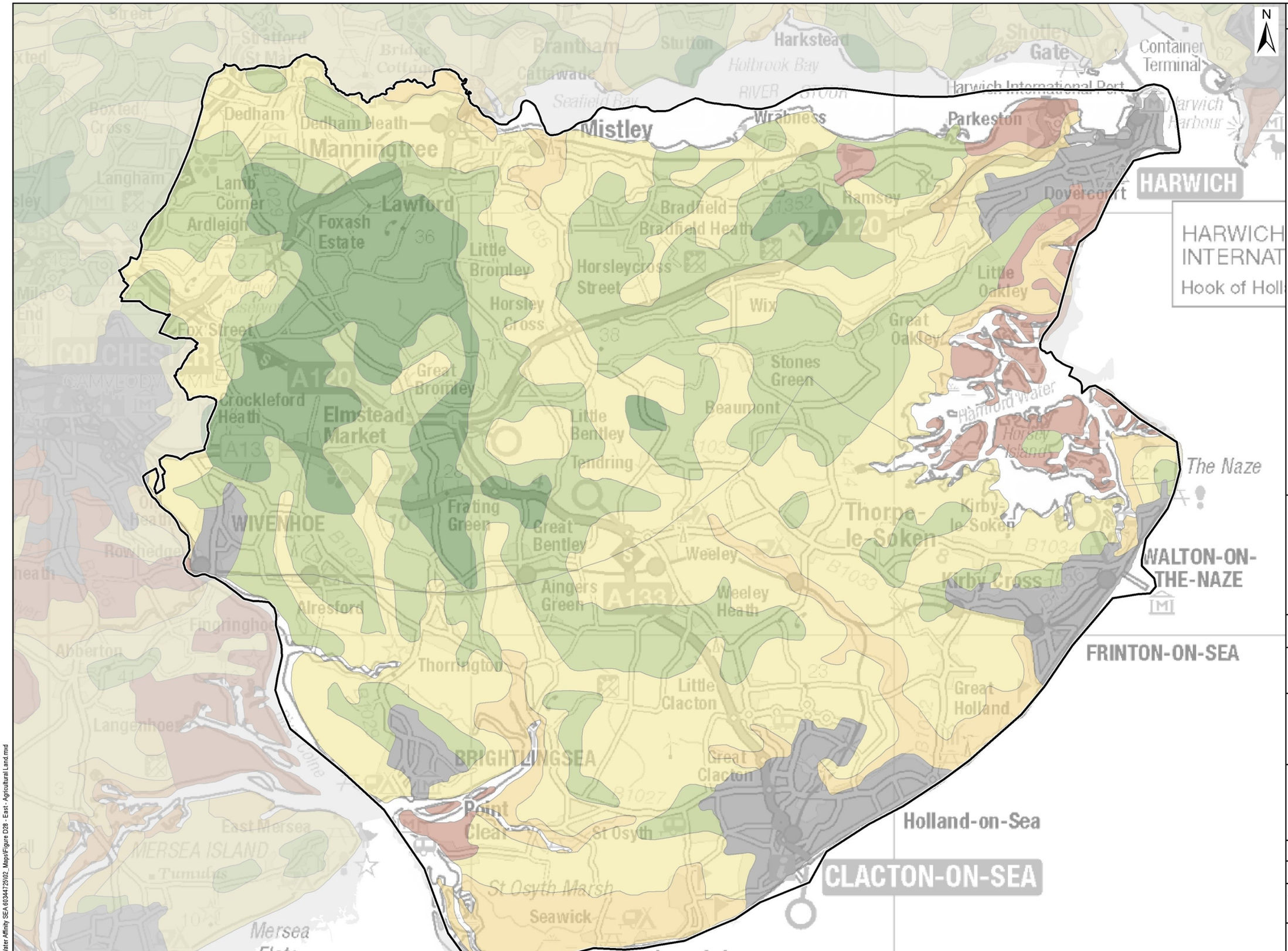
Water Affinity SEA 60344725\02_Maps\Figure D27 - South East - Agricultural Land.mxd



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LEGEND

- Affinity Water Regions

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban
- Exclusion

Purpose of Issue
FINAL

Client
AFFINITY WATER

Project Title
AFFINITY WATER DRAFT WATER RESOURCES MANAGEMENT PLAN: STRATEGIC ENVIRONMENTAL ASSESSMENT

Drawing Title
AGRICULTURAL LAND CLASSIFICATION EAST REGION

Drawn	Checked	Approved	Date
SM	BB	GM	13/01/2019

AECOM Internal Project No.	Scale @ A4
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Appendix III: Statutory consultee responses

Responses to the Scoping Report

Ref	Scoping Report Ref and/ or Question	Comment	Response
Environment Agency			
1	Sets out other plans and programmes and the relationship to the proposed water resource management plan?	The report provides a focused approach to the plan and programme review, identifying key messages rather wading through each plan individually. This has led to a more concise and focused document. The full list of documents reviewed is provided in an appendix. This section could have been further strengthened by identifying the key implications for the WRMP. Area staff also noted the following plans that should be considered in preparing the assessment for the South East operating Area: Kent Environment Strategy and the Kent Downs AONB Management Plan. The SEA also needs to recognise that the RBMP has a number of subsidiary documents. For the Dour these include a Catchment Plan and Water body Improvement Plans (WIPs). The importance of Local Plans and Neighbourhood Plans seem under-played. Mention should also be made of the proposals to expand Dover Port during the plan period and potentially Lydd Airport. Also, the prospect for a 'Garden Village' at Otterpool (Shepway) needs to be considered.	Noted. Noted. These will be added to the plans, programmes and policy review presented in Appendix II.
2	Describes the current state of the environment and how this is likely to evolve in the absence of the plan?	This has been provided.	Noted.
3	Sets out the environmental characteristics of the areas likely to be affected?	In the absence of information of the reasonable alternatives to be considered (see items 11 and 12), the environmental characteristics are described for the two regions included in the scope of the assessment.	Noted.
4	Outlines the current environmental problems that are relevant to the plan with particular reference to the Habitats and Birds Directives.	This has been provided.	Noted.
5	Refers to environmental protection objectives (international, European Community, national level) that are relevant to the plan	This has been provided.	Noted.

	and sets out how these are to be taken into account?		
6	Sets out the methodology to be used to assess the effects of the proposed plan.	The methodology for the assessment is clearly set out. However, we have a few clarifications or suggested modifications: • Impacts are to be characterised in accordance with their duration and permanence. What is considered to be the difference between these terms? Presumably an impact that has a duration of greater than 25 years would also be considered permanent? • 'Local', 'regional' and 'national' do not really seem to be expressions of the magnitude of the impact. Given the assessment only covers limited regions it seems unlikely that an impact of national magnitude would be even possible. • It might be helpful to include some acknowledgment of uncertainty or confidence in the assessment. At this strategic level it seems unlikely that the assessment will have the level of certainty associated with it that Table 15.1 appears to convey. The methodology for assessing cumulative effects is inadequately explained. Currently we are not clear on the approach or how the significance of cumulative effects is to be determined.	Noted. This comment has been taken into account within the method set out in the Environmental Report.
7	Where appropriate to the methodology, provides objectives or assessment criteria to be used in the assessment of the environmental effects of the plan.	Objectives to be used for the assessment are clearly set out and there is a clear relationship between them and the description of the existing environment and any associated problems. The majority of the objectives are appropriate for a strategic consideration of environmental effects. However, there are some that appear to be more appropriate to a project level consideration. For example, is the WRMP likely to provide sufficient detail to determine whether public rights of way would be severed or whether particular views will be affected?	Noted.
8	Sets out the environmental effects to be assessed by the strategic environmental assessment.	The effects to be assessed by the SEA are very clearly stated.	Noted.
9	Defines the spatial scope of the assessment.	A rationale for the spatial scope is provided. This includes a 10km buffer zone around each region. It is stated that this was used for the previous WRMP, however the rationale for 10km isn't clear (why not 5km or 15km? Or, why not individually scoped according to the location of actions and the sensitivity of the receiving environment?) "Section 14 Scope – non water dependent sites Flora and Fauna - We disagree that non-water dependent sites should be screened out. A number of options e.g. transfers have the potential to impact on non-water dependent protected sites and species e.g. ancient woodland. Section 6 does not imply that non-water dependent sites should be screened out – a justification for this decision needs to be provided.	Noted. Likely significant effects have been identified using the source, pathway, receptor model to ensure that no sensitive receptors within the influence of the WRMP are missed. Water dependent sites have been

			included in the SEA scope.
10a	4.3-4	The report states that the SEA for WRMP14 did not identify any significant effects and yet it is scoped into this SEA. It would have been useful to clarify what is likely to have changed between the two plans to cause tourism and recreation to be significant for this plan.	Noted.
10b	Table 5.2	The key issues focuses on the consequence of infrastructure deliver on AW, but it is not clear how the development of WRMP will influence delivery of these projects? An argument was made in section 3.5 to exclude impacts on population as the WRMP is unable to influence population change. Does the same argument not also apply to the above? Would it not be more logical to consider how WRMP decisions could impact/interact with the delivery of these projects and generation of waste?	Noted. The cumulative effects assessment presented in Chapter 6 of the Environmental Report takes interactions with other plans and programmes into account.
10c	6.2-4	Section 6.2 Marine Conservation Zones need to be included as some WRMP options may include a marine element i.e. desalination. 'Non-designated sites' are mentioned but there is no assessment of Local Wildlife Sites (Formerly Sites of Nature Conservation Importance). It needs to be clarified whether effects to non-statutory designated sites are being scoped in or out. NERC Section 41 habitats and species are mentioned but no baseline information for priority habitats and species is provided. This needs to be provided as one of the assessment questions identified for the SEA is 'Would the options/ programme lead to the loss or degradation of priority habitats or species or lead to the creation of new priority habitats?' This baseline should be drawn from 'best available data' held by Local Biological Records Centres and some Statutory Organisations. There is a mismatch between which designated sites are included in Appendix C, Table 6.3 and Vol2 Figure 6.2. For example; SE region SACs do not appear to be listed in Appendix C. The list of 'main habitat types' is very broad. A baseline list of 'water-related' internationally and nationally protected habitats and species and NERC Section 41 priority habitats and species should ideally be included in the baseline review.	Noted, scoping information presented in Appendix II has been updated to reflect this comment. A proportionate approach has been taking and the best available evidence used.

		Protected and priority marine habitats and species need to be considered too as some options may impact on the marine environment. The list of invasive non-native species (INNS) is incomplete. The scoping report needs to evidence that the baseline is drawn from 'best available data' (held by Local Biological Records Centres and some Statutory Organisations). It should include marine species where options have a marine element. As an example, some species missing from the SE region INNS baseline include Japanese knotweed, zebra mussel, giant hogweed, water fern, Turkish crayfish, pacific oyster & leathery sea squirt. We would argue the key issue is how the plan affects the spread/movement on non-native species and the consequences for priority flora and fauna rather should be considered. Section 6.3 There needs to be an assessment of likely new designations during the lifetime of the WRMP. For example, a third tranche of Marine Conservation Zones are currently planned to be designated in 2018. Section 6.4 There isn't any mention of the Dour or its fish species (important population of brown trout within the context of Kent rivers) in the key issues - only the Thames Estuary is noted. In general, fish get next to no specific mentions (both in the main document and in Section 15 - Proposed Method). We would like to see fish given extra explicit mention or included into biodiversity.	
10d	Table 7.2	One of the objectives refers to impacts on views from public rights of way, designated landscapes, parks or other valued places. At a strategic level this may be difficult to determine as proposed actions may not be sufficiently defined at this stage. It may be more appropriate to consider an objective that addresses the effect on landscape character.	Noted.
10e	8.3-5	We note that this issue has been included in the scope following feedback from Natural England. While there are locations where existing air quality is poor, this plan is only likely to impact on those locations if specific actions are proposed in or near to them. This is an example of where an outline of the alternatives under consideration would have helped to provide an understanding the spatial distribution of impacts. While noise and air quality are likely to be significant for a project level assessment, we are less certain that they are likely to be so at this strategic level. Nevertheless, we acknowledge the desire to respond positively to previous comments from Natural England.	Noted.
10f	Section 9 Table 9.2	A key risk associated with climate change is the impact of increased rainfall intensity and associated flooding events (fluvial/ and surface runoff). The WRMP focusses mainly on the dry-side risks associated with climate change, but the plan could also be affected by changes to flood risk and options in the plan could present risks / opportunities to mitigate flood risks e.g. changes to	Noted, the assessment questions are considered to be

		abstraction regime, catchment and/or channel modification, high flow storage and so on. Table 9.2. The third question 'affect the resilience of the local environment and Affinity Water assets to climate change?' needs to be split in two as the environment and Affinity Water assets can't be considered together. In addition the second question 'maximise the company's resilience to a changing climate?' would probably be better moved to the SEA objective of 'adapt to climate change' rather than falling under 'minimise the carbon footprint of the company?'. Lastly it might be better to change that last objective to [will the rdWRMP2019] adapt to the implications of climate change?	appropriate at this stage.
10g	Section 10	Section 10 It would strengthen the baseline to also comment on the scale of surface water deficits as well as groundwater status in each CAMS. This would help to make the link between groundwater abstraction and severe groundwater stress and surface water conditions more explicit. Potential additional key issue in table 10.2: Improving resilience, flexibility and sustainability of water resources, particularly with regards to potential climate change impacts on surface water and groundwater. Potential additional assessment questions table 10.2: Will it affect WFD compliance e.g. good ecological potential/status? Will it present a risk to water quality of groundwater and surface water? Section 10.3.1 We would argue than in the absence of WRMP19 that there is a significant risk that the objectives of the RBMP will not be achieved as AW's current plan assumed continuation of actions to reduce demand and deliver abstraction reduction up to 2024. These are at risk under a baseline with no PR19 WRMP. Section 10.4 Key issues: The failure of many surface waterbodies to achieve good ecological status/potential is also a key issue, as is the requirement to ensure there is no further deterioration in surface or groundwater status. In addition, Affinity Water needs to include assessment of groundwater quality, but has not included it alongside the other entries in Table 14.1 (page 78). The company states it will 'scope in' surface water quality, quantity and flood risk, but hasn't said the same for groundwater. Considering supply zones are predominantly groundwater dependent, this is particularly important.	Noted, these comments have been taken into account where necessary within the updated scoping information presented in Appendix II.

10h	12.5	Geology has been scoped out of the assessment while soil has been scoped in on the basis that construction activities could impact soil. This is likely to be an important consideration at the project level, but we would question whether this is significant at a strategic level and whether it is likely to be material to any decisions to be made.	Noted.
11	The baseline information is sufficient/relevant and up to date to offer an accurate identification of the current state of the environment, and of its evolution without the plan. Sets out reasonable alternatives to be assessed enabling the spatial distribution of environmental effects to be taken into account.	The baseline information is sufficient to provide an understanding of the existing environment and its likely evolution in each of the regions. It provides a generic picture across the regions, but it is likely that this could have been more focused on those locations where impacts are likely to occur had an outline of the reasonable alternatives been included in the report. This would facilitate a greater understanding of the spatial distribution of environmental effects, rather than just their performance against the objectives. Biodiversity, noise and air quality and heritage are all examples of effects for which the scope could have been further refined had there been an understanding of the alternatives being considered.	Noted.
13	General	Given there are previous plans and previous strategic environmental assessments, it would have been helpful to have included a summary of the environmental effects of previous plans. This may have helped to further focus the scope of the assessment on the likely significant effects born from experience.	Noted.
14	General (13)	Ecosystem services appears to be treated as another environmental effect, whereas it overlaps considerably with the more traditional SEA approach. Consideration could have been given to adopting an ecosystem services led approach to the assessment. In the absence of this, it would have been helpful for the document to have provided a fuller explanation of the relationship of the ecosystem services assessment to the SEA.	Noted, the method will be more clearly set out within the Environmental Report.
Natural England			
15a	Biodiversity, flora and fauna section; table 6.1	The following policies, plans and programmes should also be included in the main body of the text in this section: International: Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. Regulation (EC) No 1100/2007of 18 September 2007 on establishing measures for the recovery of the stock of European eel. Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on the environmental liability with regard to the prevention and remedying of environmental damage. National: Natural England's standing advice on protected species. The Natural Environment and Rural Communities Act 2006	Noted, scoping information presented in Appendix II has been updated to reflect this comment.

		The Wildlife and Countryside Act 1981 (as amended) Regional/local: National Character Area (NCA) profiles as these also concern biodiversity as well as landscape	
15b	Biodiversity, flora and fauna section; table 6.1	Key messages (Table 6.1) The following should also be included in the key messages: The Habitats Directive and the Wildlife and Countryside Act 1981 (as amended) should be included in the key messages table (table 6.1), as these are very relevant legislation for this section. Reference to priority habitats and species (NERC act S41 for England) should be added to this table.	Noted, scoping information will be updated to reflect this comment and presented in the Environmental Report.
15c	Biodiversity, flora and fauna section; section 6, paragraph 6.2, and appendix C	Review of baseline (Section 6 paragraph 6.2 and Appendix C) Natural England would raise the following issues identified in this section of the report. We would advise making any amendments suggested to ensure your 'Biodiversity, flora and fauna' assessment is adequately covered: While this section references (within Appendix C) the current baseline in terms of the condition of SSSIs (e.g. those in favourable or favourable/recovering condition), it does not discuss the conservation status of the relevant Ramsar sites, SPAs and SACs flagged. The objective for these sites is to maintain or restore favourable conservation status for the habitat and species under the Habitats Directive, and should be included. If the SSSI condition is being used as a site-specific proxy for nationally recorded statistics on Conservation Status this distinction should be clearly set out in the document. Reference to the baseline threats and pressures are not well covered in this section. While damaging issues to water dependant designated sites, such as that from invasive non-native species (paragraphs 6.2.1, 6.2.2) are discussed, there is no commitment to identify the full extent of the baseline pressures/threats that they represent, or how this fits into the rdWRMP2019. The high population and development pressure of the Affinity Water Supply area is not referenced as a pressure in the baseline of the biodiversity section. The high levels of anthropogenic influence are of significant to the consideration of water supply in the baseline condition of the environment and therefore its ability to withstand additional pressures from future abstraction and supply activities. We recognise that a climate change chapter has been included as part of this SEA Scoping, however, we would advise also including a metric of allowing wildlife to adapt to climate change in future baseline assessments within the biodiversity section.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
15d	Biodiversity, flora and fauna section; designated sites and the WRMP Spatial Scope (2.2)	Designated sites and the WRMP Spatial Scope (2.2) In paragraph 2.2 of the Scoping Report the spatial extent of the SEA area is identified, it is stated that this will include "…the Central and Southeast regions, but excludes the East region… " , and that each region will include a 10km buffer assessment area. The adoption of a 10km buffer zone is based on that applied during the previous WRMP2014 SEA iteration. However, consideration must be given to the extent of any new strategic options, which were not elected during WRMP2014, and their cumulative risk to downstream environments beyond this 10km buffer. As such, the SEA must consider the impacts on all new options in relation to the prescribed buffer zone, and work adaptively by expanding this buffer, where required. Especially on potential impacts relating to downstream protected sites. We would advise	Noted, a source, pathway, receptor model has been used to identify the likelihood for significant effects to ensure that sensitive receptors within the

clarifying that this must be a consideration within latter stages of the rdWRMP2019 development in the current SEA Scoping report. In addition to the above, the following is mentioned within paragraph 2.2 of the Scoping Report: “On that basis that no significant effects were likely the East region was excluded from the spatial scope of WRMP2014. The situation has remained the same for rdWRMP2019. The scope of this SEA therefore includes the Central and Southeast regions, but excludes the East region.” Natural England do not consider it appropriate to screen out this region of Affinity Water’s operating area at this stage. There are several designated sites and landscapes present within this area that we advise will need specific consideration within the SEA Environmental Report. Resultantly, we would advise that full screening assessments should be undertaken for the sensitive sites in this region within the SEA, alongside the strategic options for the rdWRMP20 19, prior to it formally being excluded from further consideration in latter stages. As such, including this region within the scope of the SEA is imperative, in order for Affinity Water to remain compliant with the relevant environmental legislation listed.	influence of the WRMP are not overlooked. Noted. The East region (WRZ 8) has been scoped out of the SEA for the following reasons: Initial estimates of demand forecasts for East do not trigger deficits within the 25 year statutory period (to 2044) when Ardleigh is retained within the Deployable Output (DO); The initial forecasts of demand for East suggest that releasing Ardleigh will result in a deficit using the baseline estimate, though that is unlikely to occur before 2031; Demand management options for East will be included within the wider options appraisal, however these are not likely to impact on European sites (e.g. metering, leakage reduction and water efficiency);

			Options to support existing operational resilience, and the treatment works at Horsley Cross will form the initial bases for any resilience works and investment, prior to any new supply source development; The promotion of options that include new DO would follow 'gap to licence' schemes, and are not included with the feasible option list for WRMP19; and There are no pathways for potential effects to occur on sensitive receptors in the East region as a result of supply options delivered in the Central and Southeast regions.
15e	Biodiversity, flora and fauna section; Ramsar sites (section 6)	Ramsar sites (Section 6) While most of the relevant Ramsar sites within the Affinity Water operational areas and buffer zones have been acknowledged (excluding those within the Eastern region , see above), we would suggest the following: Both the Lee Valley Ramsar (Central region) and the Dungeness, Romney Marsh and Rye Bay Ramsar (Southeast region), are listed under their associated 'SPAs'. It would be pertinent to separate these. This is since the Lee Valley Ramsar, while sharing the same physical extent as the SPA is notified for features beyond that of the birds at this site (specifically, aquatic macrophytes and invertebrates), and therefore the reasons for notification are not synonymous. This is similarly the case for the Dungeness, Romney	Noted, scoping information presented in Appendix II has been updated to reflect this comment.

		Marsh and Rye Bay Ramsar, but unlike that at Lee Valley, the Ramsar here does in fact extend further than its associated SPA delineation. lease note the marine extension to the DRMRB SPA. It is important that these distinctions are identified, to allow for relevant and specific consideration of the pressures exerted on the Ramsar sites and the SPAs, discretely. This is due to the differences in their reasons for notification and physical boundaries. It is mentioned within the scoping report that Ramsar sites are afforded the same level of protection as Natura 2000 sites (SPAs and SACs). We therefore advise that the above is amended within tables 6.2 and 6.3, respectively, to ensure that the subsequent WRMP2019 SEA and HRA documentation fully reflects this, allowing for the Ramsar sites highlighted to be sufficiently screened.	
15f	Biodiversity, flora and fauna section: Marine Conservation Area	Marine Conservation Zones There are a number of proposed and confirmed Marine Conservation Zones (MCZs) present across Affinity Water's operational area and buffer zone, yet none of these have been mentioned within the current Scoping Report.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
15g	Biodiversity, flora and fauna section: priority habitats and species	Priority habitats and species Natural England note that reference has been made to the importance of priority species and habitats within section 6, table 6.1, of this Scoping report. However, a breakdown of the priority habitats and species throughout the regions of Affinity Water's operational area has not been provided. This would be an advantageous addition to this report, as it would allow for a cross reference between local priority habitats and any relevant upcoming strategic options. We would advise highlighting within the Scoping report, and subsequent SEA documentation, the importance of identifying priority habitats and species, and working to enhance these features as part of Affinity Waters WRMP option creation. We would encourage a focus on the priority habitats and species important to the water environment and diversity of the area. It would be good to include a link to the maps of priority lake and river habitat published by Natural England. It is important that the list of S41 habitats and species to be considered should reflect those most relevant to the supply area.	Noted, a breakdown of priority habitats within the various regions is already provided.
15h		Key issues (6.4) The issues are generally well covered in section 6. 4 but could be amended to reflect the following: The need to recognise some of the habitats and species are already stressed due to the extensive anthropogenic pressures of the high and rapidly growing population. The extensive pressure that will be put on the wildlife of the Affinity Water operational area from future changes in climate. We would advise including reference to priority habitats and species (NERC act S41 for England) within the 'key issues' section of chapter 6. Reference to conserving and enhancing protected species should also be made in this table which could be added to the bullet point on coherent ecological networks. The potential for catchment scale impacts and catchment options should also be mentioned here.	Noted, scoping information presented in Appendix II has been updated where necessary to reflect this comment.

		Paragraph 6.5 refers to the proposed SEA Scope for the WRMP2019, stating that latter SEA documentation will assess the impacts of proposed options/programmes on sensitive sites. We would advise expanding on this, to also identify where positive biodiversity gains can be made, where appropriate, within this WRMP process.	
16a	Water section	Regional/local: Any relevant local authority water management plans or strategies (e.g. integrated water management strategy of Hart, Rushmoor and Surrey Heath Borough Council, Surrey County Council's Flood Risk Strategy).	Noted. It is important that the SEA is proportional, cumulative effects with other plans and programmes have been considered through the cumulative effects assessment in Chapter 6 of the Environmental Report.
16b	Water; section 10.2	Review of baseline (Section 10.2) It would be worth including the work being carried out by relevant Local Planning Authorities with in the surface water baseline of this section. Specifically looking into Local Plan policies intending to create schemes to enhance local drainage, this would be especially pertinent through flood alleviation strategies and green infrastructure mechanisms, i.e. the development of sustainable drainage within the region. This would allow for a better understanding of how the expanding townscapes within the SEAs scope is handling surface water. It would seem sensible to provide summaries, where available, of the "sustainable catchment" work being undertaken by the Environment Agency. This will give an overview of the baseline position of water resources for different catchments. The need to meet protected area targets for flow and water quality and baseline percentage of protected areas that are currently meeting these standards should be referred to in this section. With regards to the groundwater baseline, it would be relevant to discuss any works being undertaken to enhance or establish local environments to aid in local ground percolation (e.g. the establishment of chalk grasslands through countryside stewardship schemes). This would provide a more holistic view of not only the abstraction pressures through the Affinity Water operational regions, but also the work being undertaken that may be aiding in recharging such aquifers, and highlight areas where more work would be advantageous. Flood risk is addressed within the surface water baseline assessment for this chapter, but not within that for groundwater issues. Clarification should be provided within the groundwater baseline as to whether flooding presents a serious concern within the scope of the WRMP. If not, this should be explained and noted.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
16c	Water; sections 10.4 and 10.5	Key issues and proposed scope (10.4, 10.5) We would advise including the environmental implications and impacts surrounding surface and ground waters as a key issue in this section, as well as the consequences of climate change. In paragraph 10.5.1, it mentions that surface water will be included within the full SEA, specifically referencing the following: "The assessment will focus on aspects relating to water quality, water quantity and hydro-geomorphology."	Noted. The interactions between SEA objectives and assessment questions have been considered.

		We would advise including biodiversity as part of this scope, and discussing the implications of the proposed 10km buffer zone (see paragraph 2.2), specifically looking at any options that may have a hydrological influence beyond this zone and how multi-benefit biodiversity enhancements (e.g. through green infrastructure and sustainable drainage) can be secured. Paragraph 10.5.2 also scopes the groundwater within Affinity Water's operational area into SEA. Again, with the following being referenced: " The assessment will focus on impacts to water table levels, saline intrusion, and ground water pollution" In a similar vein to surface waters we would expect the influences surrounding biodiversity to also be scoped into the SEA. When discussing biodiversity, Natural England would expect the SEA to cover both the protected sites and species aspects, as discussed above, and the potential to enhance general biodiversity (including priority species and habitats), under the relevant environmental legislation. We consider that options can be created that will be beneficial for both biodiversity enhancement while improving aspects of Affinity Water's delivery (e.g. through improved water quality while meeting biodiversity targets).	
16d	Water; Table 10.2	SEA key questions (Table 10.2) We suggest incorporating the above notes on biodiversity into the SEA key questions.	Noted. The likelihood for significant effects on biodiversity has been explored in detail through the SEA and the HRA.
17a	Landscape, townscape and visual amenity; Table 7.1	Key messages (Table 7.1) The following policies, plans and programmes should also be included in the regional/local list: Landscape Character Assessments (where available)	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
17b	Landscape, townscape and visual amenity: section 7.2	Base line review (Section 7.2) We note that the relevant Areas of Outstanding Natural Beauty (AONB) and National Character Areas (NCAs) for the central and southeast regions of the Affinity Water supply area have been summarised within the baseline review. However, it would also be helpful to note the particular pressures the main NCAs are subject to. Additionally, we advise that the eastern region of Affinity Water's operational area be addressed when considering Landscape, Townscape and visual amenity. This is due to the presence of the Dedham Vale AONB, even if this aspect can be screened out, it must be considered as part of a Landscape and Visual Impact Assessment (LVIA).	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
17c	Landscape, townscape and visual amenity: section 7.5 and table 7.2	SEA Objectives and key questions (7.5 and table 7.2) The proposed objectives should be expanded to include the necessity to assess any potential impacts on designated landscapes through an LVIA. Such an assessment would require identifying any potential risks and mitigation measures required for any options selected in or around a designated landscape.	Noted.

18a	Climate; table 9.1	Key messages (Table 9.1) Paragraph 99 of the NPPF should be included in table 9.1 of this report. This paragraph relates specifically to considering climate change long term, and how this will affect biodiversity. It would be advantageous to incorporate this paragraph to allow for the consideration of the links between biodiversity and climate change resilience and mitigation into the SEA.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
18b	Climate; section 9.2	Referencing any current schemes looking at green infrastructure and sustainable drainage may be useful here as part of climate change adaptation. This would allow for an understanding of what work is currently being undertaken across the operational area of Affinity Water that may help to build local resilience to the pressures of climate change. It may also be useful to make reference to Natural England's Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate - NE546, to help contextualise these issues.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
18c	Climate; section 9.4	Key issues (Section 9.4) We note that the key issues highlighted under the climate change chapter refer to the stresses on the area (e.g. from drought and flooding), which will be exacerbated by climate change, and the actions Affinity Water will take to reduce their carbon footprint. Natural England advise also raising the connection between biodiversity and climate change. The SEA Scoping should consider how enhancing climate change resilience through the incorporation/support of biodiversity enhancement may be beneficial to Affinity Water's operational area. Attention should be afforded to how biodiversity enhancement can benefit the water environment throughout Affinity Water's regions (e.g. by creating natural areas of flood storage, river restoration to reduce flow rates, or enhancing available greenspace to promote ground recharge).	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
18d	Climate; section 9.5 and table 9.2	SEA Objectives and key questions (9.5 and table 9.2) We advise including the above points into both the overall objectives for the SEA (9.5), as well as to the key questions table (table 9.2).	Noted. The interactions of SEA Objectives and assessment questions have been explored.
19a	Population and human health; table 3.1	Policies, plans and programmes (Table 3.1) The following policies, plans and programmes should also be included in the regional/local list: Rights of Way Improvement Plans (ROWIPs) Local Authority green infrastructure strategies	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
19b	Population and human health; table 3.4	SEA objectives and key questions (Table 3.4) It may be worth including, within the scope of this section of the SEA, how enhancing green infrastructure can support a healthy environment for people to live in. As such, we would advise considering this within the SEAs scope and key questions. This could extend to the considerations around natural capital included within the SEA.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.

20a	Tourism and recreation; table 3.1	Policies, plans and programmes (Table 3.1) The following policies, plans and programmes should also be included in the regional/local list: Rights of Way Improvement Plans (ROWIPs) Local Authority green infrastructure strategies Including aspects from section 8 of the NPPF which refer to recreation	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
20b	Tourism and recreation; table 4.2	SEA objectives and key questions (Table 4.2) As mentioned under 'population and human health' it would be useful to discuss the potential implications on green infrastructure promotions within this section.	Noted.
21	Material asset and resource use	Natural England has no comments to make on coverage of this SEA topic.	Noted.
22a	Geology and soils; table 12.1	Key messages (Tables 12.1) The first sentence should be expanded to include reference to conservation local geological sites such as Regional Important Geological Sites (RIGS).	Noted, the Defra strategy makes no reference to RIGS.
22b	Geology and soils; section 12.2	Base line review (Section 12.2) Reference to any geological SSSIs would be welcome in this section.	Noted, the scoping considered all SSSIs, including ones designated for geology.
22c	Geology and soils; section 12.4	The first sentence should be expanded to include important local geological sites.	Noted, local geological sites are unlikely to be affected by the issues listed.
22d	Geology and soils; table 12.2	SEA objectives and key questions (Table 12.2) The SEA objective could be expanded to reference the need to prevent soil erosion (which can be greatly exacerbated when normally wet soils are dried).	
23	Air quality and noise; table 8.1	Key messages (Table 8.1) Also relevant to regional/local programmes is the Air Pollution Information System (www.apis.ac.uk). This provides information on air pollution impacts and the sensitivity of different habitats/designated sites.	Noted.
24	Heritage assets and archaeology	Natural England has no comments to make on coverage of this SEA topic.	Noted.

25a	Ecosystem services and the WRMP; section 13	Natural England encourages the inclusion of ecosystem services and natural capital within this SEA scoping.	Noted.
25b	Ecosystem services and the WRMP; section 13.2	Base line review (section 13.2) We note that the baseline review touches on the main habitat types in the Affinity Water operational area, alongside the ecosystem services provided by such and their current status. In addition to this, Natural England requests that the SEA includes an assessment of the potential impacts of the rdWRMP2019 on natural capital (including natural processes) and the ecosystem services it supports. This assessment should be caveated alongside tables 13.2 and 13.3.	Noted, Affinity Water and AECOM explored the potential to integrate ecosystem services assessment into the SEA. Please refer to Chapter 5 in the Environmental Report for more detail.
25c	Ecosystem services and the WRMP; sections 13.4 and 13.5	SEA Objectives (Sections 13.4 and 13.5) Our natural capital supports the provision of a wide range of ecosystem services, which provide benefits to people in terms of health, wealth and well-being. This includes the provision of water supply. It is stated within the report that the d WRMP2019 has the potential to impact on natural capital and its provision of multiple ecosystem services and we therefore fully welcome the proposed assessment of this impact is included in the SEA, as stated in section 13.5. In this respect we would like to suggest the following: We recommend reference to the UK National Ecosystem Assessment follow-on work on tools, which looks at how SEA can incorporate consideration of ecosystem services/ecosystem approach. Here is the link, it is part of the NEAT Tree toolkit: http://neat.ecosystemsknowledge.net/pdfs/strategic_environmental_assessment_ecosystem_proofed_tool.pdf Impact on ecosystem services needs to take account of impact on the natural capital assets and importantly the ecological processes/functions that underpin the provision of ecosystem services. We recommend that impact is assessed against a broad framework of ecosystem services (e.g. UK National Ecosystem Assessment (UKNEA), or Common International Classification of Ecosystem Services (CICES)) rather than a limited selection of ecosystem services. Due consideration needs to be given to impacts on the cultural ecosystem services, which can often be ignored or down-played in ecosystem service assessment, as they are difficult to quantify. In this respect we suggest the use of a narrative to report the impact on cultural ecosystem services in the assessment. We also recommend reference to our Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate - NE546 and in particular the chapter on ecosystem services in the main report.	Noted.
26	Summary of the SEA scope; section 14	Summary of the Scope of the SEA (Section 14) Natural England would expect the additions to this SEA Scoping report discussed above be incorporated, where necessary, into the final summary of the scope (table 14.1).	Noted.
27	Proposed method; section 15	Proposed method (Section 15) Natural England is happy with the proposed methods for assessment as set out in the SEA scoping report.	Noted.
28	Table 5.2	Table 15.2	Noted.

		The questions within the table should be amended to reflect amendments recommended in the sections above.	
29	Next steps; section 16	Next steps (Section 16) The iterative process described is welcome. In section 16.2, which discusses the future assessment of the rdWRMP2019, Natural England advise including: Developing strategic alternatives, expressly stating that should any negative impacts be identified through the SEA process, that alternative options to those elected will be considered.	Noted.
Historic England			
30	Table 11.1	Key messages from the NPPF should include 'Substantial harm to or loss of a grade II listed building, park or garden should be exceptional, and substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens and World Heritage Sites, should be wholly exceptional". The documents should include the Planning (Listed Buildings and Conservation Areas) Act 1990.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.
31	First paragraph, 11.2.1	We note the reference to our comments on the SEA of the previous WRMP in the first paragraph under 11.2.1. However, there is no reference to a 500m buffer in my letter of 30th November 2012 on the then SEA scoping report for the WRMP 2014 nor any request to focus on Heritage at Risk. A 500m buffer should only ever be considered as a crude initial sift to identify which heritage assets may be affected by an option or options, with a more detailed assessment based on the significance of the asset, the contribution of the setting to that significance (and appreciation of that significance) and the nature of the proposed works to follow. Where location-specific schemes are developed, Historic England will require more detailed assessments of the relevant historic environment to be undertaken.	Noted. It is recognised that distance is not a definitive guide to the likelihood or significance of an impact but it can help in the early stages of assessment to identify options that are within close proximity to sensitive receptors.
32	Figures 11.1 and 11.2	As regards heritage at risk, Historic England does encourage local planning authorities to identify assets on Historic England's Heritage at Risk Register in the Scoping Report for the SEA/SA of their local plans, as the National Planning Policy Framework requires local plans to set out a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets at risk. However, we are not aware that the same requirement applies to Water Resource Management Plans. The Scoping Report should therefore identify all heritage assets in the two areas on Figures 11.1 and 11.2.	Noted, the key designated heritage assets have been identified within the Figures.
33	Sub-section 11.4	Sub-section 11.4 should recognise potential historic assets in floodplains and the vulnerability of those assets to changes in groundwater.	Noted, scoping information presented in Appendix II has been updated to reflect this comment.

Responses to the Environmental Report accompanying the rdWRMP19 in 2018

Ref	Comment	Response
Environment Agency		
1	The plan explains that consultation is based on the preferred plan and the alternative plan. However, the revised SEA Environmental Report only considers in detail the preferred plan (chapter 5) and the cumulative effects of the preferred plan (chapter 6). Section 4.7 of the SEA Environmental Report indicates the preferred plan was progressed on the basis of cost and deliverability but does not clearly explain and justify why the alternative plan has been discounted for further assessment.	Noted. All reasonable alternatives for the rdWRMP have been assessed, including for cumulative effects in the main Environmental Report.
2	The SEA does not include sufficient information on cumulative assessment and impacts. For example, change within the River Lea catchment could impact water availability downstream linked to existing sustainability change investigations on the Lower Lea.	Noted, the SEA follows the regional method and approach being used by WRSE to determine cumulative effects. The revised Environment Report will seek to ensure that cumulative effects downstream are also considered.
3	Section 7.3 of the SEA Environmental Report (monitoring) lists 3 main monitoring measures based on the findings of the SEA. There is no supporting information on which schemes and in which water resource zones the monitoring measures relate to.	Noted, the revised Environmental Report will be revised to address this comment.
4	In addition to the comments in recommendation 9 the following minor comments relate to Technical report 4.11: Tables 4.3 and 5.2 refer only to positive impacts.	Noted, these table have been revised to reflect this comment.
5	- Several relevant plans are not currently listed in Annex A and/or the summary of the policy context within the SEA. - FRMPs are listed in the footnotes to the policy context, they are not listed in Annex A. - No reference is made to relevant Shoreline Management Plan for the South East Area. - HD RoC is referred to within the HRA Tech report, but not reference is made to the HD RoC in appendix II under water or biodiversity or Annex A.	Noted, Appendix II, including Annex A have been updated to reflect this comment.
6	The companies options assessment and SEA should reflect the relative environmental impact of drought options and explain how this has influenced the selection and sequencing of options.	Noted, drought options were assessed through the SEA process and the findings presented in Chapter 4. The final Drought Management Plan was published in 2018.
Natural England		
7	2.1 Impacts and mitigation The ‘Impact Description’ and ‘Effect Description’ columns in the Appendix V tables span multiple SEA objectives and assessment questions, and it is often difficult to pick out the information relevant to each question and see how it has been assessed.	Noted, a commentary on effects is provided for each assessment question where necessary. Appendix V has been updated to more clearly set out mitigation, where necessary.

	Mitigation measures are not always provided where negative impacts have been identified. In many cases, the information provided in the 'mitigation' column simply states that there is a need for ecological surveys and a Construction Environmental Management Plan (CEMP). Surveys do not constitute mitigation, but they may inform what mitigation measures are required. The SEA should explain what surveys are needed, and what measures in the CEMP would be required to mitigate the risks. If insufficient information is available to understand whether impacts can be mitigated then the WRMP should set out what alternative options could be delivered if it is later found that the preferred plan is not deliverable.	
8	2.2 Internationally and nationally designated biodiversity sites The scoping information for biodiversity, flora and fauna (SEA Appendix II) lists all the Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites and National Nature Reserves (NNRs) in the study area, and within 10 km of the study area. For each site there is a description of the primary habitats and species, and water-related threats to site condition. Annex B of this appendix includes similar tables with information for SACs, SPAs, Ramsar sites and SSSIs. However, neither location lists the designated interest features for the sites. The tables refer to some habitats and species which are designated interest features, and some which are not. Some designated interest features are not mentioned. The SEA assessment tables in Appendix V identify the proximity of options to designated sites and identify some potential impact pathways, but do not identify what interest features might be affected. An understanding of pathways and receptors is required in order to assess the degree of risk and to identify potential mitigation measures. Affinity Water should ensure that the potential impact of options has been assessed against all interest features of designated sites (SACs, SPAs, Ramsar sites and SSSIs) and should have regards to the sites conservation objectives (for SACs, SPAs and Ramsar sites) and favourable condition tables for the SSSIs. At present this does not appear to have been done, as the interest features are not listed anywhere and the assessment tables do not explain what site features might be impacted.	Noted, interest features of designated sites were considered when undertaking the assessment. The interest features for all international and national sites within the study area have now been included in the Environmental Report accompanying the rdWRMp19 in Appendix II, Annex B.
9	2.3 Marine Conservation Zones (MCZs) The SEA Environmental Report makes no reference to Marine Conservation Zones (MCZs). Appendix II (Baseline Review) includes information about two MCZs in the South East Area (Dover to Deal MCZ and Dover to Folkestone MCZ). Although further out to sea, the SEA assessment should also consider Folkestone Pomerania MCZ, as well as two Recommended MCZs in the area (Hythe Bay rMCZ and Goodwin Sands rMCZ). All of these sites are within 10 km of the SEA study area.	Noted. Appendix V in the Environmental Report accompanying the rdWRMp19 has been revised to include reference to MCZs and an assessment of potential impacts on them where necessary.

	Appendix V (SEA of constrained options) includes reference to MCZs against two schemes (AFF-RTR-WRZ7-0842 and AFF-DES-WRZ7-0309). In both cases, the effect description lists the proximity of the sites to the schemes, but offers no assessment of the potential for the scheme to hinder the sites conservation objectives Affinity Water should ensure that the potential for schemes to impact MCZs and rMCZs is assessed (including cumulatively and in combination), and that mitigation measures are identified if necessary. There should be an SEA question relating to impacts on MCZs and rMCZs. Natural England recommends that the MCZ assessment is clearly identifiable in the assessment process, for example by adding a separately 'MCZ assessment' section in the SEA Environmental Report.	
10	2.4 Landscape There appears to be inconsistency in the assessment of options which involve pipelines through Areas of Outstanding Natural Beauty (AONBs). Several of these schemes were assessed, and the effect score ranges from -1 to -3. It is unclear how these scores were derived. The assessment needs to explain how each option could affect the landscape characteristics of the AONB and its setting, with reference to the AONB management plan. Careful design would be essential to ensure local landscape character is not just protected, but also enhanced. There are many options in Affinity Water's rdWRMP and in other companies' plans which have the potential to impact protected landscapes should they go forward. Cumulative landscape impacts should be assessed before the final plan is submitted to ensure mitigation is possible, and mitigation should not be left to a piecemeal approach at the project stage. Natural England recommends that Affinity Water works with neighbouring companies and with Protected Landscape Officers to produce a cohesive Protected Landscape Mitigation Strategy for each AONB which could be affected by multiple schemes in the lifetime of the WRMP. These should be completed before implementation of the plans, and should address any cumulative landscape impacts which could occur.	Noted. The significance of the effect depends on the scale of new infrastructure either within the AONB or its setting. The cumulative effects on landscape are considered within the Environmental Report using the regional method and approach suggested by WRSE.
11	2.5 Priority habitats and species Potential impacts on BAP Priority Habitats and species have been identified against several options, but information on the scale of impact (in terms of area affected) and the nature of impacts (e.g. loss or fragmentation) is lacking. The mitigation discussion is also inadequate, stating that priority habitats should be avoided where possible, or else compensatory habitat will be required. There is no indication of whether avoidance or provision of suitable compensatory habitat is feasible.	Noted, the text relating to mitigation has been updated where a potential impact has been identified. At a strategic level it is difficult to propose detailed/ specific mitigation measures and it not possible to know if compensatory habitat is feasible. The potential for impacts often arises a result of proposed new pipelines where the routes cross priority habitats. The SEA now recommends that priority habitats are avoided at the detailed design stage.
12	2.6 Invasive non-native species	Noted, Appendix V has been updated to address this comment.

	The SEA assessment relating to invasive non-native species (INNS) is incomplete and inconclusive. Against most options, the assessment (in Appendix V) says "No invasive species identified, however detailed ecological survey required". The SEA should consider whether each option has the potential to introduce INNS to new areas, or to exacerbate their spread should they be present. At this stage, knowing what species are present is not necessary.	
13	2.7 Water Framework Directive Impacts on the achievement of WFD objectives appear to have been assessed in the SEA. Natural England defers to the Environment Agency (EA) to comment on the WFD assessment of the rdWRMP, and the implications for the preferred programme. We fully support the EA's views and advice on this matter.	A separate WFD assessment was carried out and this informed the SEA.
14	2.8 Impacts of supply-side options 2.8.1 BREN Reservoir (AFF-RES-WRZ4-9832) The SEA assessment (Appendix V) for this option says that "Abstraction from Brent Reservoir SSSI may affect water quality and the species and habitats that the site supports". It also states that there could be "minor construction and operation phase effects on BAP priority habitats". However the SEA does not explain what SSSI interest features would be affected or the mechanism by which water quality or biodiversity might be affected. In order to understand the potential impacts, the SEA should explain what impact the option will have on water levels and water quality (including the frequency and extent of drawdown) and link this to the interest features of the SSSI, and to any priority habitats and species which are present. Table 5.4 in the SEA Environmental Report does not mention the fact that the option involves abstracting directly from a SSSI, and therefore no mitigation is proposed. This option also identified risks of impacts to Fray's Farm Meadow SSSI and Ruislip Woods SSSI from the pipeline associated with this option. Again, links to designated site features need to be made, and more information on mitigation should be provided in the Appendix V table.	Noted, the assessment for this option in Appendix V has been updated to reflect this comment where possible.
15	2.8.2 Desalination schemes The constrained list included two desalination schemes (AFF-DES-WRZ7-0309 and AFF-DES-WRZ7-0396) and one effluent reuse scheme which requires a new desalination plant (AFF-EFF-WRZ7-0605) which were assessed in the SEA. The assessments focus on the impacts of infrastructure on the land. Impacts on coastal designated sites (SACs, SPAs, Ramsar sites, MCZs and SSSIs) could also result from: • impingement and entrainment at intake pipe (e.g. of migratory species or planktonic loading) • hypersaline discharge impacts including pH, dissolved oxygen, nitrogen, density, sea discolouration and any anti-scalant or other chemicals used • thermal discharge • scour of discharge • timing of discharge.	Noted, the assessment of the desalination schemes has been updated to reflect this comment.

These potential impacts have not been discussed or assessed. These schemes were not selected for either the preferred or alternative plan in the rdWRMP. However, Affinity Water should ensure that the assessments are completed in case the plan options are reviewed.

Responses to the Environmental Report accompanying the rdWRMP19 in 2019

Ref	Comment	Response
Historic England		
1	We note the contents of the draft WRMP together with the accompanying SEA report. Our comments below relate to those supply-side schemes identified in the SEA as having negative effects on Objective 13 (historic environment); • AFF-RTR-WRZ4-4011 Abingdon to Iver 2 • AFF-RTR-WRZ1-4010 Abingdon Reservoir to Harefield • AFF-RES-WRZ4-0832 Brent Reservoir We note that the first two schemes above are to be taken forward in partnership with Thames Water, and you will be aware of previous correspondence between Historic England and Thames Water with regard to the potential effects on the historic environment should they go ahead. A copy of Historic England's response to Thames Water's draft WRMP is attached elsewhere to this letter. We therefore note and welcome the proposed monitoring measures set out in Table 3 of the SEA.	Noted. The assessment of any schemes relating to the South East Strategic Reservoir in Appendix V have been updated to reflect HE's comments, in particular relating to archaeology. Chapter 8 has also been updated to ensure that mitigation realting to the historic environment is also clearly set out.
2	Brent. No precise location, but would appear to be in reasonably close proximity to Harrow Park – there are also other CAs nearby and a range of listed buildings. With regard to the proposed Brent Reservoir Scheme (AFF-RES-WRZ4-0832), we would welcome greater clarity as to its precise location before being able to offer a firm view as to the likely impacts on the historic environment. We note that the scheme in its entirety would appear to propose the creation of a new reservoir as well as increased abstraction of water from the existing Brent reservoir. The detail of the scheme, for example on page 49, indicates that the new reservoir would be located somewhere within the setting of the Grade II Harrow Park. We would point out that if this is the case, then the location would also likely to be within the setting of the Harrow Park conservation area, while there are also a significant number of listed buildings nearby that could potentially be affected depending on the exact location. The creation of a new reservoir (or the expansion of an existing one) could also have an effect on buried archaeology, which can be particularly vulnerable to this type of project. Specialist advice should be sought as appropriate in areas of known or potential archaeological significance, and we would point out that the Historic Harrow Archaeological Priority Area covers the historic town centre nearby (see https://historicengland.org.uk/services-skills/our-planning-services/greater-london-archaeology-advisory-service/greater-london-archaeological-priority-areas/). Historic England has produced advice on preserving such remains which can be found here.	The detailed assessment of this scheme is presented in Appendix V. It should be noted that this scheme does not include the delivery of a new raw water reservoir, it porposes a new cell at the existing Harrow Service Reservoir. The assessment found that the construction of the new reservoir cell is likely to have negative impacts on landscape/ townscape and the historic environment in the short term. The new reservoir cell would be situated on greenfield land at Harrow on the Hill, in close proximity to a Registered Park and Garden. This is likely to be visible during construction within an area of open/ green space within the existing urban area. The assessment concluded that during operation there is not likely to be any significant impacts as a result of the reservoir as it will be buried. Once mitigation is taken into account it is considered that

	As a result, we recommend that further detail as to these potential impacts, together with how they may be mitigated are included at Table 1 of the SEA. Table 3 should be similarly updated.	there is the potential for a long-term minor negative effect on the historic environment. The Environmental Report, in particular Chapter 8 (Mitigation), now specifically refers to mitigation during construction for the new reservoir cell as well as recognises the potential for buried archaeology.
Natural England		
3	Natural England notes that the SEA has informed the plan, and the SEA objectives have been included within the modelling which guided the preferred options selected.	Noted.
4	All of the constrained options which Affinity Water have identified have been assessed within Appendix V and summarised in Table 4-7 of the SEA. However, not all of these options have been selected for the preferred plan. The SEA would benefit from making it expressly clear which options are in the preferred plan, and which are not, to save confusion as to why some options which raise concern have not been subject to later assessment.	Noted. Appendix V has been revised to reflect this comment. If a scheme forms part of an adaptive future this is referenced within Appendix V. Please note that Table 6.1 clearly sets out all the schemes that form the preferred plan.
5	The SEA is logically presented, with baseline information, and explanation of how the SEA informed the selection of options in the rdWRMP19, key impacts identified in the preferred and alternative plans, and a summary of the assessment of in-combination and cumulative effects.	Noted.
6	2.1.1 AFF-RES-WRZ-0832: Brent Reservoir Brent Reservoir SSSI is designated for breeding birds which are associated with lowland wetlands and open water habitats. The SEA identified a potential negative impact on biodiversity associated with the AFF-RES-WRZ4-0832 Brent Reservoir option. Natural England strongly recommends that Affinity Water looks at ways to mitigate any biodiversity impacts associated with this scheme, and to seek out opportunities for biodiversity net gain. Mitigation could include bankside habitat improvements to try and offset the changed in levels, and a hands-off approach during the bird breeding season. This mitigation is not currently within the plan, Natural England would expect Affinity Water to add this to the rdWRMP19 in due course.	Sections 6.3.1.5 and 6.3.4.1 (SSSI section) and Table 8.1 (mitigation measures table) have been updated in the main Environmental Report to reflect this comment. The detailed assessment of this scheme in Appendix V has also been updated.
7	In our previous response, Natural England expressed concern over the lack of detail within Appendix V relating to how the SSSI interest features which may be affected by the option. In the rdWRMP19 there is much more detail provided within Appendix V,	Noted.
8	While the interest features have been included in the assessment, it is not expressly stated that these features were identified through the 'favourable condition tables' which are available for all SSSIs. Affinity Water should clarify whether this was the evidence based used against which to assess potential impacts.	The interest features were identified using the NE SSSI database available online and the favourable condition tables and status were also referred to where necessary.

9	Appendix V states the following under SEA objective 5 (d), in relation to the frequency and extent of drawdown: “There are ongoing discussions with Affinity Water and the Canals Trust for this scheme.” Natural England should also be a part of these discussions, to ensure that the designated sites is not harmed.	Noted, Appendix V and the Environmental Report have been updated to reflect this comment.
10	In Appendix V, SEA objective 5 (b) concludes that there is potential for a net negative effect on priority habitat/species, and deciduous woodland in particular is highlighted.	Noted.
11	Natural England considers that there may also be opportunities here to enhance biodiversity at the site, especially along the bankside habitat of the reservoir. Resultantly, Affinity Water should explore the potential to provide biodiversity enhancements at this SSSI. Affinity Water may also want to look into how improving marginal habitats may enhance the resilience of the SSSI notified features to fluctuations in water levels.	Opportunities for net gain are identified in the assessment for the Brent Reservoir scheme in Appendix V. Specific reference to bankside habitats has now been included.
12	There is an indication within Appendix V of the SEA that there may be an opportunity to restrict abstraction in the reservoir during the summer. Natural England expects Affinity Water to restrict abstraction at sensitive times for the birds.	Affinity Water has considered that the release of water could also be restricted during the breeding/ nesting seasons (broadly March to July) to protect designated bird species. Affinity Water will work with Natural England to discuss the detailed operation of this scheme and agree the appropriate mitigation measures to protect SSSI bird species.
13	2.1.2 AFF-RTR-WRZ1-4010: Abingdon Reservoir to Harefield Transfer (50Ml) and AFF-RTR-WRZ4-4011: Abingdon to Iver 2 (50Ml/d) The comments that Natural England have made in relation to the HRA appropriate assessment for these options are also relevant to the SEA itself and in the Appendix V summary, for the overlapping SSSI features.	Noted. Appendix V has been updated to avoid confusion in relation to the overlapping of the SPA and SSSI and the differences between interest features.
14	2.1.3 AFF-RES-WRZ5-0809: Birds Green Reservoir Both the SEA assessment and Appendix V mention that this option has the potential to impact both the Roding Valley Meadows SSSI and Harlow Woods SSSI, both of which are ultimately screened out. Natural England advises the following in relation to this option: • There is potential for Epping Forest SSSI to be impacted by this option, and this SSSI should be included within the assessment. Epping Forest SAC has been discussed and screened out in the HRA, but there are areas of this SSSI which are not within the SAC boundary. Also some SSSI interest features are not interest features of the SAC and so would not have been included in the HRA. • Roding Valley Meadows SSSI is referred to in the SEA assessment as the Roding Meadows SSSI, therefore the assessment should be updated with the correct name.	Noted. The Environmental Report in Chapter 6 and the detailed assessment in Appendix V has been updated to include consideration of Epping Forest SSSI. The Environmental Report and Appendix V have been updated to ensure the correct name of Roding Valley Meadows SSSI is used.
15	2.2 Landscape There are several options within the preferred plan which involve pipeline development through Areas of Outstanding Natural Beauty (AONBs). In our response to the previous iteration of the dWRMP19 Natural England raised concerns over the lack of a cumulative impact assessment that had been included in the SEA. The rdWRMP19 has included a	Noted. Chapter 7 of the Environmental Report includes an assessment of the potential for inter plan cumulative effects on sensitive receptors, including AONBs.

	cumulative assessment within Appendix VI, which has reviewed the cumulative impacts of all of the options, both spatially and temporally, for all of the adaptive futures included in the plan. Appendix VI of the SEA has also reviewed all of the SEA objectives (including landscape) in line with the WRMPs of other water companies throughout the south east. Where this assessments concludes that there may be an impact on AONBs in the longer term Appendix VI of the SEA states that "…any new infrastructure should be designed and adhere to the aims and policies of … AONB Management Plan(s)". Further to this, Natural England advise that Affinity Water works with relevant parties (including Natural England and the AONB Board) in the development of these options to ensure that the most appropriate landscape mitigation is selected, and that opportunities for landscape enhancements are identified where possible. Also a cumulative impact assessment for each protected landscape should be undertaken on other companies plans or projects. This may be best undertaken through Water Resources South East.	
16	2.2.1 South east Strategic Reservoir and the North Wessex Downs SPA The cumulative impacts assessment undertaken within Appendix VI for the proposed Abingdon Reservoir concludes the following: "Overall rating of cumulative effects: Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity." The report only appears to look at how landscape features will be influenced by the aspects of this option which are associated with the Affinity Water rdWRMP19 (i.e. AFF-RTR-WRZ1-4010: Abingdon Reservoir to Harefield Transfer (50Ml) and AFF-RTR-WRZ4-4011: Abingdon to Iver 2 (50Ml/d)). While the assessment does acknowledge that these options will need to be supported by the new reservoir, it does not consider the reservoir itself as part of the cumulative or in combination impacts. Natural England consider that without the reservoir, there would be no need for the above mentioned options, and as such they should be considered in tandem. Realistically, there is no real way that the development of the south east Strategic Reservoir will not have a significant impact on the setting of the North Wessex Downs AONB, and this should be considered within the SEA and mitigation measures proposed. We advise that the options in the rdWRMP19 which relate to the south east strategic reservoir are included within the cumulative impacts assessment relating to other water company options.	The assessment of schemes that involve the delivery of the SESR onclude consideration of impacts on the North Wessex Downs AONB. This is also desicussed in Section 6.1.6 in the Environmental Report. The delivery of the South East Strategic Reservoir is also taken into account within the cumulative effects assessment in Appendix VI. Appendix VI considers the potential for intra plan cumulative effects, i.e. the potential for effects that could arise as a result of interactions between schemes proposed within each of the reasonable alternatives (which includes adaptive future) for the Affinity Water WRMP19. The potential for cumulative effects with other plans and programmes, including other WRMPs, is addressed in Chapter 7 of the Environmental Report. The WRSE cumulative assessment work did not identify any cumulative effects on the North Wessex Downs AONB as a result of the SESR schemes with any other Water Company WRMP schemes.
Environment Agency		

17	The company will rely on drought permits and orders to resolve the short-term deficit, until the Grafham Water import expansion option becomes available. In our original representation we highlighted our concern about the use of drought permits because of their impact on the environment. We are pleased that Affinity Water plans to reduce its reliance on these options in the future, but we do not agree with the scoring that has been provided in the Strategic Environmental Assessment (SEA) around the drought permit and orders and believe that their environmental impacts have been under represented. The company should: Review the SEA scores for drought permits and orders and show the impacts of this on its plan	Noted, the assessment of drought options in Appendix V and the summary in Chapter 5 have been revised to reflect the concerns raised by the EA. Please note that the permit options reflect those accepted by the Secretary of State for the Drought Plan 2018 and we therefore consider the assessments appropriately reflect the effects on the environment against the relevant SEA objectives.
18	The company has also adopted a collation approach to incorporate the SEA findings into the economics of balancing supply and demand (EBSD) modelling to influence the decision making process. It is unclear how the collation method has been developed and applied, and specifically, why negative SEA scores are matched with positive environmental scores, and vice versa. The company should: Explain clearly how the collation approach has been developed and applied, and why negative SEA scores are matched with positive environmental scores, and vice versa.	The approach and method used to integrate the SEA into Affinity Water's programme appraisal and decision-making is presented in Chapter 5, in particular Section 5.2. Some additional text has been added for further clarity. How the collation approach had been undertaken and used is explained below. Undertaken: • In their own right the findings of the assessment for each option and the twelve SEA objectives cannot be effectively utilised in the EBSD modelling, so a collation approach was developed. The collated score was simply calculated by counting the number of "moderate" or "major" positives and "moderate" or "major" negatives (>= +2 or <= - 2). That means the maximum and minimum scores would be +/-12. How was it used: • During our modelling, we introduced a series of metrics and the environmental metric was one of these. We took the scores derived from the collation approach, rather than each of the scores for the 12 objectives to enable the creation

		of a single environmental metric rather than multiple metrics. (For more info on how these were used, see technical report 4.9 Decision making report). Negative/Positive Scores: • Table 5-1 shows that the SEA negative scores have been flipped into positive environmental scores, and vice versa for the positive scores. • The reason for this 'flip' is that we had a series of other metrics within our modelling that had negative scores as high values, and positive scores as negative values – simply to show the higher the score, the worse performing against that particular metric.
19	The company should provide further information on how its SEA scores have influenced its selection of options.	Section 5.5 in the Environmental Report explains how the SEA has been used to infrom decision-making.
20	As a general point, the SEA objectives should include a specific reference to the need for water companies to contribute to attaining good ecological potential and good ecological status under the Water Framework Directive (WFD), and certainly the requirement to avoid deterioration.	SEA Objectives 10 (Protect and improve surface water and groundwater body status) and 11 (Avoid adverse impact on surface and groundwater levels and flows) inherently require consideration of WFD requirements for Good Ecological Status/ Potential. The WFD assessment for the WRMP19 informed the assessment against SEA Objectives 10 and 11.
21	There are a lot of question marks in the SEA assessment for transfer options. "?" seems to equal a neutral score. This may not be appropriate where best judgement of risks indicate a likely risk. For example invasive non-native species (INNS) risk is put as either "?" or -1. This may under-represent the risk.	As identified in Table 4.3, "?" indicates an uncertain effect. Generally this means that the nature and significance of effects are uncertain at this stage and that further work is required to reduce uncertainty and enable a more definitive assessment to be carried out. Included significance key alongside each summary table to improve clarity.

22	For all of the SEA Summary Finding Tables the assessment of options 5.c (INNS impact), 5.e (biodiversity enhancement options) and 6.b (landscape enhancement) have largely been populated with a "?". This means that these aspects of the SEA have not been adequately assessed. It is important that they are scored, in order for options to be properly assessed as to their potential negative or positive impact.	Please see response above.
23	SEA report, section 6.3.5, which makes an assessment of INNS risk, is not consistent with guidance for the Water Industry National Environment Programme (WINEP). This requires all raw water transfers to be assessed, whereas the statement here indicates current transfers are all "no risk".	Additional text included in Section 6.3.5 to state that existing transfers may pose a risk for INNS either now or before new schemes are implemented - baseline monitoring for INNS should be carried out in dialogue with EA and Natural England to assess risks from existing as well as new transfers.
24	SEA report, summary table 4.17, which assesses impact of drought options, has a score 0 against 11a (protect & restore river flows) for the OUGH, UTTL and WELL options, all of which propose that support water (flow augmentation) is diverted to supply side. This scoring for the drought options look over-optimistic. Against 5b – degradation of priority habitats the options to increase abstraction from levels of past sustainability reductions score 0. We believe this should be given a lower score given the likely impact on chalk river priority habitat.	Noted, the assessment of drought options in Appendix V and the summary in Chapter 5 have been revised to reflect the concerns raised by the EA.
25	Page 25 of the SEA report states that there are no AONBs in the company's East Region (WRZ 8). The Dedham Vale and Stour Valley AONB covers part of Affinity Water's operational area (i.e. in the Brett and Stour valleys) and should be included in the report. Character Area 86 (South Suffolk and North Essex Claylands) should be added to the list of National Character Areas in the East Region.	Appendix B has been updated to include the Dedham Vale and Stour Valley AONB as well as national Character Area 86.
26	SEA report, section 7 – one of the questions in the template return is whether cumulative impacts have been properly assessed. This is from section 7.2.1: 'Overall, it is considered that the potential risk for the rdWRMP19 and the DMP (Drought Management Plan) to have cumulative effects are low. Once the location of particular drought actions is known there may need to be some consideration as to how these could interact with ongoing or emerging rdWRMP19 schemes'. This statement in combination with an assumption that drought options are temporary, would not properly assess risks of cumulative impacts.	Additional text added in Section 7.2.1 to reflect this comment.
27	SEA report, section 8 – the mitigation measures are not comprehensive but more suggestions of actions which could be considered.	Chapter 8 of the Environmental Report has been updated to reflect this comment. The mitigation measures proposed are considered appropriate for a strategic level assessment. More detailed mitigation measures will be identified at the design stage and be informed by further studies and ongoing consultation with statutory consultees.

28	SEA report, section 9 – the monitoring proposals are high level and make a number of assumptions that other organisations will hold (or be collecting) sufficient information. In Table 9.1, there is no suggestion of any INNS monitoring.	As per extant SEA guidance it is reasonable to assume that existing monitoring arrangements carried out by other parties will continue. INNS monitoring has now been added to Table 9.1.

Appendix IV: SEA screening criteria

Screening criteria for unconstrained options

Feature	'RAG' rules
• Strategic tourist routes	**Intersect or disrupt**
• Special areas of conservation (SAC)[104]	**R = <400 m** **A = 400 m – 5 km** **G = > 5 k m**
• Special protection areas (SPA)	**R = <400 m** **A = 400 m – 5 km** **G = > 5km**
• Ramsar sites	**R = <400 m** **A = 400 m – 5 km** **G = > 5km**
• Sites of special scientific interest (SSSI)	**R = <500 m or encroaches upon** **A = 500 – 2000m** **G = > 2km**
• Ancient woodland	**R = <500 m or encroaches upon** **A = 500 – 2000m** **G = > 2km**
• National nature reserves	**G = <2km**
• County wildlife sites	**R = Adjacent to, or encroaches upon** **A = <400 m**
• Local nature reserves	**G = <1km**
• AONBs	**R=<3km from AONB**
• AQMAs	**R = < 100m from an AQMA** **A = 100m - 2km from an AQMA** **G = > 2km**
• Flood risk zones	**R = Flood risk zone 3** **A = Flood risk zone 2 or 2/3** **G = Flood risk zone 1**
• Groundwater source protection zones	**Zone 1** **Zone 2** **Zone 3**
• Nitrate Vulnerable Zone	**In** **Out**
• Conservation areas	
• Listed buildings	**< 500m** **>500m**
• Scheduled monument	
• Registered Parks and Gardens and Battlefields	
• Agricultural land classification[105]	**R = Grade 1 or 2** **A = Grade 3** **G = Other / ungraded**
• Landfill sites	**TBC**
• SSSI (geodiversity)	**R = <500 m or encroaches upon** **A = 500 – 2000m** **G = > 2km**
• AONB	**R=<3km from AONB**

[104] Note that these distances have been derived from the Thames Basin Heath Avoidance Strategy and is, at this stage, a proxy for proximity impacts on European sites

[105] Agricultural land is classified into five grades, with grade one being of the best quality. High quality agricultural land is a finite resource, in that it is difficult if not impossible to replace it.

Data assumptions

SEA topic	Feature	Comments
Population, Economy and Human Health	• Urban areas over 75,000 people	The proximity of water resource options is unlikely to have a significant effect on population but could affect potential regeneration if there is insufficient water available for further development or distance makes the option unfeasible. The options are unlikely to have a significant impact on the local economy. It should be noted that there is the potential for minor impacts on the population and economy during the construction of any new infrastructure.
Tourism and Recreation	• Strategic tourist routes	The proximity of water resource options is unlikely to have a significant effect on tourism and recreation other than through potential disruption during the construction phase.
Material Assets		Limited data is available to inform the assessment. Access to a bus service is important, but the frequency of the service is important and there is no data available that captures this.
Biodiversity, Flora and Fauna	• Special Areas of Conservation (SAC) • Special Protection Areas (SPA) • Ramsar sites • Sites of Special Scientific Interest (SSSI) • Ancient Woodland • National Nature Reserves • County Wildlife Sites • Local Nature Reserves	Good data is available to inform the assessment. It is fair to assume that development in close proximity to sensitive biodiversity sites can lead to impacts. It is recognised that distance in itself is not a definitive guide to the likelihood or significance of effects on designated sites or wider biodiversity. This will be dependent on a variety of information, some of which is not available at this stage, such as the precise scale, type, route, design and layout of new infrastructure as well as level of mitigation to be provided. The specific buffers for SPAs, SACs, Ramsar sites and SSSIs vary between each designated site and can vary across different parts of a designated site. At this stage of the SEA process, the upper limit of the relevant buffer zones have been used in order to assess the sites. This equates to 5 km for SPAs, SACs and Ramsar sites and 2 km for SSSIs.
Landscape, Townscape and Visual Amenity	• Areas of Outstanding Natural Beauty (AONBs)	Good data exists to inform the assessment. In terms of mapped spatial data, AONBs and the proximity to them can be accurately determined. As above for biodiversity, it is recognised that distance in itself is not a definitive guide to the likelihood or significance of effects on the landscape. This will be dependent on a variety of information, some of which is not available at this stage, such as the precise scale, type, route, design and layout of new infrastructure as well as level of mitigation to be provided.
Air Quality and Noise	• Air Quality Management Areas (AQMAs)	Good data exists to inform the air quality assessment. AQMAs are mapped nationally and the proximity to schemes can be accurately determined. Effects are likely to be temporary i.e. construction phase, other effects due to operation would need to be assessed at the project level through EIA.
Climate	• Energy consumption	Limited data is available. The proximity of a source of water to its destination (either households or WTW) can have an implication on the energy required to transport that water.
Surface Water	• Flood risk zones	Good data is available to inform the appraisal.
Groundwater	• Groundwater source protection zones • Nitrate Sensitive Area • Nitrate Vulnerable Zone	Good data is available to inform the appraisal.
Cultural Heritage and Archaeology	• World Heritage Sites • Conservation areas • Listed buildings • Scheduled monument • Registered Parks and Gardens and Battlefields	Good data is available to inform the appraisal, i.e. there is good potential to highlight where development in proximity to a heritage asset might impact negatively on that asset, or its setting. As above for other SEA topics, it is recognised that distance in itself is not a definitive guide to the likelihood or significance of effects on the historic environment. This will be dependent on a variety of information, some of which is not available at this stage, such as the precise scale, type, route,

SEA topic	Feature	Comments
		design and layout of new infrastructure as well as level of mitigation to be provided. Unfortunately, it has not been possible to gather views from heritage specialists on sensitivity of assets / capacity to develop sites. This is a notable limitation as potential for development to conflict with the setting of historic assets / local historic character can only really be considered on a case-by-case basis. It may be the case that development can enhance heritage assets or their setting. Data is also available to show the location of known archaeological sites, although archaeology is rarely a major constraint to development.
Geology and soils	• Agricultural land classification[106] • Landfill sites • SSSI (geodiversity) • AONB (were geology is part of the designation)	Limited data is available to inform the appraisal. There is data to show the location of high quality agricultural land, and agricultural land that has been entered into an Environmental Stewardship scheme. However, it is important to note that the agricultural land quality dataset is of very low resolution. Common land is 'open access' but not necessarily managed with access (including for the young, elderly etc.) in mind.

[106] Agricultural land is classified into five grades, with grade one being of the best quality. High quality agricultural land is a finite resource, in that it is difficult if not impossible to replace it.

Appendix V: SEA of constrained options

1. Transfer Options

1.1 CTR

1.1.1.1 AFF-CTR-WRZ3-0028

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD score
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme will allow the transfer of 15Ml/d from Iver 2 Treatment Works to Bulls Green Reservoir via Ickenham Pump Station and North Mymms Pump Station. The scheme will require new mains (69.54 km of 450mm Diameter Main) from Iver 2 Treatment Works to Ickenham Pump Station, Ickenham Pump Station to North Mymms Pump Station and North Mymms Pump Station to Bulls Green Reservoir; Booster Pump Sets at Iver 2 Treatment Works (4 x 55kW Booster Pumps, 3 x Duty, 1 x Standby), Booster Pump Sets at Ickenham Pump Station (4 x 90kW Booster Pumps (3 x Duty, 1 x Standby)), Booster Pump Sets at North Mymms Pump Station (4 x 90kW Booster Pumps (3 x Duty, 1 x Standby)) and a 15Ml capacity increase of Bulls Green Reservoir. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to material consumption, road infrastructure, biodiversity, landscape, historic environment, and air quality. Key issues during operation relate to potential long-term effects on Affinity Water's carbon footprint.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The upgrade to the pipeline follows the route of existing roads, and so no accessible informal recreation sites are anticipated to be affected during construction or operation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified at the detailed design stage.	-1	0	The option requires 69.54 km of 450mm pipeline from Iver 2 Treatment Works to Bulls Green Reservoir via Ickenham Pump Station and North Mymms Pump Station. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of	-2	0	The option requires 69.54 km of 450mm pipeline from Iver 2 Treatment Works to Bulls Green Reservoir via Ickenham Pump Station and North Mymms Pump Station	0

										infrastructure will also help to minimise impacts.				
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option requires upgrades of the Iver Treatment Works Booster Pumps (5 x 355kW), upgrade of the existing main between Willowbank and New Year's Green from a 600mm diameter main to an 800mm diameter main(approximately 5.1km in length), upgrade of booster pumps at Ickenham Pump Station (5 x 500kW) and a 15Ml upgrade to Arkley Reservoir capacity.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP19 did not identify any pathways for impacts to European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary/ Permanent	N/A	Local	Moderate	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats and in particular the ancient woodland where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower around the route but this is uncertain at this stage. A CEMP should be in place during construction. Good practice construction methods should ensure that there are no significant impacts in terms of noise, light and dust disturbance. Any impacts will be	-2	0	This scheme has the potential to cause the loss of BAP priority habitat deciduous woodland, and the disturbance of BAP priority habitats deciduous woodland, semi-improved grassland and coastal or floodplain grazing marsh during construction, and potentially change the hydrology of these sites. The scheme has the potential to disturb several parcels of ancient woodland during construction, and depending on the depth of the pipeline, change the hydrology of these sites. It should be noted that the WFD assessment found that any impacts during construction would be minor, localised and temporary. No impacts during operation are likely.	?

											temporary and short-term.				
	5.c. Impact on non-native species?		?	N/A	?	N/A	?	N/A	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	During the detailed design stage the pipeline should be rerouted to avoid coming within 500m of a SSSI that has interest features sensitive to emissions of dust during earthworks. Otherwise good practice construction methods should reduce the likelihood of impacts. Careful design and construction of the pipeline, informed by further geotechnical and hydrogeological investigations, would enable it to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that water levels and quality on the SSSIs would not be significantly affected. This would need to be developed further during detailed scheme design.	-1	0	The new pipeline follows existing infrastructure where possible and this takes it in close proximity to a number SSSIs, including Fray's Farm Meadows SSSI, Ruislip Woods SSSI, Water End Swallow Holes SSSI and Whippendell Wood SSSI and Bricket Wood Common SSSI. The interest features of these SSSIs are provided in Appendix II, Annex B. There is the potential during construction for disturbance to some of the interest features as a result emissions of dust as well as impacts on water quality/ and hydrology depending on the depth of the pipeline. Given the interest features of the SSSIs it is unlikely that noise and light pollution would be a particular issue. It should be noted that the WFD assessment found that any impacts during construction would be minor, localised and temporary. Careful design and construction of the pipeline, informed by further geotechnical and hydrogeological investigations, would enable it to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that water levels and quality on the SSSIs would not be significantly affected.	

	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the pumping station. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The delivery of the new pipeline will have a temporary negative effect on the landscape/ townscape during construction. However, once the land is re-instated the likely residual effect during operation will be neutral. The expansion of Bull's Green Reservoir will also have temporary negative effects during construction. The construction of the expanded reservoir has the potential for a negative effect during construction and operation. Mitigation measures such as screening/planting should help to reduce the residual negative effects during the operational phase. Given that there is an existing reservoir and water tower it is considered that this option will have a residual neutral effect during operation.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Moderate	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within the Hillingdon AQMA. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Moderate	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles. Energy efficient pumps should be adopted to reduce the carbon footprint of the operation process.	-2	-1	Expansion of existing works will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Good practice construction methods.	0	0	The WFD assessment found that the option would not have an impact on hydromorphological status during construction or operation.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The WFD assessment found that good practice construction methods should ensure that impacts are minor, localised and temporary.	-1	0	The WFD assessment identified that there is the potential for an impact water quality during construction that is in close proximity to watercourse; however, following best construction practice should mean any impacts are small, temporary and localised. No impacts identified during construction.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD does not identify any impacts on groundwater levels/ flows.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD does not identify any impacts on groundwater quality.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify any impacts on surface water or groundwater levels/ flows.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river.	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The new pipeline route passes within 10m of a number of Listed Buildings and a Registered Park and Garden. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected is anticipated to result in negative effects on the historic environment that are short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.2 AFF-CTR-WRZ3-0349

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD score
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option will provide minor positive effects against all objective 1 sub objectives. There will be minor negative construction phase effects on strategic transport infrastructure and on public rights of way associated with this option. There is potential for habitat loss of BAP Priority habitat deciduous woodland and therefore minor negative effects on biodiversity during construction and operation. By upgrading the transfer capacity this option should result in positive effects on the resilience of the local environment and Affinity Water's assets to climate change. However, the pipeline crosses several river channels whose hydro morphology could potentially be impacted. Consequently, there will be minor negative effects on surface water bodies.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires a new 6.47 km main (400mm) from Bulls Green to Sacombe. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The construction traffic impact is not anticipated to be a significant impact for a longer duration than a few months (at any one location). No significant operation impacts are anticipated.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a new 6.47 km main (400mm) from Bulls Green to Salcombe.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The proposed transfer route is located 10km from Wormley-Hoddesdonpark Woods Special Area of Conservation (SAC). The HRA (2017) for the dWRMP found that given the distance from the transfer route and the fact that the interest features of the SAC are not vulnerable to impacts arising from this distance, adverse impacts are considered unlikely significant effects will not arise.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Low	The loss of BAP Priority habitat should be avoided where possible; if not possible, compensatory habitat will be required. A CEMP should be in place during construction. Ecology surveys will be required of terrestrial and aquatic habitats.	-1	-1	The proposed transfer pipe passes through Back Lane County Wildlife Site (CWS) and Sacombe Park CWS. Sacombe Park Tank Service Reservoir is also within Sacombe Park CWS. The pipeline route also passes through BAP Priority habitat deciduous woodland at Bulls Green Reservoir and adjacent to the River Bean. The pipeline route passes through the River Beane and the River Beane from Waterford Hall to Mill End CWS and through Stapleford Marsh Ditch which is also a CWS. The pipeline also intersects a stream at Stony hills Road Wood Ware Lodge South CWS. The pipeline route passes adjacent to Bramfields Woods CWS and Martin Spring CWS. Potential for habitat loss of BAP Priority habitat deciduous woodland, Back Lane CWS and Stapleford Marsh Ditch CWS. Loss of BAP Priority habitat should be avoided where possible. Depending on depth of pipeline, potential for changes to hydrology to CWS, ancient woodland and BAP Priority habitats. Also potential for noise, light and dust disturbance during construction. Potential for protected species to be affected. Potential impacts to species within BAP Priority woodland habitats to be impacted during construction. Potential impacts to aquatic species in waterbodies to be impacted during construction and operation. Detailed ecological survey required.	-1
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	A CEMP should be in place during construction.	0	0	The pipeline route is within 3.5km of Twinbury Site of Special Scientific Interest (SSSI) which is designated for its swamp communities with open water and wet woodland. No effects on this SSSI have been identified.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and Landscape character assessments should be carried out where significant infrastructure works will be undertaken.	-1	0	There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as reinstatement of affected land will reduce the residual effect during operational phase.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles..	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	0	0	The pipeline crosses several river channels whose hydro morphology could potentially be impacted. However, WFD assessment concludes this option is screened out as water bodies crossed by the transfer main do not include other options likely to cause combined adverse impacts.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Treatment not dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The pipeline route passes within 15m of the Woodhall Registered Park and Garden and a Listed Building. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

1.1.1.3 AFF-CTR-WRZ3-0707

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option will provide minor positive effects against all objective 1 sub objectives. The pipeline cuts across several major roads. As such there is likely to be moderate temporary negative effects on strategic transport infrastructure and minor negative effects on public rights of way during construction. The pipeline passes adjacent to several parcels of BAP Priority habitat deciduous woodland and good quality semi-improved grassland. Additionally, the new reservoir location is potentially adjacent to BAP Priority habitat deciduous woodland. This may result in negative effects on biodiversity during construction phase. The new pipeline route also runs through the Minet country park, and as such, there are likely to be moderate negative short term effects on landscape during construction. However, once re-instated the likely residual effect will be neutral. Construction and operation phase activities are likely to increase Affinity Water's carbon footprint. They will therefore result in moderate negative effects on climate change. The pipeline crosses several river channels whose hydro morphology could potentially be impacted. Further abstraction may have a negative effect on the environment if not properly monitored and licensed. There is therefore predicated to be minor negative effects during operation on climate change adaption and on surface water bodies. The pipeline passes within 5m of the Registered Cannons Park, and within 20m of a number of Listed Buildings. There is therefore likely to be moderate negative effects on the historic environment during construction. The pipeline route also crosses grade 1 agricultural land, therefore moderate negative effects are expected during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		Moderate	N/A	Low	N/A	Low	N/A	Local	Moderate	N/A	0	0	It is anticipated that there is potential for disturbance to water quality during construction work, if the pipeline does not use existing bridges or gantries. This may result in short term, temporary negative effects on recreation activates such as fishing. No operational impacts are anticipated.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option will require 31.8km of 700mm diameter main to be installed from Iver Treatment Works to Arkley Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	The option will require 31.8km of 700mm diameter main to be installed from Iver Treatment Works to Arkley Reservoir. The pipeline cuts across several major roads including the A4020, A408, A311, A317 and A312. There is likely to be significant temporary negative effects during construction.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-3	0	This option will require 31.8km of 700mm diameter main to be installed from Iver Treatment Works to Arkley Reservoir, booster pump upgrades at Iver Treatment Works (5 x 200kW), Stanmore Pump Station (4 x 132kW) and New Arkley Reservoir (4 x 45kW). Arkley Service Reservoir will be required to be upgraded by 40Ml.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	Low	Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	CEMP should be put in place to mitigate disturbance to Priority habitats. Ecological surveys required.	-1	0	Pipeline passes adjacent to several parcels of BAP Priority habitat deciduous woodland and good quality semi-improved grassland. Pipeline crosses fields with potential for hedgerow severance at Harrow School Farm, also crosses a drain in this location. The new reservoir location within this area may also affect these habitats, and is potentially adjacent to BAP Priority habitat deciduous woodland. Pipeline crosses several watercourses. Height of pipework crossing in relation to river levels is unclear at this stage. WFD assessment concludes no likely impact to hydromorphology assuming pipework is above water level.	?
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-2	0	The option requires 31.8 km of new 700mm Main from Iver Treatment Works to Arkley Reservoir, and creation of the Arkley Service Reservoir. It also requires a new pumping station at Stanmore, which is assumed will be visible during operation. Once reinstatement has been carried out the new pipeline and covered reservoir will not be visible. Upgrades to pumping stations will not significantly alter infrastructure which is already present. The new pipeline route runs through the Minet country park. As such, there are likely to be significant negative short term effects during construction. However, once re-instated the likely residual effect will be neutral.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M1 and other major roads in the vicinity of the option. However, it is noted that the site is within the Hillingdon AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	-1	0	WFD assessment concludes potential impact from construction in proximity to watercourse, however following best construction practice should mean any impacts are small, temporary and localised. No likely impact to hydromorphology during operation assuming pipework is above water level.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Treatment not dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	-1	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected. However WFD assessment concludes following best construction practice should mean any impacts are small, temporary and localised.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-2	0	The pipeline passes within 5m of the Registered Cannons Park, and within 20m of a number of Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.4 AFF-CTR-WRZ4-0716

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline cuts across several major roads and will result in moderate negative effects on the strategic transport infrastructure, and also minor negative effects on public rights of way during construction. There is also predicted to be minor negative effects during both construction and operation on biodiversity as th4e pipeline passes through the Staines Moor SSSI and due to the proximity of the South West London Waterbodies SPA and adjacent BAP priority habitats. Construction activities are likely to increase Affinity Water's carbon footprint resulting in minor negative effects during both construction and operation. Further abstraction may have a negative effect on the environment if not properly monitored and licensed, the pipeline crosses several river channels which could be adversely affected. Consequently there is likely to be minor negative effects during construction and operation with regard to surface water bodies and the local environments resilience to climate change. The new pipeline route passes within close proximity to Listed Buildings and a Scheduled Monument. Therefore there may be moderate negative construction phase effects on these assets. Additionally the pipeline route crosses a significant portion of grade 1 agricultural land and will result in major negative effects on agricultural land during the construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage	-1	0	This option will require a new 700 mm diameter main (27.9 km in length) from Walton via Chertsey and Egham to Iver Treatment Works. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	This option will require a new 700 mm diameter main (27.9 km in length) from Walton via Chertsey and Egham to Iver Treatment Works. The pipeline cuts across several major roads including the A30 and A3040. There is likely to be significant temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

												delivery of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-1	0	This scheme will require a new 700 mm diameter main (27.9 km in length) from Walton via Chertsey and Egham to Iver Treatment Works and new booster pumps at Walton, Chertsey and Egham Treatment Works.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Moderate	?	Medium term (5 -25 years)	?	Temporary	?	National	High	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. The programming and construction processes for this scheme should take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. it is recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any	-1	?	The pipeline passes along a road (A3044) that splits two sections of South West London Waterbodies SPA (King George VI Reservoir on the western side and Staines Reservoirs on the eastern side), designated for European important numbers of over-wintering gadwall and shoveler. Works may cause disturbance to this site depending on their timing (the most sensitive period for this SPA being between October and March). Since both sets of reservoirs are sealed, it is not expected that pipeline works would affect the water levels of either. The HRA (2017) for the dWRMP found that further examination of this option leads to a conclusion that it would be possible to deliver this scheme without adverse effects on integrity as long as the detailed construction programme and methods take account of the presence of sensitive wildlife. Research into the South West London Waterbodies by Briggs (2007) (and the proximity of these reservoirs to Heathrow airport) suggests that activities in the reservoirs are much more likely to be disturbing than construction in the road carriageway and both sets of reservoirs have high embankments screening them from the road. Moreover, the most sensitive period is the winter when construction activities are least likely to take place. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction.	-1

												dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. With these recommendations included, it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option.				
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years)	?	Permanent	?	Local	Low	CEMP should be put in place. Loss of deciduous woodland should be avoided if possible. It not possible, compensatory habitat may be required. Depth of pipeline should be considered to avoid changes to hydrology	-1	?	Pipeline passes adjacent to several parcels of BAP priority habitat deciduous woodland, and through one parcel south of Sutton. Pipeline crosses River Thames via a road bridge. Loss of priority habitat should be avoided where possible. If this is not possible, compensatory habitat will be required. CEMP should be in place to avoid disturbance.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	?	Medium term (5 -25 years)	?	?	?	Regional	High	CEMP put in place. Depth of pipeline should be considered to avoid changes to hydrology	-1	-1	Pipeline passes adjacent to Staines Moor SSSI, designated primarily for the habitats they support. Potential for disturbance or changes in hydrology to these sites.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include appropriate re-	0	0	Once reinstatement has been carried out the new pipeline will not be visible. Upgrades to pumping stations will not significantly alter infrastructure which is already present. The route does not run	?

										instatement and screening.			through any sensitive areas and as such no significant effects are predicted.	
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M25, M40, M3 and other major roads close to the route. However, it is noted that the option is partially within the Hillingdon AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Predicted climatic changes in England include hotter and drier summers. This option does not result in increased storage capacity.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Design and construction methods should follow sustainable design principles	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form	-1	0	WFD assessment concludes potential impact from construction in proximity to watercourse, however following best construction practice should mean any impacts are small, temporary and localised. No likely impact to hydromorphology during operation assuming pipework is above water level.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option runs through areas of 1 in 100 year flood plains. However, it will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-2	0	The new pipeline route passes within close proximity (less than 5m) to a number of Listed Buildings and within 10m of a Scheduled Monument. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of affected land is anticipated to result in negative effects being short-term, temporary and not experienced during the operational phase. It is considered unlikely that the new booster pumps will have negative effects of significance on the historic environment given that they will be located on existing sites and the distance from designated heritage assets. It is considered that there are suitable mitigation measures available to ensure that residual effects are neutral during operation.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-3	0	The pipeline route crosses a significant portion of grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.5 AFF-CTR-WRZ3-0076

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	There may be minor negative construction phase effects on biodiversity due to the proximity of BAP habitat to the reservoir and pipeline route. With regards to climate change, the increased energy demand from boosters will likely increase the company's overall energy use and will result in minor negative effects during construction and operation. Assumed that Preston Reservoir expansion requires small extension of existing reservoir site. This site is within 60m of a Registered park and garden. There is therefore potential for negative effects during the construction phase. The Reservoir is located in ALC Grade 3 land. It is not clear whether this is Grade 3a or 3b. In any case, there may be temporary negative effects through construction but from an operational perspective, once the land is reinstated there should be a neutral effect. The addition of further supply by this option should result in operation phase positive effects in terms of climate change resilience though increasing overall supply.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 40Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate		0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate		0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Construction work will be within the land adjacent to the site boundaries and no PRoW have been identified.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	NA	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	0	0	Construction work is anticipated to occur in land adjacent to existing site boundaries. No road closures or works are anticipated. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	Low	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will require a 15 Ml capacity upgrade at Preston Reservoir, 4 x 355kW booster pumps at Bulls Green Reservoir (3 x Duty, 1 x Standby), and two Surge Vessels on existing mains.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	0

	5.b. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	High	None proposed	0	0	The scheme involves the use of an existing pipeline between Preston Service Reservoir and Bulls Green Service Reservoir. No adverse impacts are anticipated to Wains Wood, Knebworth Woods, Tewinbury, Benington High Wood and Sherrardspark Wood SSSI.	
	5.d. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Medium term (5 -25 years)	N/A			Local	Low	A CEMP should be implemented during construction. Ecological surveys are required. Investigations into linking hydrological pathways.	-1	0	Bulls Green Service Reservoir is adjacent to BAP Priority habitat deciduous woodland. Preston Service Reservoir is located 119m from BAP Priority habitat deciduous woodland. The existing pipeline passes through BAP Priority habitat lowland meadows and good quality semi-improved grassland. The existing pipeline is also adjacent to BAP Priority habitat traditional orchard. Potential for noise, light and dust disturbance during construction of the new building for booster pumps at Bulls Green reservoir to BAP Priority habitat deciduous woodland. Potential for changes in hydrology to BAP Priority habitats due to upgrades at Preston Service Reservoir.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Measures such as screening/planting will reduce the residual effect / may provide enhancement during operational phase.	-1	0	Assumed that Preston Reservoir expansion requires small extension of existing reservoir site. There are likely to be minor negative effects on landscape during construction phase.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	CEMP should include measures to reduce air pollution from construction (e.g. damping down and the use of covers on HGVs)	-1	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the site is not located within an AQMA. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1

				(>25 years)											
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water bodies affected by this scheme.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water bodies affected by this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water bodies affected by this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water bodies affected by this scheme.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water bodies affected by this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None proposed	-1	0	An element of the main is in a 1:100 year flood zone but it is not considered that this will be affected by this option.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Appropriate reinstatement of any land affected	-1	0	Assumed that Preston Reservoir expansion requires small extension of existing reservoir site. This site is within 60m of a Registered park and garden. There is therefore potential for negative effects during the construction phase. Although appropriate reinstatement of any land affected should reduce these effects there may be a minor residual negative effect. Once mitigation is taken into account it is considered that there would be a residual neutral effect during operation.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Appropriate reinstatement of any land affected	-1	0	The Reservoir is located in ALC Grade 3 land. It is not clear whether this is Grade 3a or 3b. In any case, there may be temporary negative effects through construction but from an operational perspective, once the land is reinstated there should be a neutral effect.	0

1.1.1.6 AFF-CTR-WRZ4-0750

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD Score
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline cuts across several major roads and will result in major negative effects on the strategic transport infrastructure during construction. There may also be minor negative effects on public rights of way and critical services. However, it is predicted that the residual effect during operation will be neutral. The construction and operation phase activities are likely to increase Affinity Water's carbon footprint and are considered to have a moderate negative effect on Affinity Waters carbon footprint over construction and operation phase. Further abstraction may have a negative effect on the environment and the pipeline crosses several river channels whose hydromorphology could potentially be impacted. Consequently it is considered that	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 40Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate		0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate		0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage	-1	0	This option requires 30.7 km of 600 mm diameter main to a 40 Ml New Harrow Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-3	0	This option requires 30.7 km of 600 mm diameter main to a 40 Ml New Harrow Reservoir. The pipeline cuts across several major roads including the M4, M25, A4020, A40, AND A4005. There is likely to be significant temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Medium term (5 -25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option will require 4 x 75 kw Intake pumps to be installed at Sunnymeads, 4 x 110 kW Booster Pumps to be	0

						to Long term (>25 years)							installed at New Iver Water Treatment Works, New Water Treatment Works, 4 x 90 kW Booster Pumps to be installed at New Harrow Reservoir, 30.7 km of 600 mm diameter main and a 40 Ml New Harrow Reservoir.		
	4.b. Result in higher levels of reuse of waste?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-2	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	Avoidance of hedgerow severance at Harrow School Farm, or re-instating hedgerows post construction. CEMP in place to prevent acoustic/light/dust etc disturbance to deciduous woodland and watercourses.	-1	0	Pipeline passes adjacent to BAP priority habitat deciduous woodland using an existing road to the east of Iver Treatment Works, east of Yiewsley, at Wood End, north of Northolt, and at Harrow on the Hill. Pipeline passes adjacent to BAP priority habitat good quality semi-improved grassland. There is a potential for disturbance (noise, light, dust etc.) to these habitats during construction. Pipeline crosses several watercourses by road bridges. Potential for impacts (loss, pollution, changes in hydrological conditions and disturbance) to these watercourses during construction. Pipeline crosses fields with potential for hedgerow severance at Harrow School Farm, also crosses a drain in this location. The new reservoir location within this area may also affect these habitats, and is potentially adjacent to BAP priority habitat deciduous woodland. The new reservoir may affect the hydrology of this location. Iver Treatment Works will be upgraded. Depending on the works required there may be some disturbance to BAP priority habitat deciduous woodland and waterbodies, situated adjacent to the Treatment Works site.	?
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	None identified	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-2	0	The reservoir may be partially visible above ground when completed and a new pump house will be required at the reservoir. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The pipeline route travels through multiple residential area and a Country Park. Therefore, given the likely visibility of construction works and the number and sensitivity of receptors, there will be short-term temporary negative effects associated with the construction phase of the pipeline.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of several major roads including the M4 and M25 adjacent to the site. However, it is noted that the sites is partially within the Hillingdon AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	0	WFD assessment concludes potential impact from construction in proximity to watercourse, however following best construction practice should mean any impacts are small, temporary and localised. No likely impact to hydromorphology during operation assuming pipework is above water level.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No issues anticipated as water will be provided as treated water (via another scheme) to Iver Treatment Works.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Source of water for transfer is not included in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low		0	0	Supply is not dealt with in this scheme. Source of water for transfer is not included in this scheme. Height of pipework crossing in relation to river levels is unclear at this stage. WFD assessment concludes if pipeline route uses existing bridges to cross over watercourses, impact will be negligible.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option runs through areas of 1 in 100 year flood plains. However, it will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets	High	N/A	Short term (<	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-	-2	0	The new pipeline route passes within close proximity (less than 10m) to a number	0

	and the historic environment?				5 years)					instatement of any land affected by construction.			of Listed Buildings and within 60m of a Scheduled Monument. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of affected land is anticipated to result in negative effects being short-term, temporary and not experienced during the operational phase. It is considered unlikely that the new booster pumps will have negative effects of significance on the historic environment given that they will be located on existing sites and the distance from designated heritage assets. It is considered that there are suitable mitigation measures available to ensure that residual effects are neutral during operation.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-3	0	The pipeline route crosses a significant portion of grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.7 AFF-CTR-WRZ1-0751

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This is route cuts across several strategic transport networks including the A40, A4007, M25, M4.Therefore, there will be major temporary negative effects during construction. Additionally, construction and operation phase activities are likely to increase Affinity Water's carbon footprint. The pipeline crosses several river channels whose hydro morphology could potentially be impact, this option will therefore have a minor negative effect on water bodies and the local environment. There will also be moderate construction phase effects on the historic environment due to the proximity of designated assets. However, these effects should not be experienced during construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 40Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate		0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate		0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		Lowe	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	0	0	The Pipe crosses watercourses - Alderbourne and Colne - with the potential for disturbance to water quality during construction works. There may therefore be some minor negative effects on angling and other water based recreation activities during construction. However these are not expected to be significant. No residual effects on angling are anticipated during operation.	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	This scheme requires new mains from the River Thames at Sunnymeades, to the New Iver Treatment Works and then transfer by a new main for storage at Harefield Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-3	0	This scheme requires new mains from the River Thames at Sunnymeades, to the New Iver Treatment Works and then transfer by a new main for storage at Harefield Reservoir. This is route cuts across several strategic transport networks including the A40, A4007, M25, M4. There is likely to be significant temporary negative effects during construction.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-3	0	The scheme will require 5 x 55kw Booster pumps to be installed at Sunnymeads, 5 x 110kW Booster Pumps to be installed at New Iver Treatment Works, New Treatment Works, 25.5km of 600mm diameter main and a 25Ml upgrade of Harefield Reservoir.	0
	4.b. Result in higher levels of reuse of waste?		Moderate	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	-1
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	?	Long term >25 years	?	Permanent	?	Local	Low	Loss of BAP Priority habitat should be avoided where possible. If not possible, compensatory habitat will be required. Ecological survey required. CEMP should be in place during construction.	-1	?	Pipeline passes adjacent to and through (using existing roads) several parcels of BAP priority habitat deciduous woodland. Pipeline passes through one parcel of BAP Priority habitat deciduous woodland south of Harefield Reservoir. Harefield Reservoir is 55m from Top Wood French Grove ancient woodland and deciduous woodland Priority habitat. Pipeline passes adjacent to a parcel of good quality semi improved grassland Priority habitat. Pipeline passes several parcels of ancient woodland; 75m from an unnamed woodland east of Chandler's Hill, 12m from an unnamed woodland north-east of Chandler's Hill, 80m from Common Plantation, 150m from Bayhurst Wood, 80m from Claypits, 300m from Ashain Springs, 100m from Scarlet Springs, 250m from Deadman's Grove, 160m from Battlers Wells Wood and 150m from French Grove. There is the potential for these ancient woodland parcels to be disturbed (through noise, light, dust etc.) during the construction of this Option. Location of Iver Treatment Works is around 50m from BAP priority habitat deciduous woodland, however is separated from this by the M25 motorway. Therefore this habitat will already undergo light and noise disturbance. Site is also adjacent to waterbodies, potential for noise and light disturbance to these.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	?	Medium term (5 -25 years)	?	Temporary	?	Regional	Moderate	Any proposal for this option should avoid designated sites where possible and ensure an appropriate buffer between any new infrastructure. Disturbance effects could be minimised by small alterations in the pipeline route, use of appropriate construction methodologies, and timing of works.	-1	?	The pipeline passes adjacent to Fray's Farm Meadows LNR and SSSI, designated for being one of the last remaining examples of relatively unimproved wet alluvial grassland in Greater London and the Colne Valley. Approximately 53.3% of this SSSI is in favourable condition, with the remainder unfavourable declining. The unfavourable declining is as a result of dense litter/thatch cover (high cover of graminoids/tall herbs). The vegetation throughout is very dense and under-managed.	

													The pipeline also passes adjacent to Ruislip Woods NNR and SSSI, designated for its ancient semi-natural woodland, including some of the largest unbroken blocks that remain in Greater London. The SSSI is in favourable and unfavourable – recovering condition status. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for disturbance (noise, light, dust etc.) to the sites during construction.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-1	0	The pipeline route runs within 150m of the Bishops Wood Country park. Construction may have a negative effect on the landscape setting and character. However, once re-instated the likely residual effect will be neutral.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	N/A	-1	0	Sections of the option are situated within the Hillingdon AQMA. Construction activities and associated congestion has the potential to worsen air quality within the AQMA and therefore result in significant negative effects.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of affinity water's assets to climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form	-1	0	The transfer pipeline crosses several surface water bodies which has potential for disturbance to water quality and hydrological changes during construction. Following best construction practice should mean any impacts are small, temporary and localised. Neutral effect during operation anticipated.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Low	Low	Medium term (5 -25 years)	Medium term (5– 25 years) and Long term >25 years	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form	0	0	Abstraction source and transfer pipeline crosses several surface water bodies the quality of which could be affected during construction. Located in proximity to Colne Brook and the River Colne - new mains will run in urban and made ground with historic landfills nearby. New mains route located in proximity of Fray's Farm Meadows SSSI, which contains swamp species that may be groundwater dependent. Temporary and localised dewatering may be required along the route of the new mains. Abstracted water returned to ground or surface water where possible. Creation of new preferential pathways into aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	0
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5– 25 years) and Long term >25 years	N/A	Temporary	Local	Low	Appropriate licensing and HOF will be required. Mitigation could include a Hands off Flow condition to prevent abstraction at low flows below a certain level. This should be given further	0	-1	Abstraction in river may have a negative effect if not properly monitored and licenced. Temporary and localised dewatering may be required. Abstracted water returned to groundwater or adjacent surface waters. Foundations may disrupt groundwater flow and cause minor obstruction to groundwater	

										consideration at the detailed design stage.			flows causing localised mounding. WFD assessment concludes local or temporary effects.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Mitigation may also include undertaking a borehole integrity check. Make sure headworks are properly sealed to surface water run-off. Specific mitigation should be explored further at the detailed design stage.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Regional	Moderate	Monitor water levels in the reservoir to inform the use of Hands off Flow conditions/ restrict release of water to maintain suitable water levels and avoid adverse effects. This should be given further consideration at the detailed design stage.	-1	0	Abstraction may have a negative effect if not properly monitored and licenced. Underground mains may disrupt groundwater flow and cause minor abstraction to groundwater flow causing localised mounding. Local/temporary effects anticipated. No change in water status predicted.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-2	0	The option will require new Treatment Works at Iver, which will be visible once completed, and have a residual negative effect on nearby (less than 60m) grade II listed buildings. There will also be 25.5km of 600mm diameter main and a 25Ml upgrade of Harefield Reservoir. The piping and reservoir expansions should not be visible once completed. However the piping will be installed approximately 7m from a listed building and 60m from a scheduled monument. This will result in short term temporary negative effects on these heritage assets during construction through loss of setting and character. Assuming appropriate re-instatement the residual effect during operation should be neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 1 and 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.8 AFF-CTR-WRZ5-0753

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	There may be minor negative construction phase effects on strategic transport infrastructure and knock on effects on critical services and industries. The pipeline route passes 11m from the Debden Water SSSI and crosses some areas of BAP Priority Deciduous Woodland. Therefore, there may be moderate negative effects to this SSSI during construction phase. Construction activities are likely to increase Affinity Water's carbon footprint, with minor negative construction and operational effects. The pipeline passes around the perimeter of a Registered Park and Garden, and crosses some areas of Grade 2 agricultural land. There is therefore the potential for minor negative effects on heritage and agricultural land during construction phase.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option (to WRZ5). 30 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	0	0	Any water quality changes are anticipated to be short-term and imperceptible to recreational users. No operation impacts on the footpaths or nearby waterbodies are anticipated. The moderate negative impacts on Debden Water may have short term impacts on informal recreation, however these are not expected to be significant.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The construction impacts are anticipated to be insignificant as it is anticipated that the footpaths will be rerouted whilst the pipeline construction is underway.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	One well used road will be affected by the scheme: B1052 0.5km, Unclassified 0.3. B roads assessed due to greater length affected and greater likelihood of significant congestion impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Long term >25 years	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This option requires a new 8.8km main between Uttlesford Bridge Pump Station and Sibleys Reservoir and 4 x 160kW Booster Pumps at Uttlesford Bridge Pump Station.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Medium	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Regional	Moderate	The pipeline passes 11m from Debden Water SSSI; there is the potential for disturbance (noise, light, dust etc.) to this habitat during construction. Ecological surveys are required, and a CEMP should be in place during construction.	-2	0	The pipeline passes 11m from Debden Water SSSI; there is the potential for disturbance (noise, light, dust etc.) to this habitat during construction.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	Low	The loss of BAP Priority habitat and potentially the severance of hedgerows should be avoided where possible; if not possible, compensatory habitat will be required. A CEMP should be in place during construction. Ecology surveys will be required.	-1	0	Pipeline crosses through two parcels of BAP Priority habitat deciduous woodland; east of Amberden Hall and west of Debden Water SSSI. The pipeline also passes adjacent to or within 100m of several parcels of BAP Priority habitat deciduous woodland. The pipeline crosses several fields, with the possibility of hedgerow severance during construction. The pipeline also crosses several watercourses, including at Debden Water SSSI and the River Cam or Granta north of Thistley Hall. The pipeline passes adjacent to or within 250m of several ponds. The pipeline passes 30m from Horseley Wood Ancient Woodland, 70m from Park Wood Ancient Woodland and 175m from Brakey Ley Wood Ancient Woodland. The construction of this option would currently result in the loss of BAP Priority habitat and potentially the severance of hedgerows. This option also has the potential to result in the disturbance (noise, light, dust etc.) to BAP Priority habitat deciduous woodland, waterbodies and ancient woodland during construction.	?
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The upgrade of booster pumps and existing buildings may have also have a minor negative effect during construction; however, once mitigation is taking into account it is predicted that the residual effect during operation will be neutral	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		Low	Low	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option provides greater resilience in WRZ5.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Long term >25 years	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	No abstraction provided as part of this Option. However, potential for in combination effects if increased abstraction to support this Option is required under another Option or scheme. Further abstraction may have a negative effect on the environment if not properly monitored and licensed, the pipeline crosses several river channels which could be adversely affected.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The pipeline passes around the perimeter of a Registered Park and Garden, there is therefore the potential for minor negative effects on heritage during construction phase. The pipeline will be buried and appropriate reinstatement of land will reduce the residual effect during operational phase to neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.9 AFF-CTR-WRZ5-0869

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Well used roads will be affected by the option, as such there may be a minor negative effect during construction phase with minor indirect negative effects on critical services and industries. Although this option does not require further abstraction, there is potential for in minor negative in combination effects if increased abstraction to support this Option is required under another Option. The new pipeline passes within 10m of the Temple Dinsley Registered Park and Garden, the Great Wymondley Castle Scheduled Monument and a significant number of Listed Buildings and crosses areas of grade 2 agricultural land. Therefore it may have minor negative effects on heritage and agricultural land during construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option (to WRZ5). 25 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The anticipated minor residual impacts on water quality or flow are not anticipated to be perceptible to the majority of informal bankside recreation users.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Well used roads will be affected by the option: A1(M), A10, A505, A507, A602, B1039, B1368, B1383, B197,B656, M11. 5km B roads, 7.6km unclassified roads, 0.1km motorway, 0.1km A roads	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Long term >25 years	Permanent	Permanent	Local	Moderate	N/A	-1	0	The option will require 46.55km of new 600mm diameter main from Preston to Uttlesford Bridge and 4 x 55kW Booster Pumps at Preston Reservoir and 4 x 55kW Booster Pumps at Wicker Hall.	0
	4.b. Result in higher levels of reuse of waste?		Moderate	N/A	Short term (> 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	N/A	Short term (< 5 years)	?	Temporary	?	Regional	Moderate	Ecological survey required. CEMP should be implemented during construction.	-1	0	Loss of BAP Priority habitat and CWS should be avoided where possible. Where this is not avoidable compensatory habitat likely to be required. No HRA implications identified as it is assumed that water will always be available as part of this option. However, if increased abstraction required to support this option under another scheme/ option, in combination HRA may be required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Ecological survey required. Small pipeline route changes to prevent degradation of BAP Priority habitats. CEMP should be implemented during construction.	-1	0	Pipeline is adjacent to deciduous woodland BAP Priority habitat and in proximity to numerous other parcels of deciduous woodland BAP Priority habitat along the pipeline length; adjacent to lowland calcareous grassland BAP Priority habitat ad within 35m of Lowland calcareous grassland BAP Priority habitat and good quality semi-improved grassland and 88m of ancient woodland. Potential for changes in hydrology of the site depending on depth of pipeline. Potential for acoustic, light and dust disturbance during construction.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The upgrade of booster pumps and existing buildings may have also have a minor negative effect during construction; however, once mitigation is taking into account it is predicted that the residual effect during operation will be neutral.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading supply resilience this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Moderate	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	No abstraction provided as part of this Option. However, potential for in combination effects if increased abstraction to support this Option is required under another Option or scheme. Further abstraction may have a negative effect on the environment if not properly monitored and licensed	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline passes within 10m of the Temple Dinsley Registered Park and Garden, the Great Wymondley Castle Scheduled Monument and a significant number of Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.10 AFF-CTR-WRZ5-1043

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This route cuts across the A602 and A10. Consequently, there may be minor negative effects on the strategic transport infrastructure with knock on minor negative effects on critical services and industries. There may minor negative effects on biodiversity during construction and operation due to loss of BAP priority habitats, and chances to the hydrology of the River Ash due to the Hadham Mill Reservoir upgrades. The reservoir upgrade may also have a minor negative effect on landscape during construction and operation. Construction and operation phase activities are also likely to increase Affinity Water's carbon footprint and result in minor negative effects over operation phase. Although this option does not require further abstraction, there is potential for in minor negative in combination effects if increased abstraction to support this Option is required under another Option. The option crosses areas of grade 2 agricultural land. Therefore it may have minor negative effects on agricultural land during construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 50 Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The construction impacts are anticipated to be insignificant as it is anticipated that the footpaths will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option requires 19.9km of new 700mm diameter main from Bulls Green Reservoir to Hadham Mill Reservoir This route cuts across the A602 and A10. There are likely to be temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-1	0	The option will require 19.9km of new 700mm diameter main from Bulls Green Reservoir to Hadham Mill Reservoir, a 50Ml capacity upgrade at Hadham Mill Reservoir and 4 x 250kW relift booster pumps at Hadham Mill Reservoir (3 x Duty, 1 x Standby).	0
	4.b. Result in higher levels of reuse of waste?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N.A	0	0	There are no identified impact pathways to any SSSIs or their interest features.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	?	Long term >25 years	?	Permanent	?	Local	Low	Detailed ecological surveys required. CEMP should be in place during construction. Will need to consider combination effects on waterbodies crossed for WFD assessment. Loss of BAP Priority habitat should be avoided where possible. If not possible, compensatory habitat will be required. Detailed ecological survey required.	-1	-1	There is a potential for disturbance (noise, light, dust etc.) to BAP Priority habitats during construction. There is also a potential for disturbance to watercourses(River Ash and River Rib) during construction. The upgrades to Hadham Mill Reservoir may affect the hydrology of the River Ash and aquatic habitats present. There may be some disturbance to BAP Priority habitats of coastal and floodplain grazing marsh during the upgrade. Detailed ecological survey required. Loss of BAP Priority habitat should be avoided where possible. If not possible, compensatory habitat will be required. Potential for species roosting/nesting in houses adjacent to the pipeline route to be disturbed during construction. Ecological surveys required. Potential for disturbance to Priority habitats, CWS and ancient woodland during construction. Also potential disturbance to Waterford Wood LNR during construction. Potential for changes in hydrology of the site depending on depth of pipeline. Ecological assessments required, and CEMP should be in place during construction.	-1

	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	N/A	-1	-1	Mitigation including screening/planting should ensure that the residual effects during operation are reduced. However, given the uncertainty over the reservoir upgrade and mitigation to provided it is assumed that there will be a minor negative effect on the landscape during operation.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer capacity this option should result in positive effects on the resilience of affinity water's assets to climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore, pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	0	0	The pipeline crosses several river channels whose hydro morphology could potentially be impacted. WFD assessment concludes this option is screened out as water bodies crossed by the transfer main do not include other options likely to cause combined adverse impacts.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline passes within 10m of a number of Listed Buildings. There will be short term, temporary negative effects associated with construction of the pipeline. However, with appropriate mitigation and reinstatement of the affected land the residual effects during operation are predicted to be neutral.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.11 AFF-CTR-WRZ1-1097

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Well used roads will be affected by the option, as such there may be a minor negative effect during construction phase with minor indirect negative effects on critical services and industries. There may be minor indirect negative effects on biodiversity due to the proximity of BAP priority habitat and also Whippendell Wood SSSI and Little Heath Pit SSSI during construction phase. There are also likely to be construction phase minor negative effects on landscape. The pipeline route passes within close proximity to a significant number of Listed Buildings and crosses areas of grade 2 agricultural land. Therefore it may have minor negative effects on heritage and agricultural land during construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 40 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The construction impacts are not anticipated to be significant as it is anticipated that the footpaths will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option requires a new 23.3km 700mm diameter main from Harefield Reservoir to Boxted Pump Station. This route cuts across the A4251, the A41, A412, A404 and the M25. There are likely to be significant temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Long term >25 years	Permanent	Permanent	Local	Moderate	N/A	-1	0	The option will require 4 x 250kW Booster Pumps to be installed at Harefield Reservoir and a new 23.3km 700mm diameter main from Harefield Reservoir to Boxted Pump Station.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP concluded that given the distances to European sites and the lack of sensitivity that no likely significant effect will arise.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	?	Short term (< 5 years)	?	Temporary	?	Local	Low	A CEMP should be in place during construction. Ecology surveys will be required of terrestrial and aquatic habitats.	-1	0	The pipeline route is within 600m of Whippendell Wood Site of Special Scientific Interest (SSSI) and 1.0km of Little Heath Pit SSSI. Harefield Reservoir is within 1.3km of Ruislip Woods SSSI and 1.7km of Old Park Wood SSSI. Depending on depth of pipeline, potential for changes to hydrology within designated sites. Also potential for noise, light and dust disturbance during construction.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice..	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	Low	The loss of BAP Priority habitat should be avoided where possible; if not possible, compensatory habitat will be required. A CEMP should be in place during construction. Ecology surveys will be required of terrestrial and aquatic habitats.	-1	0	The pipeline route may result in the loss of BAP Priority habitat deciduous woodland. Potential for species roosting/nesting in houses adjacent to the pipeline route to be disturbed during construction. Potential for disturbance to Priority habitats and ancient woodland during construction. Potential for changes in hydrology of the site depending on depth of pipeline.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	Low	N/A	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The upgrade of booster pumps and existing buildings may have also have a minor negative effect during construction; however, once mitigation is taking into account it is predicted that the residual effect during operation will be neutral.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is likely to be negative effects on air quality during construction and the pipeline route passes through the Three Rivers District Council AQMA. However, considering the existing sources of atmospheric pollution in this area, including the M25 and Heathrow Airport, any increase in atmospheric pollution as a result of this option will be minor.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		Moderate	Moderate	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-1	-1	The option will require 19.9km of new 700mm diameter main from Bulls Green Reservoir to Hadham Mill Reservoir, a 50Ml capacity upgrade at Hadham Mill Reservoir and 4 x 250kW relift booster pumps at Hadham Mill Reservoir (3 x Duty, 1 x Standby)..	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading supply resilience this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licensing of water abstraction.	0	-1	No abstraction provided as part of this Option. However, potential for in combination effects if increased abstraction to support this Option is required under another Option or scheme. Further abstraction may have a negative effect on the environment if not properly monitored and licensed	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline passes within 10m of a significant number of Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.12 AFF-CTR-WRZ3-1099

(in the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is a transfer of 40Ml/d of treated water by a new main from Boxted Pump Station to Chaul End Reservoir via Friars Wash. The scheme will require 4 x 110kW Booster Pumps to be installed at Boxted Pump Station, a new 17.06km 700mm diameter main from Boxted Pump Station to Chaul End Reservoir and a 40Ml capacity upgrade of Chaul End Reservoir. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to public rights of way, biodiversity, landscape, historic environment, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on the landscape and historic environment and in particular the impacts on the landscape.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 40 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified at the detailed design stage.	-1	0	The option requires a new 17.06km 700mm diameter main from Boxted Pump Station to Chaul End Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option requires a new 17.06km 700mm diameter main from Boxted Pump Station to Chaul End Reservoir. This route cuts across the A4146 and the A5. There are likely to be minor temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The Option will require 4 x 110kW Booster Pumps to be installed at Boxted Pump Station, a new 17.06km 700mm diameter main from Boxted Pump Station to Chaul End Reservoir and a 40Ml capacity upgrade of Chaul end Reservoir. Minor negative effect.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	National	High	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	No specific mitigation identified at this stage. A CEMP should be in place during construction.	0	0	Boxted Pump Station is 1.1km from Little Heath SSSI. The pipeline is 2.6km from Blow's Down SSSI, 2.7km of Chilterns Beechwood SSSI and 3.8km from Kensworth Chalk Pit SSSI. Given the distances of the SSSIs and their interest features it not considered likely that there will be any short-term impacts during construction. It is also considered unlikely that there will be any significant negative effects during operation as the assessment has found that there will not be any significant negative effects in terms of air quality or surface and groundwater levels/quality. Given the distance of the SSSIs there will not be any increased disturbance during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower around the route but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The construction of the new pipeline route may result in the loss of Priority Habitats (in particular deciduous woodland). Potential for disturbance to species during the construction of the pipeline route. However this is uncertain at this stage and the route follows existing infrastructure where possible. Potential for a minor negative effect during construction. It is considered unlikely that this scheme will have significant effects during operation as the assessment found that it is unlikely to have significant effects on air quality or surface or groundwater levels/ quality.	?
	5.c. Impact on non-native species?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	

	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-2	-1	A small proportion (approx. 500m) of the pipeline route falls within the Chilterns AONB. The rest of the pipeline predominantly falls within rural areas and follows existing infrastructure, such as roads. The construction of the pipeline has the potential for a minor negative effect in the short term. At this stage it is not clear if the upgrade to the reservoir would result in any new visible infrastructure. A new pump house may be required and other minor structures but these will be installed at a pre-existing pump station and will therefore not result in significantly visible new infrastructure.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	HGVs and other vehicles relating to the construction and operation could be routed to avoid any AQMAs.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1

	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading supply resilience this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	0	Potential for impacts during construction as the new pipeline crosses a number of watercourses. It is considered that there is suitable mitigation available to ensure that there will be a residual neutral effect during construction. During operation there will not be any impacts. WFD assessment found no impacts in terms hydromorphological status.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water is already treated before reaching this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is not abstracting water but transferring to a reservoir. It is therefore not likely to alter water table levels or aquifers.	0
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several small watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Specific mitigation should be explored further at the detailed design stage.	-1	0	Construction activities that could affect water quality include where the pipeline crosses watercourses.	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option is not proposing a new abstraction or increasing an existing one.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures to be explored further at the detailed design stage and be set out in any applications for Flood Defence Consents where these are required for any river construction works.	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The new pipeline passes within 300m of a number of listed buildings. The pipeline predominantly falls within rural areas and follows existing infrastructure, such as roads, where possible. The construction of the pipeline has the potential for a minor negative effect in the short term on the local character/ historic environment; however, it is temporary and there is mitigation available to ensure that there are no significant effects. At this stage it is not clear if the upgrade to the reservoir would result in any new visible infrastructure. There are no visible designated heritage assets from the reservoir. A new pump house may be required and other minor structures but these will be installed at a pre-existing pump station and will therefore not result in significantly visible new infrastructure.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The new pipeline does not pass through any BMV agricultural land.	0

1.1.1.13 AFF-CTR-WRZ3-2001

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option may have minor negative effects on public rights of way and strategic transport infrastructure during construction phase with knock on minor effects on critical services and industries. There may also be minor negative effects during construction phase on biodiversity due to the proximity of numerous SSSI's and BAP priority habitats. The new pipeline is within 10m of two Registered Parks and Gardens. Construction may have a negative effect on the landscape setting and character. However, once re-instated the likely residual effect will be neutral. The pipeline crosses several river channels whose hydro morphology could potentially be impacted. Consequently there is likely to be minor negative effects on surface water body status. Additionally, there will be an increase in Affinity Water's carbon footprint due to construction and operation of this option. .	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 40Ml/d equates to a minor positive effect	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	A minor significant impacts is anticipated at construction for the length of pipeline along footpaths (e.g. the Chiltern Way). The anticipated minor negative impacts on water quality or flow are not anticipated to be perceptible to informal bankside recreation users.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	The option will require a new 15.9km 800mm diameter main from Hadham Mill Reservoir to Rye Hill Reservoir. This is route cuts across the M1 at one section, and A1081. There are likely to be temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will require 2 x 75kW Booster Pumps to be installed at Chaul End Reservoir and a new 20.97km 700mm diameter main from Chaul End Reservoir to Preston Reservoir.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The transfer route is located 9.8km from the Chilterns Beechwoods SAC. The HRA (2017) for the dWRMP found that given the distance from the transfer route and the lack of sensitivity that SAC interest features have to impacts arising at this distance, significant effects are considered unlikely.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	?	Short term (< 5 years)	?	Temporary	?	Local	Low	A CEMP should be in place during construction..	-1	0	The pipeline route is also located 880m from Wain Wood Site of Special Scientific Interest (SSSI), 2.5km from Blow's Down SSSI, 3.5km from Knebworth Woods SSSI and 3.7km from Kensworth Chalk Pit SSSI. Potential for noise, light and dust disturbance during construction to the closest of these sites.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Low	The loss of BAP Priority habitat should be avoided where possible; if not possible, compensatory habitat will be required. A CEMP should be in place during construction. Ecology surveys will be required of terrestrial and aquatic habitats.	-1	0	The pipeline route may result in the loss of BAP Priority habitat deciduous woodland. Potential for species roosting/nesting in houses adjacent to the pipeline route to be disturbed during construction. Potential for disturbance to Priority habitats and ancient woodland during construction. Potential for changes in hydrology of the site depending on depth of pipeline.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and Landscape character assessments should be carried out where significant infrastructure works will be undertaken.	-1	0	The new pipeline is within 10m of two Registered Parks and Gardens. Construction may have a negative effect on the landscape setting and character. However, once re-instated the likely residual effect will be neutral	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. This option will increase affinity waters storage capacity.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	-1	-1	The options will not remove any artificial structures or channel modifications. The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline is within 10m of two Registered Parks and Gardens. It is also located within 10m of a number Listed Buildings. There is therefore potential for significant negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

1.1.1.14 AFF-CTR-WRZ5-2006

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option may have minor negative effects on public rights of way and strategic transport infrastructure during construction phase with knock on minor effects on critical services and industries. There may also be minor negative effects during construction phase on biodiversity due to the proximity of numerous SSSI's and BAP priority habitats. The pipeline route passes within close proximity to a significant number of Listed Buildings and crosses areas of grade 2 agricultural land. Therefore it may have minor negative effects on heritage and agricultural land during construction phase. The pipeline crosses several river channels whose hydro morphology could potentially be impacted. Consequently there is likely to be minor negative effects on surface water body status. Additionally, there will be an increase in Affinity Water's carbon footprint due to construction and operation of this option.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option will require a new 15.9km 800mm diameter main from Hadham Mill Reservoir to Rye Hill Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option will require a new 15.9km 800mm diameter main from Hadham Mill Reservoir to Rye Hill Reservoir. This is route cuts across the A414, and A1169. There are likely to be minor temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	

										delivery of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	High	Long term >25 years	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-2	0	The option will require 4 x 250kW Booster Pumps to be installed at Hadham Mill Reservoir and a new 15.9km 800mm diameter main from Hadham Mill Reservoir to Rye Hill Reservoir.	0	
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Regional	Moderate	There is the potential for disturbance to Harlow Woods SSSI (noise, light, dust etc.) during construction. A CEMP should be in place during construction.	-1	0	The pipeline passes 150m from Harlow Woods SSSI. The interest features for this site are *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland and *Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland. The site is in 46.05% favourable condition and 53.95% unfavourable – recovering condition. This unit is currently in woodland grant scheme, but only limited coppicing has been undertaken at northern end. Plans to expand the coppicing regime are dependent on sufficient future funding. There is the potential for disturbance to this site (noise, light, dust etc.) during construction.		
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	?	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	Low	The loss of BAP Priority habitats should be avoided if possible. If this is not possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats during construction; a CEMP should be in place and ecological surveys are required.	-1	0	Hadham Hill Reservoir is located 28m from BAP Priority habitat coastal and floodplain grazing marsh and 84m from deciduous woodland Priority habitat. There is the potential for disturbance to these habitats during the installation of the additional booster pumps. A CEMP should be in place during construction. The pipeline passes through a parcel of BAP Priority habitat deciduous woodland east of Hadham Hill Reservoir. The pipeline passes adjacent to one parcel of BAP Priority habitat traditional orchard, adjacent to or within 100m of several parcels of BAP Priority habitat deciduous woodland and adjacent to a large area of coastal and floodplain		

														grazing marsh Priority habitat Option potentially passes through hedgerow habitats, ecological surveys required. The loss of BAP Priority habitats should be avoided if possible. If this is not possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats during construction; a CEMP should be in place and ecological surveys are required. The pipeline crosses the River Stort via a road bridge. There is the potential for disturbance to this watercourse, river habitats and associated species during construction, and potential for changes in hydrology.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. This option will increase affinity waters storage capacity.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term	Temporary	Permanent	Local	Low	Best construction practice.	-1	-1	The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	-1

				(>25 years)												
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme.			
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme			
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.			
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0		
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		0		
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline is within 10m of a Scheduled Monument as well as a significant number of Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0		
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.			
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0		

1.1.1.15 AFF-CTR-WRZ2-2020

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is a transfer of 20 Ml/d of treated water by a new main from Boxted Pump Station to Shakespeare Road Reservoir via Friars Wash Pump Station and a new Shakespeare Road Reservoir. This scheme will provide an additional 20 Ml/d during both peak and average conditions for use within WRZ2. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, road infrastructure, agricultural land, and protecting and improving surface and groundwater body status. Key issues during operation relate to potential long-term effects on the landscape, and protecting and improving surface and groundwater body status.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 40Ml/d equates to a minor positive effect	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	0	0	The option will require a new 17.05km 500mm diameter main from Boxted Pump Station to Shakespeare Road Reservoir. The anticipated pipeline route crosses a number of footpaths. However, the construction impacts on footpaths are anticipated to be insignificant as it is anticipated that the footpaths will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The option will require a new 17.05km 500mm diameter main from Boxted Pump Station to Shakespeare Road Reservoir. This is route follows the footprint of a number of roads. Well used roads to be affected by the scheme include the A4146 (0.1km), A5 (0.5km), A1081 (1.2km), B651 (0.3km), unclassified (3.4km). The delivery of the new booster pumps and reservoir will also have impacts on the surrounding road network due to an increase in HGVs. There will be some traffic disruption during the construction phase; however, this is likely to be local and temporary. No significant operation impacts are anticipated.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Short term (< 5 years)	Medium term (5–25 years) and	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option will require 4 x 250kW Booster Pumps to be installed at Hadham Mill Reservoir, a new 20 Ml Reservoir and a new 15.9km 800mm diameter main.	0

						Long term >25 years									
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline and Boxted Pump Station are 2.6km from Chilterns Beechwoods SAC. The HRA (2017) for the dWRMP found that given the distance from the transfer route and the lack of sensitivity that SAC interest features have to impacts arising at this distance, significant effects are considered unlikely.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Mitigation should include ensuring the pipeline route and construction working areas does not encroach onto designated sites. Potential for acoustic, light and dust disturbance during construction. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The pipeline and Boxted Pump Station are 1.0km from Little Heath Pit SSSI. This site is designated for its controversial Plio-Pleistocene deposits of Little Heath Pit. These are thought to be amongst the earliest "plateau deposits" preserved in Britain. The SSSI is in a favourable condition. The pipeline and pump station are also 2.6km from Ashridge Common and Woods SSSI. This site is designated for supporting an exceptionally rich breeding bird community including both county and national rarities. Of particular importance within the community are species found rarely elsewhere in Hertfordshire, such as redstart, nightingale and wood warbler. The nationally rare firecrest is found here at one of its two known county localities. The pipeline at the existing Shakespeare Reservoir is 0.8km from Batford Springs LNR and 1.4km from Shrubhill Common LNR. The pipeline is also 1.1km from Howe Grove Wood LNR. The pipeline passes through Green Lane south of Jack's Dell County Wildlife Site (CWS), Meadow by River Gade, S. of Grist House Farm CWS and The Nicky Line CWS, however it is assumed that the Nicky Line CWS is on a bridge over the Luton Road, and is not actually intersected by the pipeline. The pipeline also passes within 10m of the following CWS; Annabels Farm, Jacksdell Delmerend Lane Delmerend Lane Chalk Pit and M1 Motorway Junction 9 (South-west). The pipeline passes within 50m of five additional CWS, and within 100m of two additional CWS. The pipeline also passes within 200m of nine additional CWS. There is the potential for disturbance (light, noise, dust etc.) to designated sites during construction. A CEMP should be implemented during construction. There are also potential for changes	?

													in hydrology depending on depth of the pipeline.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route and booster pumps but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The pipeline passes through one parcel of BAP Priority habitat deciduous woodland. However this is along Luton Road, and it is assumed that the woodland is on a road bridge and is not actually intersected by the pipeline. The pipeline also passes adjacent to four parcels of BAP Priority habitat deciduous woodland, within 50m of an additional two parcels of deciduous woodland and within 100m of an additional three parcels of deciduous woodland. The pipeline also passes within 50m of five parcels of good quality semi-improved grassland Priority habitat and 183m from a parcel of coastal and floodplain grazing marsh. There is the potential for disturbance (light, noise, dust etc.) to BAP Priority habitats during construction. A CEMP should be implemented during construction. There are also potential for changes in hydrology depending on depth of the pipeline.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, pumps, and new reservoir cell. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	Moderate	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Permanent	Local	?	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland	-1	-1	The new pipeline will be buried so is not anticipated to have negative effects on the landscape during the operational phase. However, it should be noted that a small proportion of the new pipeline passes through the Chilterns AONB and that there is the potential for minor negative effects on landscape during operation as a result of the new reservoir and pump house but this is uncertain at this stage.	-1

										links and grassland will reduce the residual effect during operational phase. New opportunities are to be created for improved access, recreation and amenity provision across the area of the reservoir to reduce adverse effects during the operation phase.				
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None of the scheme falls within in AQMA and is not likely to significantly increase traffic within an AQMA during construction or operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	New booster pumps, new reservoir, and new main construction will result in energy and raw materials use, operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	Low	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. This option will increase affinity waters storage capacity.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	-1	The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No water treatment in scheme	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river	0	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	

										works. Specific mitigation should be explored further at the detailed design stage. Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.				
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape and historic environment. Re-route the new pipeline to avoid damaging listed buildings, scheduled monuments and registered parks and gardens, especially those within 10m / working area. Use of complex directional drilling underneath the sites to avoid permanent damage should also be investigated. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The new pipeline is within 10m of a Scheduled Monument as well as a significant number of Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by pipeline construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.16 AFF-CTR-WRZ3-4005

(in the Aspirational, Expected, Supply-side Challenging, and Optimistic Futures)

Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
		Probability		Duration		Permanence					Con	Opp		Worst
		Con	Op	Con	Op	Con	Op							
1.a. Provide affordable access to clean water adequate to support health?	This scheme is to allow for the bypass of Arkley 2 Reservoir and to improve the interconnectivity between reservoirs. These works will provide drought resilience with the improved connectivity allowing for reservoirs to cope with high demand (WRZ2). Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to landscape, historic environment, and air quality. No key issues identified during operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option is to allow for the bypass of Arkley 2 Reservoir and to improve the interconnectivity between reservoirs. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. While 0Ml/d, it is recognised that the option will provide drought resilience with the improved connectivity allowing for reservoirs to cope with high demand. A minor positive effect is therefore anticipated during operation.	1
1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The proposed scheme is not anticipated to impact upon water quality or flow.	
2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	0	0	The proposed pipeline route may cross a couple of public footpaths alongside Rowley Green Road, however mitigation measures such as footpath diversions would help reduce the potential effect during construction. There are no impacts anticipated on informal recreation during operation. Scheme not anticipated to cause significant impacts on river access, and therefore it is not anticipated to impact angling.	0
3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	The proposed scheme requires approx. 50m of new 30" diameter pipework at Arkley 2 to allow for bypass and will therefore result in digging up. Closure of roads is not anticipated for the construction of the pipework (the work will take place between the existing water tower at Arkley reservoir and the existing main located a few meters always from Rowley Green Road). Construction work impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). No impacts are anticipated during operation of the scheme.	0

3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	Construction work impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). Due to the location of the proposed scheme, it is assumed that closure of Roley Green road will not take place, therefore no impacts on critical services and industries are anticipated.	
4.a. Require significant new construction or demolition of existing assets?	High	High	Long term >25 years	Long term >25 years	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires 50m of 30"new main. Construction of new main will require use of raw materials.	0
4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	
5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	Where necessary, the pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route, but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	0	0	The only construction to take place is a small section (up to 50m) of pipeline within the boundaries of the Reservoir. The only habitats likely to be affected, from aerial mapping, is amenity grassland. It is assumed that any excavation to remove the non-return valve (once surveys have located it) will be within the existing road structure and shall not affect any other habitat. The residual significance of construction and operation is therefore likely to be minor. However, should this not be the case surveys may need to be conducted to assess impact if areas of trees/hedgerow, priority habitat, protected and/or notable species are affected.	
5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. Abstraction is within the existing licence. It is therefore considered that there is low risk of increasing the spread of INNS during operation.	?
5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	Any proposal for this option should avoid designated sites where possible.	0	0	In terms of designated sites, Rowley Green Common LNR is situated next to the area of pipeline to be surveyed using a camera. This is unlikely to cause any impact to the LNR. The only construction taking place is a small section (up to 50m) which will occur within with boundaries of the Reservoir which will be over 200m from the LNR and the removal of a non-return valve once surveys have located it. It is assumed that any excavation to remove the non-return valve will be within the existing road structure and shall not be within the designated site boundary. The residual significance of construction and operation on the LNR is therefore likely to be minor.	
5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to	-1	0	The option is located within the residential area of Arkley. Construction of the pipework could affect a significant number of local residents and recreation users with a short-term temporary minor negative effect. The	?

									the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be set out at the detailed design stage.			new pipework will be buried so is not anticipated to have negative effects on the landscape during the operational phase.	
6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7.a. Impact an AQMA?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The option is within the Barnet AQMA. However it is considered unlikely that the construction or operational phases would result in significant impacts on the AQMA given the presence of the A1 M1, M25 and other major roads close to the pipework. There are likely to be negative effects on air quality during construction of the new pipework as a result of increased traffic.	0
8.a.Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Long term >25 years	N/A	Permanent	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By providing drought resilience this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Construction of new main. No WFD assessment required as the new main does not cross any surface water body.	0
10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme does not take any additional water from the environment and the new main does not cross any surface water bodies.	
10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Construction of new main. No WFD assessment required as the new main does not cross any surface water body.	
11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0

13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The new pipeline passes within 50m of a Listed Building. There is therefore potential for minor short-term negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The only construction taking place is a small section (up to 50m) which will occur within with boundaries of the Reservoir and will therefore have no significant effects.	0

1.1.1.17 AFF-CTR-WRZ4-4001

(in the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme involves the installation of a new booster station which will allow 17 Ml/d to be pushed through the existing main. This will allow transfer of 17 Ml/d from Egham to Harefield, which will allow use of the existing surplus within the Wey community (WRZ4). Key issues during construction phase relate to the delivery of infrastructure, and potential minor impacts on protecting and improving surface and groundwater body status. No key issues identified during operation.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 17Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as scheme will take place in water works. Water works assumed inaccessible to the public (no public rights of way or public facilities in site footprint).	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts on water quality or flow which may subsequently be perceptible to informal bankside recreation users.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as scheme will take place within water works. Water works assumed inaccessible to the public (no public rights of way or public facilities in site footprint).	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as scheme will take place within water works.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme construction will take place on the water works site. Therefore it is assumed that there will be no significant traffic related impacts.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as scheme will take place within water works with no significant infrastructure change.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways for European sites.	?

including designated and other important habitats and species?	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	A CEMP should be in place during construction. Preventative measures to ensure water quality is not compromised during the construction of the booster station should be taken into consideration. Lighting design should be designed sensitively to ensure that no direct light spill onto the River Thames.	0	0	The construction of the booster station will take place within a water works on the bank of the River Thames. The construction has the potential to cause impact upon the river water quality through spillages and therefore affect the aquatic species which reside within the River Thames. Lighting during the construction of the booster station could also have an impact on aquatic species of fish. Should preventative design and construction methods be adhered to the residual significance of the construction and operation of the pipeline is likely to be minor.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No identified impact pathways to designated sites.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the pumping station. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will result in a new booster station however no new storage is required. The new booster station will be housed within the existing pumping station so it will not affect the landscape during construction or operation. The option also requires a 25 m3 surge vessel which will be above ground. It is assumed there will be appropriate screening on site. This will mitigate any potential adverse effects during construction or operation.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	The route does not pass through any AQMAs. There is the potential for minor negative effects during construction but these are unlikely to be significant. There is unlikely to be any significant impacts on local air quality during operation.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Permanent	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Permanent	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme does not cross any surface water body.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	0	0	Creation of new preferential pathways into aquifer due to below ground workings. surf or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Low	Appropriate licensing and HOF will be required. To confirm sustainability of abstraction, progress with pumping tests and further modelling work and if the tests prove no impact, have a time limited licence while collecting monitoring data for review. Mitigation could include a Hands-off Flow condition to prevent abstraction at low flows below a certain level.	0	0	Depending on the depth of the foundations temporary and localised dewatering may be required. Underground foundations may disrupt groundwater flow and cause minor abstraction to groundwater flow causing localised mounding.	0
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	It should be taken into consideration preventative measures to ensure water quality is not compromised during the construction of the booster station. Mitigation could include standard good practices to avoid pollution of watercourses and control of earthworks drainage.	-1	0	Construction activities that could affect water quality include the creation of the new booster station, which will take place within a water works on the bank of the River Thames. Appropriate mitigation should ensure residual effects are neutral.	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Moderate	If dewatering is required calculations may be needed to estimate extent of dewatering and the associated radius of influence.	0	0	Temporary and localised dewatering may be required around the new pumping station. Abstracted water returned to groundwater or adjacent surface waters. Final construction may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. No change in water status predicted.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures to be explored further at the detailed design stage and be set out in any applications for Flood Defence Consents where these are required for any river construction works.	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option is not predicted to have any significant negative effects on the historic environment.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

1.1.1.18 AFF-CTR-WRZ4-4002

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves the installation of a new 700mm diameter main from Blackford BPS to Ickenham BPS (3.6m). The option will provide minor positive effects against all objective 1 sub objectives. There will be minor negative effects during construction on strategic transport infrastructure and on public footpaths associated with this option. The new pipeline passes within 40m of a Listed Building and crosses areas of grade 3 agricultural land. Therefore it may also have minor negative effects on heritage and agricultural land during the construction phase (if found to be grade 3a). Additionally, there are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. Regarding climate change, and minimising Affinity Waters carbon footprint, construction activities are likely to result in a minor negative effect during operation. However, by upgrading the transfer capacity this option should result in minor positive effects on the resilience of Affinity Water's assets to climate change.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 30Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	0	0	It is anticipated that there is potential for disturbance to water quality/flow during construction work, however it is predicted that the potential changes in water quality or flow would not be significant enough to be perceived by informal recreational users. No access to the site for in-stream recreational activities (terrestrial) has been identified. No operational impacts are anticipated.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	-1	0	The option will require 3.6km of 700mm diameter main from Blackford BPS to Ickenham BPS. Informal recreational activities potentially take place alongside the proposed pipeline route (public footpaths, Grand Union Canal Walk). This has the potential for a temporary short term minor negative effect. No anticipated impacts during operation as pipeline will be buried.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts	-1	0	The option will require 3.6km of 700mm diameter main from Blackford BPS to Ickenham BPS. The main will pass through an urban area, which may require temporary closures of roads and digging up. This is likely to result in minor temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new main pipeline. These work related traffic impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). As such negative effects during construction are likely to be minor and temporary.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-1	0	The option requires a new 3.6 km main (700mm).	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None identified impact pathways to European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	Any proposal for this option should avoid designated sites where possible. Loss of priority habitat/species should be avoided where possible. Preventative design and construction methods should be adhered to. This includes consideration for the timing of construction. Additionally, the design and construction of the pipeline will need to take into consideration a five metre root protection exclusion zone from the base of the hedgerow and the base of the tree trunk in order to ensure the protection of the roots. In terms of species, the ring of trees surrounding the open water areas of the SSSI should be ground truthed and if sufficient screening is not present on the site, further screening methods should be considered within the design and construction of the new pipeline.	-1	0	The proposed transfer pipe passes several stands of woodland, including down a small track off of Newyears Green Lane. The construction of the pipeline has the potential to cause damage to tree roots through use of diggers excavating soil beneath the canopy of the trees. Woodland is a Section 41 habitat of principal importance. Hedgerow may also be damaged through excavation along the track south of Newyears Green Lane. Should preventative design and construction methods be adhered to the residual significance of the construction of the pipeline is likely to be minor. In terms of species, Mid Coln Valley SSSI is a former gravel pit within 60m of the pipeline with areas of beech and hornbeam woodland, which has ornithological interest. The gravel pits regularly have up to 70 breeding species including tufted duck, little ringed plover and kingfisher and up to 80 wintering species including tufted duck, gadwall, shoveler and pochard, with numbers of national significance being reached by tufted duck. There is the potential that construction could cause disturbance to bird populations within the SSSI, through noise, light and visual disturbance resulting in flushing of birds from nests or winter roosts. The open water areas of the SSSI appear to be ringed with trees, which may create a screen to visual disturbance. Should preventative design and construction methods be adhered to the residual significance of the construction and operation of the pipeline is likely to be minor.	?
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	Any proposal for this option should avoid designated sites where possible. Preventative design and construction methods should be adhered to. This includes consideration for the timing of construction.	0	0	Mid Colne Valley SSSI is within 60m of the new pipeline. The SSSI is a former gravel pit with areas of beech and hornbeam woodland, which has ornithological interest. The gravel pits regularly have up to 70 breeding species including tufted duck, little ringed plover and kingfisher and up to 80 wintering species including tufted duck, gadwall, shoveler and pochard, with numbers of national significance being reached by tufted duck. There is the potential that construction could cause disturbance to bird populations within the SSSI, through noise, light and visual disturbance resulting in flushing of birds from nests or winter roosts. The open water areas of the SSSI appear to be ringed with trees, which may create a screen to visual disturbance. This should be ground truthed and if sufficient screening is not present on the site, further screening methods should be considered within the design and construction of the new pipeline. Should preventative design and construction methods be adhered to the residual significance of the construction and operation of the pipeline is likely to be minor.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. This can be determined at the detailed feasibility stage if this option is progressed. The appropriate reinstatement of any land/ soil affected should help to minimise residual effects.	-1	0	There are likely to be short-term minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		Low	N/A	Medium term (5 - 25 years) to Long	N/A	Permanent	N/A	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer capacity this option should result in positive effects	

				term (>25 years)									on the resilience of Affinity Water's assets to climate change.		
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change	0	
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction	-1	0	Potential impact on hydromorphology from construction given proximity to watercourse however following best construction practice any impacts should be small, temporary and localised.	0	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Treatment not dealt with in this scheme.		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction	-1	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction	-1	0	Abstraction not dealt with in this scheme. However, the pipeline travels between areas of open water gravel pits at its western end; therefore depending on the height of the water table, the construction of the pipeline may cause changes to water quality and groundwater flow. Potential for negative impact/effect.	0	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should avoid designated assets where possible and mitigation should include the reinstatement of any land affected by construction. If this option is progressed then further consideration should be given to the historic environment when detailed feasibility studies are carried out. It will then be possible to set out more detailed mitigation measures.	-1	0	The pipeline route passes within 40m of a Listed Building. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.		

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 3 agricultural land. If found to be grade 3a short term negative effects will be expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.19 AFF-CTR-WRZ2-4003

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves building a new pumping station in the vicinity of Harefield Reservoir and laying a new main from the new PS to Oxheywood (6km). This option will provide major positive effects against all objective 1 sub objectives. The pipeline crosses an urban area. As such there is likely to be minor temporary negative effects on strategic transport infrastructure, and minor negative effects on landscape (including public rights of way) during construction. The new pipeline passes within 40m of a Listed Building and crosses areas of grade 3 agricultural land. Therefore it may also have minor negative effects on heritage and agricultural land during the construction phase (if found to be grade 3a). The construction of the new pumping station appears to be within an area of enclosed woodland, and the pipeline passes several blocks of deciduous woodland, some of which is designated as Ancient Woodland. Species associated with woodland include bats, birds, badgers and dormouse. The new pipeline also passes through Batchworth Heath LNR and comes within 50m of Oxhey Woods LNR. This may result in negative effects on biodiversity during the construction phase. Construction and operation phase activities are likely to increase Affinity Water's carbon footprint. They will therefore result in minor negative effects on climate change. However, by upgrading the transfer capacity this option should result in minor positive effects on the resilience of Affinity Water's assets to climate change.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 70Ml/d equates to a major positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts on water quality or flow which may subsequently be perceptible to informal bankside recreation users.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	0	0	The scheme will be located on Affinity water land, it is assumed that informal water-based recreation does not take place on site. The pipeline route may cross a number of public footpaths; however, mitigation measures such as footpath diversions would help reduce the potential effect during construction. There are no impacts anticipated on informal recreation during operation. Scheme not anticipated to cause significant impacts on river access, and therefore it is not anticipated to impact angling.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option will require 6km of 800mm diameter main from the new pumping station in the vicinity of Harefield Reservoir to Oxheywood. The main will pass through an urban area, which may require temporary closures of roads and disturbance. This is likely to result in minor temporary negative effects during construction. However, these impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). No impacts are anticipated during operation of the scheme.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new main pipeline. These work related traffic impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). As such negative effects during construction are likely to be minor and temporary. No impacts are anticipated during operation of the scheme.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	High	Medium term (5 - 25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-1	0	The option requires 4 x 200kW Booster Pump Sets (Ickenham 2 to Oxheywood 3 x Duty / 1 x Standby), 6km of 800mm Main and a 49 m3 Surge Vessel.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No identified impact pathways to European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	Loss of Ancient Woodland should be avoided where possible. Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required. Preventative design and construction methods should be adhered to, i.e. Construction must only take place at least 5m from the base of the trees, or outside of the span of the canopy to ensure that construction does not damage the root systems. Where habitat loss is anticipated mitigating planting should be adopted. To mitigate adverse effects on protected species, suitable lighting design to avoid directly lighting up trees around the pumping station and along the pipeline should be incorporated into the construction design.	-1	0	The construction of the new pumping station, from aerial mapping, appears to be within an area of enclosed woodland, and therefore any construction will lead to the loss of a proportion of trees and ground flora habitat that will need to be addressed by mitigating planting. The woodland in this area is deciduous and sections north and south of the pumping station construction area are designated as ancient woodland. The pipeline passes several blocks of deciduous woodland, some of which is designated as ancient woodland, it is assumed that any construction will take place within the existing roadway; however, should any construction take place outside of the current roadway this has the potential to cause damage to root systems of the trees. In terms of species, the trees could have potential for both bats and nesting birds and possibly dormouse and the woodland has the potential for badger setts and therefore removing trees has potential impacts for both birds, bats, badger and dormouse through loss of habitat and potential accidental killing through removal of trees. There is also a potential for noise and light disturbance to bats through lighting during construction. The effects on protected species should therefore be entirely addressable through mitigation. However, there may be net residual effects on a habitat level due to loss of woodland particularly if any Ancient Woodland were involved.	?
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low.	

													This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 - 25 years)	N/A	Permanent	N/A	Local	Low	Any proposal for this option should avoid designated sites where possible.	0	0	In terms of designated sites, the new pipeline passes through Batchworth Heath LNR. However assuming the pipeline construction will be limited to the existing roadways, no land take from the designated site is anticipated. The new pipeline also comes within 50m of Oxhey Woods LNR at the terminal end of the pipeline. It is assumed that no construction will take place within the boundaries of the LNR. The construction of the new pumping station is approximately 1km from Batchworth Heath LNR and the construction of this pumping station is not expected to affect either designated site.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline and pumps. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. This can be determined at the detailed feasibility stage if this option is progressed.	-1	0	This option requires building a new pumping station in the vicinity of Harefield Reservoir. It is assumed that the new station can be housed in the existing pump house. This option will require a 800mm in diameter and approximately 6km length new pipeline main. There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so is not anticipated to have negative effects on the landscape during the operational phase. The option also requires a 49 m3 surge vessel which will be above ground. It is assumed there will be appropriate screening on site. If sufficiently screened there will be a residual neutral effect.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	? At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within 25m of Hillingdon AQMA. It is thought that there may be minor short-term negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years) Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best practice construction practices.	0	0	Potential impact on hydromorphology from construction given proximity to watercourse; however, following best construction practice any impacts should be small, temporary and localised	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Treatment not dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction practice	0	0	Potential for negative impact/effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should avoid designated assets where possible and mitigation should include the reinstatement of any land affected by construction. If this option is progressed then further consideration should be given to the historic environment when detailed feasibility studies are carried out. It will then be possible to set out more detailed mitigation measures.	-1	0	The new pipeline passes within 30m of a number of Listed Buildings and is within 50m of a Registered Park and Garden. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 3 agricultural land. If found to be grade 3a short term negative effects will be expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

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SEA Objective	Assessment questions (would the options / programme...?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves the construction of approximately 8km of 800mm diameter main. This option will provide moderate positive effects against all objective 1 sub objectives. The pipeline crosses an urban area and is adjacent to Aldenham Country Park. As such there is likely to be minor temporary negative effects on strategic transport infrastructure, and minor negative effects on landscape during construction. Given a proportion of the pipeline falls with Barnet AQMA, the construction of the pipeline may also have a minor negative impact on local air quality. The new pipeline passes in close proximity (less than 10m) to a number of Listed Buildings, is within 210m of Aldenham House Scheduled Monument, and crosses areas of grade 3 agricultural land. Therefore it may also have minor negative effects on heritage and agricultural land during the construction phase (if found to be grade 3a). Construction and operation phase activities are likely to increase Affinity Water's carbon footprint. They will therefore result in minor negative effects on climate change. However, by upgrading the transfer capacity this option should result in minor positive effects on the resilience of Affinity Water's assets to climate change.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 40Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No access to the site for in-stream recreational activities (terrestrial) identified	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	0	0	Informal recreational activities potentially take place alongside the proposed pipeline route (proposed pipeline route travels adjacent to Aldenham Country Park and may cross a number of public footpaths). It is assumed that appropriate footpaths diversions and other preventive measures will take place, therefore residual significant impacts upon informal recreation are anticipated to be negligible during construction. No anticipated impacts during operation.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	This scheme involves the construction of approximately 8km of 800mm diameter main. The main will pass through an urban area, which may require temporary closures of roads and digging up. This is likely to result in minor temporary negative effects during construction. However, these impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). No impacts are anticipated during operation of the scheme.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new main pipeline. These work related traffic impacts are likely to be limited in duration and intensity (construction activity is expected to move from one section of pipe to another). As such negative effects during construction are likely to be minor and temporary. No impacts are anticipated during operation of the scheme.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-1	0	Option would require 4 x 90kW Booster Pump Sets, 8km of 800mm main and 44m3 surge vessel.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No identified impact pathways to European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	Low	Medium term (5 - 25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required. Preventative design and construction methods should be adhered to. i.e. construction must only take place at least 5m from the base of trees, or outside of the span of the canopy to ensure that construction does not damage the root systems. Preventative measures for the introduction of invasive species and for preventing reduction on water quality should be built into the design and construction of the pipeline. In terms of priority species, a detailed lighting plan should be incorporated into the design and construction of the pipeline to ensure that any lighting does not directly shine onto trees along the route or at the site for the construction of the new booster station. The trees surrounding the reservoir should be ground truthed and if insufficient further screening should be incorporated into the design and construction of the pipeline. Considering the close proximity to Aldenham Reservoir preventative measures should be incorporated into the design and construction to avoid the reduction in water quality and the introduction of invasive species.	0	0	The pipeline passes several blocks of deciduous woodland, it is assumed that any construction will take place within the existing roadway; however, should any construction take place outside of the current roadway this has the potential to cause damage to root systems of the trees. The pipeline comes into close proximity to Aldenham Reservoir a large water body previously used for gravel extraction. The pipeline travels along Elstree Road and Watford Road which come within several metres of the water. The construction of the pipeline could potentially have an effect on water quality of the waterbody through spillages or through the introduction of invasive species. In terms of priority species, deciduous woodland have potential for bats and breeding birds. Therefore the construction of the pipeline may have an effect on these species through light disturbance. The pipeline also passes Aldenham Reservoir, wintering waterfowl may be disturbed by visual stimulus causing them to take flight from feeding or roosting and therefore expending excess energy. From aerial photography it appears that the reservoir is ringed with trees which may provide screening from the construction. With the construction of the pipeline so close to Aldenham Reservoir there is the potential for spillages to cause a decrease in water quality and therefore affect aquatic species of flora and fauna. Should preventative design and construction methods be adhered to the residual significance of the construction and operation of the pipeline is likely to be minor. There is	?

													a negligible risk of invasive species being introduced or spread.	
	5.c. Impact on non-native species?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The pipeline comes into close proximity to Aldenham Reservoir a large water body previously used for gravel extraction. The pipeline travels along Elstree Road and Watford Road which come within several metres of the water. The construction of the pipeline could potentially have an effect on water quality of the waterbody through the introduction of invasive species. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	Any proposal for this option should avoid designated sites where possible.	0	0	No land take will occur from any designated site along the construction of the new pipeline. The majority of the designated sites are at least 200m from the pipeline. Stanmore Common LNR is within 50m of the pipeline. The habitats for which this site is designated (woodland and heathland) are not hydrologically connected to the construction area. Therefore no impacts are anticipated on designated sites.	

	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. This can be determined at the detailed feasibility stage if this option is progressed. The appropriate reinstatement of any land/ soil affected should help to minimise residual effects.	-1	0	The pipeline route travels along roads within existing residential areas and adjacent to Aldenham Country Park. The option will result in a new booster station however no new storage is required. The option also requires a 44 m3 surge vessel which will be above ground. It is assumed there will be appropriate screening on site. There will also be a new pipeline but this will not be visible during operation. The new pipeline will have minor temporary negative effects on the landscape and views from the Park in the short-term during construction. During operation the pipeline will be buried so it will not affect the current landscape in the long-term.	
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the pipeline route crosses the M1 and there are other major roads close to the route. However, it is noted that a small proportion of the pipeline falls within the Barnet AQMA. Construction activities and associated congestion has the potential to worsen air quality within the AQMA and therefore result in negative effects.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change	0

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impact as the scheme does not cross any surface water body.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impact as the scheme does not cross any surface water body.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction practice.	0	0	The pipeline comes into close proximity to Aldenham Reservoir a large water body previously used for gravel extraction. The pipeline travels along Elstree Road and Watford Road which come within several metres of the water. The construction of the pipeline could potentially have an effect on water quality of the waterbody through spillages or through the introduction of invasive species. Appropriate mitigation should ensure any negative residual effects are minor.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should avoid designated assets where possible and mitigation should include the reinstatement of any land affected by construction. If this option is progressed then further consideration should be given to the historic environment when detailed feasibility studies are carried out. It will then be possible to set out more detailed mitigation measures.	-1	0	The new pipeline passes within close proximity (less than 10m) to a number of Listed Buildings and passes within 210m of Aldenham House Scheduled Monument. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 3 agricultural land. If found to be grade 3a short term negative effects will be expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.21 AFF-CTR-WRZ3-4006

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This combined option includes for a new 10 Ml cell and 2 No. new booster pumping stations. This option will provide moderate positive effects against all objective 1 sub objectives. The construction of the new 10 Ml reservoir will take place within an area of broadleaved woodland. As such there is likely to be minor negative effects on biodiversity and landscape due to loss of woodland during construction. The site of the new reservoir is within 800m of a Scheduled Monument and four Listed Buildings, and crosses areas of grade 3 agricultural land. Therefore it may also have minor negative effects on heritage and agricultural land during the construction phase (if found to be grade 3a in relation to agricultural land). Construction and operation phase activities are likely to increase Affinity Water's carbon footprint. They will therefore result in moderate negative effects on climate change. However, by improving response and recovery times, and managing sustainability reductions in the area, this combined option should result in minor positive effects on the resilience of Affinity Water's assets to climate change.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This combined option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 20Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is assumed that the construction of the new cell and the two boosters will take place on Affinity Water site and that there is no public access to these sites. No access to the site for in-stream recreational activities (terrestrial) identified. Therefore there are no anticipated impacts on water-based recreation assets.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is assumed that there is no public access to sites, therefore there are no anticipated impacts on informal recreation.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The construction of the new Cell at Bulls Green and the two new booster stations is likely to result in some disturbance. However it is assumed that the new booster stations will be constructed within the bounds of the current reservoir site, and the site is not adjacent to significant transport infrastructure. Therefore no traffic related impacts are anticipated for this scheme.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is assumed that the new booster stations will be constructed within the bounds of the current reservoir sites. Therefore negative impact on critical services and industry is not anticipated.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Medium term (5 - 25 years) to Long term (>25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	N/A	-2	0	Combined option would require 4 x 110kW Booster Pump Sets, 4 x 200kW Booster Pump Sets, Pipework required to connect cell to main at Bulls Green, Suction and delivery pipe connections required at both booster stations, 50 m3 and 103 m3 surge vessels.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No identified impact pathways to European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Medium term (5 - 25 years) to Long term (>25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Due to the potential for impacts upon species it is recommended that the woodland is surveyed for the presence of these species in order to inform the development of detailed mitigation measures. This can be considered further at the detailed feasibility stage if this option is progressed.	-1	0	It is assumed that the new booster stations will be constructed within the bounds of the current reservoir sites. The majority of the habitats within the reservoir boundaries are amenity grassland therefore it is assumed that no other habitats e.g. trees will be affected by the construction of the new booster stations. No impacts to species are likely from the creation of the new booster stations. The construction of the new 10 Ml reservoir at Bull's Green will take place within an area of broadleaved woodland. The woodland will be cleared to create the new reservoir and once created will be covered with grass and therefore the habitat will be lost. This woodland habitat has the potential for a number of protected and/or notable species including bats, badger, breeding birds and potentially dormouse. There are also three ponds within 250m of the proposed reservoir and a further seven ponds within 500m of the proposed reservoir which are easily accessible to the woodland. Therefore there is the potential for great crested newts to use the woodland as terrestrial habitat as well. The effects on protected species should be entirely addressable through mitigation. However, there may be net residual negative effects on a habitat level due to loss of woodland during construction.	?
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	0	0	There are no designated sites within 500m of either the Bulls Green or the Preston site. The closest designated site is Wains Wood SSSI which is approximately 850m north west of Preston Reservoir. Wain Wood SSSI may contain groundwater dependent species. The combined option will create new preferential pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally although the unsaturated zone is expected to be relatively thick so effects would be negligible.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Medium	Medium	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. This can be determined at the detailed feasibility stage if this option is progressed.	-1	-1	The combined option will result in 2 new booster pumping stations; however, no new storage is required. It also requires two 50 m3 and 103 m3 surge vessels which will be above ground. It is assumed there will be appropriate screening on site. The combined option will also result in a new 10Ml cell (buried reservoir). It is assumed the reservoir will be raised above existing ground level but covered in grass as per the existing cell. The new reservoir would therefore be visible but visibility would be low. This could affect the landscape for a number of residents, however effects are expected to be minor given the new reservoir will be covered with grass and given existing vegetation surrounding the site. It would also result in the loss of woodland leading to minor negative effects on landscape in the long-term during operation.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects on local air quality during construction but these are unlikely to be significant given that the combined options do not fall within any AQMAs or are adjacent to significant transport infrastructure. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-1	This scheme involves eight new booster pump sets, a new service reservoir and two surge vessels to be provided. The construction of new pumps, surge vessels, and service reservoir will require raw materials use. The operation of new pumps, surge vessels, and service reservoir will result in an increase of energy use. Construction and operational activities are therefore likely to increase Affinity Water's carbon footprint.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By providing a new cell this combined option will improve response and recovery time in the event of a failure of the Grafham import and will help to manage the sustainability reductions in the area. By providing new booster pumping stations this combined option will also provide resilience against a failure of the Grafham import. This should therefore result in positive effects on the resilience of Affinity Water's assets to climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalization of water bodies, for example through the removal of artificial structures or channel modifications?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction practice.	0	0	Creation of new preferential pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally although the unsaturated zone is expected to be relatively thick so effects would be negligible. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction practice.	0	0	Creation of new preferential pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally although the unsaturated zone is expected to be relatively thick so effects would be negligible. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual effects predicted.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction practice.	0	0	Creation of new preferential pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally although the unsaturated zone is expected to be relatively thick so effects would be negligible. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual effects predicted.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme. However, there is a pond and drain to the north and north east of the proposed reservoir. The design and construction of the reservoir should take this into consideration to ensure that no change in water quality or groundwater flow occurs within the pond or drain.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off. The option will not lead to loss of floodplain or significantly increase surface water run off.	0

	additional areas of hard standing)?														
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	If this option is progressed then further consideration should be given to the historic environment when detailed feasibility studies are carried out. It will then be possible to set out more detailed mitigation measures. Particular consideration should be given to views to and from the Scheduled Monument.	-1	-1	The site of the new reservoir is within 800m of a Scheduled Monument and four Listed Buildings. There is therefore potential for negative effects during the construction phase. Given the reservoir is buried it is assumed that visible infrastructure will be minor. The loss of woodland as a result of the reservoir could have an impact on the setting of the Scheduled Monument during the operational phase. This impact is likely to be minor if appropriate screening is provided.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The combined option crosses grade 3 agricultural land. If found to be grade 3a short term negative effects will be expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.22 AFF-CTR-WRZ3-4015

SEA Objective	Assessment questions (would the options / programme…?)	Impact description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is a transfer of 50Ml/d of raw water by a new main from Minworth Sewage Treatment Works (a Severn Trent asset) to a new Sundon Treatment Works (option AFF-NTW-WRZ3-1042). The scheme will require 5 x 315kW Booster Pumps to be installed at Minworth STW, a new 130km long 1000mm diameter main from Minworth STW to Sundon WTW and a new WTW at Sundon. This option will provide moderate positive effects against all objective 1 sub objectives. The pipeline route crosses numerous footpaths along its length and also cuts across several strategic transport networks, and so minor and major negative effects are anticipated during construction respectively. Given the pipeline route passes within the Coventry AQMA, moderate adverse effects are predicted during construction in the short-term for air quality. The new pipeline passes in close proximity to a significant number of designated heritage assets, and therefore minor negative effects are predicted during the construction phase. The pipeline route crosses Grade 2 agricultural land, and therefore short term negative effects are expected resulting from loss of top soil during construction phase. This option requires the construction of new water treatment works and approx. 3.3km of new main within the Chilterns AONB. During construction there is the potential for a moderate negative effect, and a residual minor negative effect is predicted during operation. The option includes a further 127km of new mains and while this will have a negative effect on the landscape in the short-term during construction and neutral effects during operation given that the pipeline will be buried. The pipeline travels through the Smithcomb, Sharpenhoe and Sundon Hills SSSI, however assuming that the construction is	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is anticipated that any impacts from installation of new main would have minor impacts during construction and no lasting impacts during operation. It is anticipated that these changes would not be perceived by recreational users. The scheme will not significantly affect water levels.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	-1	0	The option requires a new 130km pipeline from Minworth Sewage Treatment Works to a new Sundon Treatment Works. This crosses numerous footpaths along its length and may cause short term disruption along public rights of way during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-3	0	This scheme requires 130km of new mains from Minworth Sewage Treatment Works to a new Sundon Treatment Works. This is route cuts across several strategic transport networks, including the M1 and numerous A roads. There is likely to be significant temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	confined to the roadway there will be no land take of the SSSI. The pipeline will be constructed within 16m of Everdon Stubbs SSSI. The construction of the pipeline also has the potential to affect habitats including ancient woodland through disturbance. There could also be a potential hydrological impact dependent on the drainage patterns of the area. The current route also bisects a small arm of woodland off the SSSI. Removing trees here would cause habitat severance of the small extension of trees there could also be impacts to species which reside within the trees. The pipeline will be constructed passed the Tocil Wood and Meadow LNR. Assuming that the construction will take place only within the bounds of the current roadway and bridge, there is the potential to cause impact through the reduction of water quality during construction through pollution spillages, in addition there is also the potential to cause damage to root systems and canopies of trees lining the roadway. The pipeline also crosses the River Blythe SSSI. Under the same assumption, the construction of the pipeline has the potential to cause a reduction in river quality through pollution. Construction works may lead to potential impacts on numerous habitats including the removal of hedgerows and potential impacts to the canopy and roots of the areas of woodland bordering the Sewage works area. Areas of ancient woodland, priority habitat woodland, grazing marsh, lowland meadows, ponds, streams, rivers and field drains will all have impacts on species, including through reduced habitat and species diversity, and habitat severance. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint. The pipeline crosses several surface water bodies, the quality of which could be affected during construction works. The installation of the pumps also has the potential to affect water quality during construction works. Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in	High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	N/A	N/A	-3	0	The scheme will require a new treatment works, 130km of 1000mm diameter main and 5 x 315kW Booster Pumps to be installed at Minworth STW.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is remote from European sites and there are no identified pathways for impacts.	-1
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	?	N/A	Local	Moderate	The pipeline route should avoid priority habitats and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. This could include restricting construction to the roadway and ensuring that it is a suitable distance from important habitats.	-1	0	Construction of the new sewage treatment works at Sundon, south of Streatley Road borders an area of priority habitat deciduous woodland to the west. The area for construction appears to currently be in use as arable field and is bordered by hedgerow to the north and east, there is another small copse of woodland bordering the south of the works area. There are potential impacts including the removal of hedgerows and potential impacts to the canopy and roots of the areas of woodland bordering the works area. Arable margins are also important features for birds and invertebrates and would reduce habitat and species diversity with their removal. Removal of hedgerow also causes habitat severance for species such as bats, reptiles dormouse etc. Areas of ancient woodland, priority habitat woodland, grazing marsh, lowland meadows, ponds, streams, rivers and field drains will all have impacts on species. The loss of woodland could potentially have impacts on a variety of species but the presence of them is unknown at this stage. Lighting of woodland during construction will also cause disturbance to bats and birds. Bisecting field drains, streams and rivers and construction near to ponds could cause hydrological impacts but also impacts on species including floral species, fish, invertebrates and amphibians such as great crested newts both terrestrially and aquatically through removal of habitat and pollution during construction and potential killing through landtake. Impacts on grazing marsh could include a change in hydrology causing a change in floral species, construction through or near grazing marsh could disturb breeding/wintering birds present within the marshland.	
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Temporary	Regional	Low	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option involves the transfer of treated effluent supplied by Severn Trent Water and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.	

		positive effects on the resilience of the local environment and Affinity Water's assets to climate change.									construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.				
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	The pipeline route should avoid designated sites and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. This could include restricting construction to the roadway and ensuring that it is a suitable distance from important habitats.	-1	0	The pipeline travels up Harington Road through the Smithcomb, Sharpenhoe and Sundon Hills SSSI, however assuming that the construction is confined to the roadway there will be no land take of the SSSI. The pipeline will be constructed within 16m of Everdon Stubbs SSSI. The woodland is ancient woodland with a carrying canopy of native species which is determined by the complex nature of the underlying soil chemistry and drainage. The current indicative route is approximately 16m from the SSSI a minimum is required for ancient woodland in order to not damage root systems, however there could still be a potential hydrological impact dependent on the drainage patterns of the area. The current route also bisects a small arm of woodland off the SSSI although this is not within the SSSI boundary it is likely that the species are the same and therefore could be considered supporting habitat. Removing trees here would cause habitat severance of the small extension of trees there could also be impacts to species which reside within the trees. The pipeline also appears to be constructed through Wainbody Wood and Stivichall Common LNR at SP30747485. Assuming that the construction is kept within the road way and outside of the extent of the canopy of trees there is likely to be no impact on this designated site. The pipeline will be constructed passed the Tocil Wood and Meadow LNR at SP30177534. This nature reserve is designated for deciduous woodland, floodplain grazing marsh, waterbodies and a brook. Assuming that the construction will take place only within the bounds of the current roadway and bridge, there is the potential to cause impact through the reduction of water quality during construction through pollution spillages, in addition there is also the potential to cause damage to root systems and canopies of trees lining the roadway. Finally the pipeline crosses the River Blythe SSSI at SP21718817 (Duke Bridge). The Blythe is designated as being a fine example of a lowland river on clay with both diverse physical features and floral communities, one of the most species rich rivers in England. Assuming that the construction will take place within the existing roadway and bridge there is the potential to cause a

													reduction in river quality through pollution.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-3	-1	This option requires the construction of new water treatment works and approx. 3.3km of new main within the Chilterns AONB. The option also includes a further 127km of new mains. During construction there is the potential for a major negative effect. However, once mitigation is taken into account, including appropriate screening and the burying of the new main, it is predicted that there will be a residual minor negative effect during operation.	-1

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-2	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within the Coventry AQMA. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic; however, these can be mitigated through good construction practices and traffic management.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-3	-3	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-3
	8.b. Maximise the company's resilience to a changing climate?	N/A	Medium	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer and storage capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Low	Best practice construction.	-1	0	The pipeline crosses a number of surface water courses and therefore there is the potential, dependent on construction method for hydrological impacts and also impacts relating to reduction in water quality through pollution. However following best construction practice should mean any impacts are small, temporary and localised. Neutral effect during operation anticipated.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Low	WFD assessment may be required.	-1	0	The pipeline crosses a number of surface water courses and therefore there is the potential, dependent on construction method for impacts relating to reduction in water quality through pollution. The Sewage works at Minworth are also on the banks of the River Tame where five booster stations will be constructed, there is potential impacts with pollution relating to construction. The pipeline crosses or passes within 10m of multiple small to moderate sized ponds, field drains, brooks, and streams within its 130km, and at each of these locations there is potential for hydrological changes and impacts relating to pollution. However measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts. Neutral effect during operation anticipated.	

	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Heritage impact assessment should be carried out to determine the effect of the pipeline and in particular the new reservoir on designated heritage assets.	-1	0	The new pipeline passes in close proximity to a significant number of designated heritage assets, including Scheduled Monuments, Registered parks and Gardens and Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

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SEA Objective	Assessment questions (would the options / programme…?)	Impact description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is a transfer of 100Ml/d of raw water by a new main from Minworth Sewage Treatment Works (a Severn Trent asset) to a new Sundon Treatment Works (option AFF-NTW-WRZ3-1042). The scheme will require 5 x 550kW Booster Pumps to be installed at Minworth STW, a new 130km long 800mm diameter main from Minworth STW to Sundon WTW and a new WTW at Sundon. This option will provide major positive effects against all objective 1 sub objectives. The pipeline route crosses numerous footpaths along its length and also cuts across several strategic transport networks, and so minor and major negative effects are anticipated during construction respectively. Given the pipeline route passes within the Coventry AQMA, moderate adverse effects are predicted during construction in the short-term for air quality. The pipeline route crosses Grade 2 agricultural land, and therefore short term negative effects are expected resulting from loss of top soil during construction phase. The new pipeline passes in close proximity to a significant number of designated heritage assets, and therefore minor negative effects are predicted during the construction phase. This option requires the construction of new water treatment works and approx. 3.3km of new main within the Chilterns AONB. During construction there is the potential for a moderate negative effect, and a residual minor negative effect is predicted during operation. The option includes a further 127km of new mains and while this will have a negative effect on the landscape in the short-term during construction and neutral effects during operation given that the pipeline will be buried. The pipeline travels through the Smithcomb, Sharpenhoe and	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 100Ml/d equates to a major positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is anticipated that any impacts from installation of new main would have minor impacts during construction and no lasting impacts during operation. It is anticipated that these changes would not be perceived by recreational users. The scheme will not significantly affect water levels.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	-1	0	The option requires a new 130km pipeline from Minworth Sewage Treatment Works to a new Sundon Treatment Works. This crosses numerous footpaths along its length and may cause short term disruption along public rights of way during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-3	0	This scheme requires 130km of new mains from Minworth Sewage Treatment Works to a new Sundon Treatment Works. This is route cuts across several strategic transport networks, including the M1 and numerous A roads. There is likely to be significant temporary negative effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	N/A	N/A	-3	0	The scheme will require a new treatment works, 130km of 800mm diameter main and 5 x 550kW Booster Pumps to be installed at Minworth STW.	0

	4.b. Result in higher levels of reuse of waste?	Sundon Hills SSSI, however assuming that the construction is confined to the roadway there will be no land take of the SSSI. The pipeline will be constructed within 16m of Everdon Stubbs SSSI. The construction of the pipeline also has the potential to affect habitats including ancient woodland through disturbance. There could also be a potential hydrological impact dependent on the drainage patterns of the area. The current route also bisects a small arm of woodland off the SSSI. Removing trees here would cause habitat severance of the small extension of trees there could also be impacts to species which reside within the trees. The pipeline will be constructed passed the Tocil Wood and Meadow LNR. Assuming that the construction will take place only within the bounds of the current roadway and bridge, there is the potential to cause impact through the reduction of water quality during construction through pollution spillages, in addition there is also the potential to cause damage to root systems and canopies of trees lining the roadway. The pipeline also crosses the River Blythe SSSI. Under the same assumption, the construction of the pipeline has the potential to cause a reduction in river quality through pollution. Construction works may lead to potential impacts on numerous habitats including the removal of hedgerows and potential impacts to the canopy and roots of the areas of woodland bordering the Sewage works area. Areas of ancient woodland, priority habitat woodland, grazing marsh, lowland meadows, ponds, streams, rivers and field drains will all have impacts on species, including through reduced habitat and species diversity, and habitat severance. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint. The pipeline crosses several surface water bodies, the quality of which could be affected during construction works. The installation of the pumps also has the potential to affect water quality during construction works. Predicted climatic changes in England include hotter and drier	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is remote from European sites and there are no identified pathways for impacts.	-1
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	?	N/A	Local	Moderate	The pipeline route should avoid priority habitats and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. This could include restricting construction to the roadway and ensuring that it is a suitable distance from important habitats.	-1	0	Construction of the new sewage treatment works at Sundon, south of Streatley Road borders an area of priority habitat deciduous woodland to the west. The area for construction appears to currently be in use as arable field and is bordered by hedgerow to the north and east, there is another small copse of woodland bordering the south of the works area. There are potential impacts including the removal of hedgerows and potential impacts to the canopy and roots of the areas of woodland bordering the works area. Arable margins are also important features for birds and invertebrates and would reduce habitat and species diversity with their removal. Removal of hedgerow also causes habitat severance for species such as bats, reptiles dormouse etc. Areas of ancient woodland, priority habitat woodland, grazing marsh, lowland meadows, ponds, streams, rivers and field drains will all have impacts on species. The loss of woodland could potentially have impacts on a variety of species but the presence of them is unknown at this stage. Lighting of woodland during construction will also cause disturbance to bats and birds. Bisecting field drains, streams and rivers and construction near to ponds could cause hydrological impacts but also impacts on species including floral species, fish, invertebrates and amphibians such as great crested newts both terrestrially and aquatically through removal of habitat and pollution during construction and potential killing through landtake. Impacts on grazing marsh could include a change in hydrology causing a change in floral species, construction through or near grazing marsh could disturb breeding/wintering birds present within the marshland.	
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Temporary	Regional	Low	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option involves the transfer of treated effluent supplied by Severn Trent Water and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.	

		summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of the local environment and Affinity Water's assets to climate change.									measures to avoid the introduction and spread of INNS.				
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	The pipeline route should avoid designated sites and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. This could include restricting construction to the roadway and ensuring that it is a suitable distance from important habitats.	-1	0	The pipeline travels up Harington Road through the Smithcomb, Sharpenhoe and Sundon Hills SSSI, however assuming that the construction is confined to the roadway there will be no land take of the SSSI. The pipeline will be constructed within 16m of Everdon Stubbs SSSI. The woodland is ancient woodland with a carrying canopy of native species which is determined by the complex nature of the underlying soil chemistry and drainage. The current indicative route is approximately 16m from the SSSI a minimum is required for ancient woodland in order to not damage root systems, however there could still be a potential hydrological impact dependent on the drainage patterns of the area. The current route also bisects a small arm of woodland off the SSSI although this is not within the SSSI boundary it is likely that the species are the same and therefore could be considered supporting habitat. Removing trees here would cause habitat severance of the small extension of trees there could also be impacts to species which reside within the trees. The pipeline also appears to be constructed through Wainbody Wood and Stivichall Common LNR at SP30747485. Assuming that the construction is kept within the road way and outside of the extent of the canopy of trees there is likely to be no impact on this designated site. The pipeline will be constructed passed the Tocil Wood and Meadow LNR at SP30177534. This nature reserve is designated for deciduous woodland, floodplain grazing marsh, waterbodies and a brook. Assuming that the construction will take place only within the bounds of the current roadway and bridge, there is the potential to cause impact through the reduction of water quality during construction through pollution spillages, in addition there is also the potential to cause damage to root systems and canopies of trees lining the roadway. Finally the pipeline crosses the River Blythe SSSI at SP21718817 (Duke Bridge). The Blythe is designated as being a fine example of a lowland river on clay with both diverse physical features and floral communities, one of the most species rich rivers in England. Assuming that the construction will take place within the existing roadway and bridge there is the potential to cause a		

													reduction in river quality through pollution.	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	?	N/A	?	N/A	?	Local	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-3	-1	This option requires the construction of new water treatment works and approx. 3.3km of new main within the Chilterns AONB. The option also includes a further 127km of new mains. During construction there is the potential for a major negative effect. However, once mitigation is taken into account, including appropriate screening and the burying of the new main, it is predicted that there will be a residual minor negative effect during operation.	-1

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-2	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within the Coventry AQMA. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic; however, these can be mitigated through good construction practices and traffic management.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-3	-3	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-3
	8.b. Maximise the company's resilience to a changing climate?	N/A	Medium	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. By upgrading the transfer and storage capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Medium	N/A	Long term >25 years	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Low	Best practice construction.	-1	0	The pipeline crosses a number of surface water courses and therefore there is the potential, dependent on construction method for hydrological impacts and also impacts relating to reduction in water quality through pollution. However following best construction practice should mean any impacts are small, temporary and localised. Neutral effect during operation anticipated.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Low	WFD assessment may be required.	-1	0	The pipeline crosses a number of surface water courses and therefore there is the potential, dependent on construction method for impacts relating to reduction in water quality through pollution. The Sewage works at Minworth are also on the banks of the River Tame where five booster stations will be constructed, there is potential impacts with pollution relating to construction. The pipeline crosses or passes within 10m of multiple small to moderate sized ponds, field drains, brooks, and streams within its 130km, and at each of these locations there is potential for hydrological changes and impacts relating to pollution. However measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts. Neutral effect during operation anticipated.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1		Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Heritage impact assessment should be carried out to determine the effect of the pipeline and in particular the new reservoir on designated heritage assets.	-1	0	The new pipeline passes in close proximity to a significant number of designated heritage assets, including Scheduled Monuments, Registered parks and Gardens and Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.24 AFF-CTR-WRZ4-4025

(In the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme involves the installation of a new booster pumping station (BPS) which will allow a total of 15 Ml/d to be pushed through a new 500mm ID trunk main. It also involves a 710mm reinforcement of a section of trunk main between Egham Reservoir and Ashford. This will allow for future phases of supply through the transfer of 15 Ml/d from Hatton Cross into distribution. This will allow the transfer of unused surplus water from within WRZ6 (Wey) to WRZ4 (Pinn). This option is to allow for the transfer of an existing potable water allocation and, as such, the benefit realised is from an existing allocated supply. No new water supply volumes are produced as a result of this option. The key issue during the construction phase relates to the delivery of a new pumping station and associated pipeline. Potential impacts have been identified for the biodiversity SEA objective, due to the potential loss of woodland at Cranford Park. No significant issues have been identified during operation.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified at the detailed design stage	-1	0	Informal recreational activities potentially take place alongside the proposed pipeline route. This is given sections of the proposed pipeline route travel through Cranford Park and Harmondsworth Moor and may cross a number of public footpaths. The new pipeline may sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The pipeline will affect a number of well used roads (notably 1.7km of the A40). The effect of construction traffic is not expected to be significant given the extent of the pipeline.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV	-1	0	There could be minor indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

											routes and working hours.				
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires the installation of a new booster pumping station (2 x 88kW Booster Pump Sets (Hatton Cross to distribution 2 x Duty / 1 x Standby)), pipeline connections to new booster pumps suction and delivery, and a 25m3 surge vessel.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	National	High	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction.	0	0	The new booster station is not within 500m of any designated sites. One section of new main will be constructed in the carriageway of the A30 adjacent to the Staines Reservoirs components of the South-West London Waterbodies SPA/Ramsar site. However, construction noise impacts on the European site will not arise because in this location the SPA waterbodies are at a considerable elevation above the carriageway and behind a high earth embankment which will entirely attenuate noise reaching the waterbodies from construction in the carriageway. There will be no hydrological impact from pipeline construction on the SPA because Staines Reservoirs are sealed and therefore not in direct contiguity with the surrounding water table. The option is sufficiently remote from the nearest European site that no other impact pathways (i.e. noise or air quality during construction) will occur as Table 2-1 of this report identifies these may only arise from schemes located within 200m (air quality) or 500m (noise) of European sites. The HRA for the WRMP19 concluded no LSE.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Low	There is the potential for the pipeline construction to result in a loss of woodland at Cranford Park. Loss of woodland should be avoided if possible. It is recommended that if this option is taken forward the route is shifted slightly east into the more open	-2	0	Sections of the new pipeline lie within road carriageways. However, a new pipe crossing of the River Crane appears to be required. Depending on how this is achieved there may be habitat loss impacts. The pipeline sections through Cranford Park are currently routed through woodland which would result in net habitat loss. It is recommended that if this option is taken forward the	

											grassland parts of the Park. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction. It should be taken into consideration preventative measures to ensure water quality is not compromised during the construction. Ecological surveys may be required.			route is shifted slightly east into the more open grassland parts of the Park. The construction of some sections of pipeline will take place close to the River Crane. The construction phase therefore has the potential to cause impact upon the river water quality through spillages, affecting the aquatic species which reside within the River Crane. Additionally, lighting during the construction phase may impact on aquatic species (fish) within the River Crane. Sensitive lighting should be adopted to ensure that no direct light spill onto the River Crane. No adverse effects are predicted during operation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction.	0	0	One section of new pipeline will be constructed 80m from Management Unit 11 of Staines Moor SSSI, of which the main habitat in this unit is standing open waters and canals. However, the risk of noise impacts is small given the works are separated from this part of the SSSI by the A30 dual carriageway and existing industrial buildings. Due to the distance no dust deposition impacts are expected either. Precautionary noise mitigation may be required but would be easily deliverable. 98.29% of the SSSI area is currently favourable or unfavourable recovering.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Medium	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. This can be determined at the detailed feasibility stage if this option is progressed.	-1	0	The new booster pumping station will have minor temporary negative effects on the landscape in the short-term during construction. The new booster pumping station will be located within a water works/ substation site so will be in keeping with surrounding uses and will not affect the landscape in the long-term. The option also requires a 25 m3 surge vessel which will be above ground. It is assumed there will be appropriate screening on site. The construction of the pipeline will have minor temporary negative effects on the landscape in the short-term during construction (notably where the pipeline passes through Cranford Park). The pipeline will be buried during operation.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Any proposal for this option should seek to reduce impacts on traffic during the construction phase.	-1	0	The new booster pumping station is located adjacent to the A30 and may result in increased vehicular use during construction. It is recognised that a large volume of vehicles use the A30 to access Heathrow airport and therefore disruption (and resulting congestion) during the 3 year construction period has the potential to increase the levels of atmospheric pollution from vehicles. The entire scheme falls within Hounslow, Hillingdon or Ealing AQMAs. For that reason minor negative effects on air quality in the short-term during construction are anticipated. However, given the presence of the M30 in the vicinity of the scheme it is considered that construction and operational impacts are unlikely to be of significance in terms of local air quality. Adverse impacts during operation of the new booster pumping station are not considered to be significant (maintenance only).	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the	-1

														carbon footprint of the Company.	
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By enabling enhanced transfer of water from existing sources this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment did not identify any impacts on hydromorphological status during construction or operation.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Moderate	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The WFD assessment found that CoPC and best practice design, construction and operation should ensure that impacts are minor, localised and temporary.	-1	0	WFD assessment states potential impact water quality from construction in proximity to watercourse; however, following best construction practice should mean any impacts are small, temporary and localised. During operation height of pipework crossing in relation to river levels is unclear at this stage. No likely impact to hydromorphology and element assuming pipework is above water level.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	High	Further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a Hands off Flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage.	0	-1	Located in proximity to Grand Union Canal and River Crane and River Colne - new mains will run through urban areas and made ground with historic landfills nearby. Temporary and localised dewatering may be required along the route of the new mains. Abstracted water returned to ground or surface water where possible. Creation of new preferential pathways into aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	-1
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term	Temporary	Temporary	Local	Low	The WFD assessment found that best practice design, construction and operation should ensure that impacts are minor,	-1	-1	The WFD assessment (2019) found that this option would not result in the risk of saline or other intrusions. However, it did identify that there is the potential for the creation of new preferential	

						(>25 years)					localised and temporary.			pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Appropriate licensing and HOF will be required. Mitigation could include a Hands off Flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage.	0	-1	Abstraction may have a negative effect if not properly monitored and licenced. Option is located in proximity to Grand Union Canal and River Crane and River Colne. WFD assessment (2019) highlights that temporary and localised dewatering may be required along the route of the new mains. Abstracted water returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow and cause minor obstruction to groundwater flows causing localised mounding. WFD assessment concludes local or temporary effects. No change in status predicted.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should avoid designated assets where possible and mitigation should include the reinstatement of any land affected by construction. If this option is progressed then further consideration should be given to the historic environment when detailed feasibility studies are carried out. It will then be possible to set out more detailed mitigation measures.	-1	0	The Green Man Public House Grade II Listed building is located 240m southeast of the new booster pumping station. Potential for minor adverse effect during the construction phase. Neutral effects anticipated during operation once mitigation has been taken into account. 'Technical Block A - Heathrow Airport' is also a Grade II listed building located 550m from the site, north of the A40. The new pipeline is in close proximity to a number of listed buildings. Notably, the pipeline passes within 60m of the Grade II* Listed Church of St Mary, Harmondsworth and is within 120m of another 14 Grade II Listed Buildings in this area (Harmondsworth). The pipeline also passes adjacent to/ under the Grade II Listed Bridge over River Crane. Potential for minor negative effects during construction. Neutral effects anticipated during operation	0

													once mitigation has been taken into account.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 1 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.1.1.25 AFF-CTR-WRZ4-4026

(In the Expected, High Growth, and Supply-side Challenging Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The scheme is to trade 4Ml/d from existing abstraction license from third party. RWE's power station is capable of reducing the volume of consumptive water which it abstracts from the River Thames by managing the volume of electricity generation, i.e. leaving the consumptive evaporative water in the Thames. This enables an equivalent volume of water to be abstracted by a downstream user. In this case, the downstream user is Affinity Water at its existing Egham surface water treatment works. The RWE Didcot Abstraction Licence will remain unchanged. There is no new infrastructure required. No significant issues have been identified against the SEA Objectives during construction or operation.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 4Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is to trade 4Ml/d from existing abstraction license from third party - therefore, Option not anticipated to have any impacts on access to informal recreation site and related activities	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required. Therefore, the scheme is not likely to cause any traffic related impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required. Therefore, the scheme is not likely to impact on critical services and industries	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new construction or demolition of existing assets.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No effects on European sites identified. The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required.	0

														Additionally, the scheme is remote from designated sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No effects on priority habitats / species identified. The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required.		
	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No effects identified - no net change in abstraction involved when RWE and Affinity Water are considered together. No new infrastructure required.		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No effects on condition of SSSIs identified. The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required. Additionally, the scheme is remote from designated sites.		
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required.		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required.		0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required.		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required. Therefore, the scheme is not likely to impact on air quality.		0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Design methods should follow sustainable design principles.	0	-1	No new infrastructure required. Therefore no effect anticipated during construction. During operation, an increase in electricity use is expected for the increased abstraction at the Egham intake and also additional chemicals required. This is likely to have a negative impact on the carbon footprint of the Company.		-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By better linking abstractors with available water and introducing quicker, and more flexible trading of water this option should result in positive effects on the resilience of Affinity Water's assets to climate change.		
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – no WFD assessment required.		0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – no WFD assessment required.		0
	10. b. Improve water treatment and water quality before it returns	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – no WFD assessment required.		

	to surface water bodies?														
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – no WFD assessment required.		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – no WFD assessment required.		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – no WFD assessment required.	0	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required. No heritage assets will be affected.	0	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - The scheme is to trade 4Ml/d from existing abstraction license from third party - therefore, no archaeology sites will be affected.		
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - The scheme is to trade 4Ml/d from existing abstraction license from third party - there is no new infrastructure required. No impact on best and most versatile agricultural land.	0	

1.2 RTR

1.2.1.1 AFF-RTR-WRZ5-0161

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option will have minor negative effects on strategic transport infrastructure during construction with minor negative knock on effects on critical services and industries. The option will also have a minor negative effect on Affinity Waters carbon footprint. There will also be minor negative effects on the resilience of the local environment to climate change. The pipeline to Chishall Reservoir crosses a tributary of River Rhee, as such there may be minor negative effects on the hydromorphology of this river. There is also likely to be minor negative construction phase effects on heritage designations and agricultural land.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The Rhee tributary is not expected to be used for informal recreation due to lack of access and availability of alternative footpaths and rivers in local area.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The Rhee tributary is not expected to be used for informal recreation due to lack of access and availability of alternative footpaths and rivers in local area.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No access to the affected waterway was identified.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Well used roads will be affected by the scheme: B1039 0.85(km) and crossed, B1368 crossed. B roads assessed due to greater length affected and greater likelihood of significant congestion impacts. 100m assumed to be affected where pipeline crosses roads	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

										delivery of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	This option requires a 4Ml capacity upgrade at Chishill Reservoir and a new 4.9km 250mm diameter main.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Pipeline 200m from BAP Priority Habitat of deciduous woodland which will not result in loss of habitats. Chishill Reservoir upgrade will result in an increase of water levels which may impact of aquatic habitats and species. Supply is not dealt with in this scheme however transfer pipeline crosses River Rhee tributaries with the potential for disturbance to water quality during construction works. Potential for impacts to aquatic habitats.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage..	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-1	0	There is the potential for short-term temporary negative effects on landscape during the construction phase. It is predicted that there will be a residual neutral effect during operation following appropriate reinstatement of the land.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operational energy use is minimal.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	The pipeline to Chishall Reservoir crosses a tributary of River Rhee and therefore could be some impact on the hydromorphology. WFD assessment states that this is a contractual agreement only – no WFD assessment required.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Treatment not dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	0

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The pipeline passes within 100m of two Listed Buildings. There is potential for minor short term temporary negative effects during construction phase. However, the residual effect during operation are anticipated to be neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.2 AFF-RTR-WRZ4-0654

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option will have minor negative effects on strategic transport infrastructure during construction with minor negative knock on effects on critical services and industries. The pipeline route is located 600m from South West London Waterbodies and within BAP priority habitat. Therefore there will be minor negative construction phase effects in regard to these. There is also likely to be both construction and operational phase effects with regards to Landscape. The option will also have a minor negative operational effect on Affinity Waters carbon footprint. There will also be minor negative effects on the resilience of the local environment to climate change. Additionally, the pipeline crosses a number of water courses. As such, there may be minor negative effects on the hydromorphology of these rivers. There is also likely to be a minor negative construction phase effect on heritage designations and a moderate negative construction phase effect on agricultural land.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d (during peak times) equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The site is assumed to be inaccessible to the public (no public rights of way or public facilities in site footprint). Additionally, the anticipated minor impacts on water quality or flow are not anticipated to be perceptible to the majority of informal bankside recreation users. The pipeline route crosses footpaths. These footpaths are anticipated to be well used due to the surrounding population density. No significant impacts anticipated.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts predicted	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Potential fishing sites on River Colne and nearby lakes were identified through the Angling Trust's site (fishinginfo.co.uk).No changes to access are anticipated as a result of this scheme.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. However, The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will require construction of new assets.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	National	High	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction. An HRA will be required to ensure there are no likely significant effects on this European designated site.	-1	0	This option is an import from Thames Water Kempton Park Interconnection Point, and transfer on to Harrow Reservoir via Iver Treatment Works. The scheme requires a new Harrow Reservoir, and 21.5km of new main to be installed from Kempton Park Interconnection Point, to Iver Treatment Works, to the New Harrow Reservoir, to the existing Harrow Reservoir. The southern-most end of the pipeline, as it connects to Kempton Park Interconnection Point is 600m from a section of the South West London Waterbodies Ramsar site and SPA (Kempton Park Reservoirs SSSI), designated for European important numbers of over-wintering gadwall and shoveler. However, this part of the SPA consists of sealed reservoirs separated from the pipeline connection point by the operational water treatment works and a substantial block of woodland. The reservoir lies below the level of the surrounding land which also protects it from visual disturbance.	?

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 -25 years)	N/A	Permanent	N/A	Regional	Moderate	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction.	-1	0		
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Long term >25 years	N/A	Temporary	N/A	Local	Low	Ecological surveys of BAP Priority habitats are required. Loss of BAP Priority habitat should be avoided where possible. If not possible, compensatory habitat will be required. A CEMP should be in place during construction.	-1	0	The proposed pipeline route passes through BAP Priority habitat of deciduous woodland, good quality semi-improved grassland and traditional orchard. The pipeline route is also 175m from BAP Priority habitat of lowland meadows. There is potential for loss of BAP Priority habitat. There is a potential for disturbance (noise, light, dust etc.) to BAP Priority habitats during construction. Potential for changes in hydrology of BAP Priority habitats depending on depth of pipeline.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-1	-1	The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. However, there is the potential for minor negative effects as a result of the new reservoir and pump house but this is uncertain at this stage. Mitigation measures such as screening/ planting should reduce the significance of any residual negative effects during operation so that they are minor. The pipeline route travels through multiple residential areas. Therefore, there will be short-term temporary negative effects on residents associated with pipeline excavation work of residential streets, but not domestic properties. Residents will not be affected by the pipeline during the operational phase as it will be buried. The new reservoir and pump house could also affect the landscape for a number of residents depending on the level of mitigation provided. However, this is uncertain at this stage	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High		-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within the Wey AQMA. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic.	-1
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0

10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	The pipeline to crosses a number of surface watercourses and therefore could be some impact on the hydromorphology. WFD assessment states that following best construction practice should mean any impacts are small, temporary and localised. Height of pipework crossing in relation to river levels is unclear at this stage. No likely impact during operation assuming pipework is above water level.	0
	10.b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a treated water transfer and therefore no water quality issue anticipated.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option is not located within a floodplain area (identified by the Environment Agency) and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline passes within 10m of a significant number of Listed Buildings. Additionally, the site of the new reservoir at Harrow is within 100m of the Harrow Registered Park. There is therefore potential for negative effects during the construction phase. However, the burial of the pipeline and reinstatement of any land affected is anticipated to result in negative effects being short-term, temporary and not experienced during the operational phase. It is assumed that there will be appropriate mitigation to ensure that the visible infrastructure does not have a significant negative effect on the historic environment.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.3 AFF-RTR-WRZ6-0752

(In the Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Pop		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an import of 2.7 Ml/d of treated water from Thames Water via Ladymead Interconnection Point for transfer to Park Barn Drive Reservoir. The increase will provide an additional 2.7 Ml/d during both peak and average conditions for use within WRZ6. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, surface and groundwater body status, and road infrastructure. Key issues during operation relate to potential long-term effects on surface and groundwater body status; specifically impact on the hydromorphology of surface water bodies crossed by the pipeline.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.7Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The Wey River is accessible to water craft. This option is not anticipated to cause impacts to this access	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minor impacts on water quality or flow are assumed not to impact users of boats or water craft as it is deemed unlikely that these changes would be perceived during use.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Site (the Park Barn Drive Reservoir) assumed inaccessible to the public (no public rights of way or public facilities in site footprint). No footpaths in route of pipeline. No anticipated impacts.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a 2.7 Ml service reservoir upgrade at Park Barn Drive Reservoir, 2 x 30kW Pumps, and 2 km of new 200 mm diameter transfer main.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	?

and other important habitats and species?	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None identified.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	This option is an import of treated water for transfer to Park Barn Drive Reservoir, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should be explored at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing existing habitats but this is uncertain at this stage. Potential for water quality changes and subsequent loss of suitable habitat. Mitigation could include monitoring water levels to inform the use of Hands off Flow conditions/ restrict release of water to maintain suitable water levels for the river habitats and associated species they support. Potential for acoustic, light and dust disturbance during construction. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	Deciduous woodland Priority habitat is located to the north, west and south of the Park Barn Drive Reservoir. The upgrade of this reservoir may lead to the loss of, or disturbance to this habitat. However, the location of the works associated with the expansion of the reservoir are not yet known. The pipeline passes 200m from a parcel of BAP Priority habitat lowland fens. The pipeline also passes within 150m of one parcel of BAP Priority habitat deciduous woodland, and within 50m of two additional parcels of this Priority habitat. There is the potential for disturbance to these habitats (through noise, light and dust) during construction. A CEMP should be in place. The pipeline crosses the River Wey via a road bridge. There is the potential for river habitats and species to be disturbed (through noise, light, dust and changes in water quality) during construction. A CEMP should be in place.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the reservoir, new pumping station, and new pipeline. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The new pumping station to be located at Ladymead interconnection point, is within a built up urban area. Therefore assuming appropriate mitigation such as screening / planting - a new structure in this area should not result in a significant residual effect on landscape.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given the scale of the option and that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 - 25 years) and Long term >25 years	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) and Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) and Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This option could have negative effects on BAP priority habitats and crosses several surface water bodies.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) and Long term >25 years	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore, pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	0	The pipeline crosses a number of surface watercourses and therefore could be some impact on the hydromorphology. This option is screened out of the WFD assessment.	0
	10.b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No treatment dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	It should be taken into consideration preventative measures to ensure water quality is not compromised during the construction of the pumping station.	0	0	Potential for negative impact effect during construction of the pumping station where there is groundwater in the superficial deposits but appropriate mitigation should ensure residual effects are neutral. This option is screened out of the WFD assessment.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures to be explored further at the detailed design stage and be set out in any applications for Flood Defence Consents where these are required for any river construction works.	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency). However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no designated heritage assets that are likely to be affected during the construction phase. The option will not have any significant residual effects on the historic environment during the operational phase.	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected by this scheme.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

1.2.1.5 AFF-RTR-WRZ7-0842

(In the Expected and High Growth Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an import of water from South East Water to Water Resource Zone 7 via an interconnection point at Aldington for transfer to Saltwood Reservoir. This scheme requires a 3Ml capacity upgrade of Saltwood Reservoir, a new 12.2 km 200 mm Diameter Main from the interconnection point to Saltwood Reservoir and a new pump station at the interconnection point (3 x 22 kW Booster Pumps). Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to material consumption, carbon footprint, road infrastructure, biodiversity, historic environment, and in particular the landscape given the presence of the Kent Downs AONB. Key issues during operation relate to potential long-term effects on local water quality, biodiversity and landscape.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not result in any new opportunities for recreation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment did not identify any impacts on water levels/ flow. It does identify the potential for impacts on water quality but best practice design, construction and operations should ensure that impacts on water quality are minor. This will not significantly affect water-based recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The majority of the new pipeline runs along the motorway but there are small sections in rural areas. They could sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of	-1	0	The majority of the new pipeline follows the motorway and while it is unlikely to result in significance disturbance there is the potential for some localised traffic.. No significant impacts are anticipated during operation. It is anticipated that works traffic will be	0

										infrastructure will also help to minimise impacts.			timed to avoid congestion impacts.	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will require a 3Ml capacity upgrade of Saltwood Reservoir, a new 12.2 km 200 mm Diameter Main, a new pump station at the interconnection point (3 x 22 kW Booster Pumps), and a surge 12.2 km of 200 mm Diameter Main and a 4 m3 Surge Vessel.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	If increased abstraction required supporting this option under another scheme/ option, in combination HRA may be required.	0	0	The HRA (2017) for the dWRMP concluded that there are no HRA implications as it is assumed that water will always be available as part of this option. Given the distances involved and the lack of sensitivity that SAC and SPA interest features have to impacts arising at this distance it is considered no likely significant effect will arise. No impact pathways to any MCZs.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	High	The WFD assessment found that best practice design, construction and operation should ensure that impacts on water quality are minor, localised and temporary.	0	0	The pipeline route is located approx. 420m from Gibbin's Brook SSSI, 1 km from Otterpool Quarry SSSI, 1.4 km from Seabrook Stream SSSI, 1.7 km from Lympne Escarpment SSSI, 1.7 km from Folkestone to Etchinghill Escarpment SSSI, 3.3 km from Hatch Park SSSI and 3.9 km from Great Shuttlesfield Down SSSI. The interest features of these designated sites are provided in Appendix II, Annex B.	?

													Given the distance of the SSSIs from the option, their interest features and the presence of the M20, it is not considered that there are likely to be any impacts during construction. The WFD assessment identified that there is the potential for minor, localised and temporary negative effects on water quality given the presence of the River Stour. Given the negligible effects on water quality and mitigation available it is considered unlikely that this scheme would have any impacts on any SSSIs downstream.	
	5.c. Impact on non-native species?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	0	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Good practice construction methods should ensure that any impacts during construction are minor, local and temporary. The WFD assessment found that best practice design, construction and operation should ensure that impacts on water quality are minor, localised and temporary.	-1	-1	The proposed pipeline route passes adjacent to a number of BAP Priority Habitats, primarily deciduous woodland. Priority Habitat (deciduous woodland) is also present around the existing reservoir site. Impacts (noise, light and dust) are most like to occur during construction but best practice construction methods should ensure that these are local, minor and temporary. The WFD assessment found that there would no impacts on water levels/ flows but there is the potential for local, temporary and minor negative impacts on water quality. As a result of this there is a potential for a minor negative effect on some of the adjacent deciduous woodland. The WFD assessment found that best practice design, construction and operation should ensure that impacts on water quality are minor, localised and temporary.	

	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. The new pump house building should also be designed sympathetically to fit in with the surrounding landscape and screening used where appropriate. More detailed mitigation measures should be set out at the detailed design stage.	-2	-1	The construction of the new pump house, pipeline and expansion of the reservoir will have a temporary and local negative effect on landscape in the short-term. The pipeline will not have any negative effects during operation as it will be buried. Approximately 2.5km of the pipeline and the expanded reservoir fall within the Kent Downs AONB. The new pump house falls just outside the AONB and the expansion of the Saltwood service reservoir would fall within the AONB, as a result the potential for negative effects during construction is predicted to be moderate. During operation the only visible infrastructure is likely to be the new pump house and to a minor extent the extended service reservoir. The new pump house will be delivered on or near to existing farm buildings and once screening/ planting has been carried out the residual effect is likely to be negligible. The expansion of the existing reservoir is also likely to have a negligible residual effect on the landscape during operation once mitigation is taken into account. However, given that this option will result in the delivery of new infrastructure within the AONB it is considered that there is the potential for a minor residual negative effect in the medium to long-term during operation.	-1

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	N/A	-2	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment found that best practice design, construction and operation should ensure that impacts are minor, localised and temporary.	0	-1	The WFD assessment found that there is the potential for minor, localised and temporary negative effects on water quality given the proximity of the River Stour. It states that natural attenuation will reduce any turbidity resulting from construction. The WFD assessment states that best practice design, construction and operation reduces the any risks to water quality. While no significant residual effects predicted there is the potential for a change in water quality to reduce the resilience of the local environment to climate change.	-1
10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment did not identify any impacts on hydromorphological status during construction or operation.	-1
	10.b. Improve water treatment and water quality before it returns to surface water bodies?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years)	Temporary	Temporary	Local	Low	The WFD assessment found that best practice design,	-1	-1	The WFD assessment identified that there is the potential for an impact on water quality given	

						to Long term (>25 years)					construction and operation should ensure that impacts are minor, localised and temporary.			proximity of the River Stour. It states that natural attenuation will reduce any turbidity resulting from construction. The WFD assessment states that best practice design, construction and operation reduces the any risks to water quality. No significant residual effects predicted.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD does not identify any impacts on groundwater levels/ flows.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The WFD assessment found that best practice design, construction and operation should ensure that impacts are minor, localised and temporary.	-1	-1	The WFD found that this option would not result in the risk of saline or other intrusions. However, it did identify that there is the potential for the creation of new preferential pathways into the aquifer due to below ground workings and construction of mains. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Best practice for design, construction and operations should reduce risks to water quality. No significant residual impacts predicted.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD does not identify any impacts on water levels/ flows.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river.	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	During the detailed design stage the pipeline should be rerouted so that it is further from the scheduled monument. An archaeological survey should be carried out in any areas in close proximity to the Scheduled Monument prior to any construction works. Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-2	0	The new pipeline passes within 5m of a Scheduled Monument and within 20m of a Listed Building. There is therefore potential for a moderate negative effect during the construction phase due to the proximity of the designated heritage assets. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. It should also be noted that the existing reservoir is within 100m of two Listed Buildings. However, the disused railway line and extensive vegetation separates the existing reservoir from the listed buildings. It is predicted that mitigation, including appropriate screening/ planting, will result in a residual neutral effect during operation.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.6 AFF-RTR-WRZ5-0849

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an import of water from Essex and Suffolk Water via the interconnection point at Brentwood for transfer to Rye Hill Reservoir. This scheme requires a new 24.5 km of 450 mm Diameter Main from Brentwood Interconnection Point to Rye Hill Reservoir, 4 new booster pumps at Brentwood Interconnection Point and a 15 Ml capacity increase of Rye Hill Reservoir. No significant issues have been identified for this option during the construction or operation phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The River Roding is accessible to water craft. This option is not anticipated to cause impacts to this access.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minor impacts on water quality or flow are assumed not to impact users of boats or water craft as it is deemed unlikely that these changes would be perceived during use.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The anticipated pipeline route crosses a number of footpaths. However no significant impacts are predicted.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	The option requires the construction of new Mains and a reservoir upgrade.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	National	High	A dust management plan may be needed for this section of pipeline construction if it is likely that dust generating activities will arise within 200m of the SAC. A project transport strategy may enable the SAC to be avoided entirely except at the actual point of pipeline construction.	-1	0	The HRA (2017) for the dWRMP found the following: A short (200m) stretch of pipeline lies within a road corridor (Ivy Chimneys Road and Theydon Road) that passes between 133m and 200m from Epping Forest SAC in the vicinity of the M25 Bell Common Tunnel. Some of the heathland at this SAC is hydrologically sensitive and could be affected by dewatering for pipeline construction (for example). There are no wet heathland elements of the SAC in this part of the site and there is a history of extensive engineering works between the pipeline route and the SAC such as installation of the M25 and Bell Common Tunnel. As such, changes in hydrology at the SAC are unlikely to arise. However, there is the potential for dust impacts to the site during construction. The SAC is also highly sensitive to atmospheric nitrogen and NOx (and possibly ammonia) from traffic. Not only does the pipeline route (which will be used by construction traffic) use Ivy Chimneys Road and Theydon Road within 200m of the SAC but several major roads cross the SAC which may be used by construction traffic. A dust management plan may be needed for this section of pipeline construction if it is likely that dust generating activities will arise within 200m of the SAC. Although construction traffic may travel within 200m of the SAC to reach the pipeline construction site, it likely that the level of construction traffic will be small (i.e. low double figures per day at most) and will be temporary and short-term. There are no other Affinity Water options in this area. A project transport strategy may enable the SAC to be avoided entirely except at the actual point of pipeline construction. It is not considered that the potential air quality risk to the SAC (given their temporary nature, restricted to pipeline construction in the local vicinity) would render this scheme undeliverable. Such	-1	0	The HRA (2017) for the dWRMP found the following: A short (200m) stretch of pipeline lies within a road corridor (Ivy Chimneys Road and Theydon Road) that passes between 133m and 200m from Epping Forest SAC in the vicinity of the M25 Bell Common Tunnel. Some of the heathland at this SAC is hydrologically sensitive and could be affected by dewatering for pipeline construction (for example). There are no wet heathland elements of the SAC in this part of the site and there is a history of extensive engineering works between the pipeline route and the SAC such as installation of the M25 and Bell Common Tunnel. As such, changes in hydrology at the SAC are unlikely to arise. However, there is the potential for dust impacts to the site during construction. The SAC is also highly sensitive to atmospheric nitrogen and NOx (and possibly ammonia) from traffic. Not only does the pipeline route (which will be used by construction traffic) use Ivy Chimneys Road and Theydon Road within 200m of the SAC but several major roads cross the SAC which may be used by construction traffic. A dust management plan may be needed for this section of pipeline construction if it is likely that dust generating activities will arise within 200m of the SAC. Although construction traffic may travel within 200m of the SAC to reach the pipeline construction site, it likely that the level of construction traffic will be small (i.e. low double figures per day at most) and will be temporary and short-term. There are no other Affinity Water options in this area. A project transport strategy may enable the SAC to be avoided entirely except at the actual point of pipeline construction. It is not considered that the potential air quality risk to the SAC (given their temporary nature, restricted to pipeline construction in the local vicinity) would render this scheme undeliverable. Such	?

														small changes are likely to be lost in the day-to-day variation in flows that will be seen on this road. Moreover a travel plan during construction could potentially enable vehicle movements past the SAC to be minimised even further. Small scale short-term temporary changes in emissions will have no effect on the integrity of the SAC since botanical changes stem from long-term (many years) regular deposition, which is why nitrogen deposition rates are expressed as kilograms of nitrogen over a given area per year.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Regional	Moderate	There is the potential for disturbance to, or changes in hydrology of, SSSIs during construction. A CEMP should be in place during construction and ecological surveys are required	-1	0	The pipeline passes 133m from Epping Forest SSSI, 1.5km from Curtismill Green SSSI and 2.2km from The Coppice Kelvedon Hatch SSSI. There is the potential for disturbance to, or changes in hydrology of, these sites during construction. A CEMP should be in place during construction and ecological surveys are required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	There is the potential for habitats, including ancient woodland, watercourses and BAP Priority habitats to be disturbed (through noise, dust and lighting) during construction. A CEMP should be in place. Changes in the pipeline route may avoid works adjacent to ancient woodland and BAP Priority habitats.	-1	0	The Brentwood Interconnection Point is located approximately 500m from BAP Priority habitat deciduous woodland. However, due to the distance is it not anticipated that construction of the booster pump building will have an effect on this habitat. The pipeline passes adjacent to 21 parcels of BAP Priority habitat deciduous woodland, as well as within 50m of several parcels of this habitat. The pipeline passes adjacent to 1 parcels of BAP Priority habitat good quality semi-improved grassland The pipeline also passes 133m from ancient woodland and BAP Priority habitat deciduous woodland associated with the Epping Forest SAC and SSSI, 100m from ancient woodland at Beachet Wood and 70m from ancient woodland at Lower Boishall Wood. The pipeline also passes adjacent to ancient woodland at Bob's Barn Wood and Langford Bottom CWS, and at Heronland Shaw, Strawberry Wood and High Wood. The pipeline passes adjacent to a watercourse south of Epping and crosses watercourses to the east of Stapleford Tawney and south of Langford Bottom. There is the potential for habitats, including ancient woodland, watercourses and BAP Priority habitats to be disturbed (through noise, dust and lighting) during construction.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate landscaping and re-instatement post construction of pipeline.	-1	0	At this stage it is not clear if the upgrade to the reservoir would result in any new visible infrastructure. A new pump house may be required and other minor structures. There are likely to be minor negative effects on landscape during construction phase. Appropriate mitigation such as screening/planting will reduce the residual effect during operational phase.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs . There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	The pipeline to crosses a number of surface watercourses and therefore could be some impact on the hydromorphology. WFD assessment concludes following best construction practice should mean any impacts are small, temporary and localised. Height of pipework crossing in relation to river levels is unclear at this stage. No likely impact during operation assuming pipework is above water level.	0
	10.b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No treatment dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline passes within 10m of a number of Listed Buildings. There is also a scheduled monument located approximately 250m from the Rye Hill reservoir. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected as well as suitable screening/ planting should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	0	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.7 AFF-RTR-WRZ3-0860

1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option will have minor negative effects on strategic transport infrastructure, and public rights of way during construction with minor negative knock on effects on critical services and industries. The new pipeline route and service reservoir at Sundon is located 750m away from Smithcombe, Starpenhoe & Sundon Hills SSSI and is 300m away from Galley & Warden Hills SSSI. Additionally, it is also located within an area of BAP Priority habitat deciduous woodland. Consequently there is potential for minor negative, and moderate negative construction phase effects on these biodiversity features. The pipeline passes through the Chilterns AONB and consequently There is also likely to be major negative effects on landscape during the construction phase and a minor negative effect during operation. This option will result in a minor negative effect on Affinity Water's carbon footprint during operation. Additionally, further abstraction may have a negative effect on the environment's resilience to climate change if not properly monitored and licenced. The option may also have a minor negative effect during both construction and operation on the hydro morphology of rivers which it crosses. There is likely to be moderate negative effects during construction on heritage assets with a residual minor negative effect during operation. There is also likely to be a minor negative effect one agricultural land during construction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The Pipeline from Sundon treatment works to Preston reservoir does not cross any water bodies. However, the proposed pipeline route crosses a number of footpaths, included the Chiltern Way footpath many times. Despite the assumption that the Chiltern Way will be temporarily (and satisfactorily) rerouted, a minor negative impact is therefore anticipated during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option requires installation of new mains pipes between Sundon Treatment Works and Preston Reservoir. This may cause disruption to numerous minor roads, and several A roads (including the A505 and A6) during construction phase. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

											help to minimise impacts.				
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	The option requires installation of new mains pipes between Sundon Treatment Works and Preston, and creation of reservoir at Sundon Reservoir. This will require construction of new assets.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction.	-1	0	The new pipeline route and service reservoir at Sundon is located 750m away from Smithcombe, Starpenhoe & Sundon Hills SSSI and is 300m away from Galley & Warden Hills SSSI which is also designated as a Local Nature Reserve (LNR). Wain Wood SSSI is also 300m from the proposed pipeline route. Potential for disturbance to SSSI during construction.	
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option proposes a transfer of raw water supplied by Anglian Water and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.	-1

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	?	Local	Low	Loss of habitat can be avoided by small change to the pipeline route. If loss of Priority habitat cannot be avoid then compensatory habitats will be required. Disturbance can be avoided by small changes in pipeline route. CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction. Detailed Ecological survey required.	-1	0	The location of proposed pipeline from Sundon TW is within an area of BAP Priority habitat deciduous woodland. Pipeline passes through the Chilterns AONB and passes within 19m of ancient woodland. Potential for habitat loss of hedgerows along the proposed pipeline route. Potential for noise, light and dust disturbance to these sites during construction, and potential changes in hydrology based on the depth of the pipeline during operation. Potential for loss of BAP priority habitat deciduous woodland along proposed pipeline route. Investigation required.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase. New opportunities are to be created for improved access, recreation and amenity provision	-3	-1	The new pipeline will be buried so will not have negative effects on the landscape during the operational phase. There is also the potential for negative effects as a result of the new reservoir and pump house but this is uncertain at this stage. Given the presence of the AONB, it is considered that there is the potential for a major negative effect during construction and a minor negative effect during operation.	-1

											across the area of the reservoir to reduce adverse effects during the operation phase.				
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-2	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company..	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity and transfer supply, this option should result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline from Sundon PS to Preston Reservoir is not crossing any surface water bodies	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Not occurring in this scheme	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No pathways to aquifers in this scheme	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No pathways to aquifers in this scheme	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No pathways to surface water in this scheme	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option is not located within a floodplain area (identified by the Environment Agency) and measures are not likely to significantly increase the	0

													surface area of hardstanding within the option location.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-2	0	The new pipeline passes within 10m of the Temple Dinsley Registered Park and Garden as well as a number of Listed Buildings. There is therefore potential for negative effects during construction phase. Reinstatement and mitigation measures should ensure no negative effects during operation of the pipeline.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.8 AFF-RTR-WRZ1-1007

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Op		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	It is anticipated that the works will not cause significant interruptions to supply for local residents during construction. The improvement to supply infrastructure is anticipated to result in a minor long term positive impact on supply in operation. The pipeline is adjacent to a section of the South West London Waterbodies Ramsar and SPA, as well as an associated SSSI. The site is 160m from the River Thames at its closest, 440m from the abstraction point. The pipeline is also within 1.5km from two additional SSSIs associated with this Ramsar and SPA, and is within 50m of two additional SSSIs not associated with the Ramsar/SPA. The abstraction and construction of the pipeline also has the potential to affect BAP Priority habitats and ancient woodland through changes in hydrology and disturbance during construction. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint, although currently this is not expected to be a significant increase. Further abstraction may have a negative effect on the environment if not properly monitored and licenced. Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The River Thames is accessible to water craft. This option is not anticipated to cause impacts to this access.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity. The anticipated levels (minor significant impact during construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No changes to access are anticipated as a result of this scheme.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. However, the construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	The option requires the construction of new Mains and a reservoir upgrade.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		High	Low	Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Standard dust suppression measures should be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design.	-1	0	The HRA (2017) for the dWRMP found the following: An approximately 200m section of the pipeline would be within the carriageway of Welley Road adjacent to a section of the South West London Waterbodies Ramsar site and SPA (known as Sunnymeads Gravel Pits). The flooded gravel pits are in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline (and thus the need for dewatering of the excavation or risk of pollution) there is thus potential for changes in hydrology and water quality within the SPA. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. However, in practice any effects on the SPA can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. This would need to be developed further during detailed scheme design. In terms of dust generation, it is impossible to know at this point whether there will be any significant dust generating activities but there are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light	-1

														disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	Low	Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. Ecological surveys are required.	-1	-1	The pipeline is adjacent to Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. The pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. There is the potential for increased abstraction from the River Thames to affect the hydrology of these sites. The pipeline is also 360m from Kingcup Meadows and Oldhouse Wood SSSI, 40m from Fray's Farm Meadows LNR and SSSI and 52m from Ruislip Woods NNR and SSSI Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Long term >25 years	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Ecological surveys of BAP Priority habitats are required. The loss of BAP Priority habitat should be avoided where possible. Where this isn't possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction; a CEMP should be in place. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames.	-1	-1	The abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. The pipeline also passes 14m and 79m from two parcels of ancient woodland east of Chandlers Hill, 52m from ancient woodland at Ruislip Woods, adjacent to French Grove and Battlers Wells Wood ancient woodland and 88m from ancient woodland north of French Grove. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction; a CEMP should be in place. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate landscaping and re-instatement post construction of pipeline.	-1	0	New pipeline will be underground. New booster pumps may require an expansion of existing buildings at Sunnymeads. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. Mitigation including screening/planting should ensure that the residual effects during operation are reduced. However, given the uncertainty over the reservoir upgrade and mitigation to provided it is assumed that there will be a minor negative effect on the landscape during operation.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	0	0	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within the Hillingdon AQMA. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	?	Design and construction methods should follow sustainable design principles. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Further abstraction may have a negative effect on the environment if not properly monitored and licenced. WFD assessment states that without instigation of a scheme to provide compensation flows by Thames Water then the environment may be adversely impacted (changes to water hydromorphology and river flow) and the Environment Agency are unlikely to license.	-2
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume from abstraction, and result in changes to water hydromorphology. Abstraction may lead to deterioration of the WFD status.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	-1	-2	WFD assessment states potential for disturbance to water quality during construction due to the loss of habitat during installation of the pump and chamber. This is unlikely to be significant at water body scale (minor, temporary effects). WFD assessment concludes during operation potential impact on reduction in water quality with lower water levels and flows. Has potential to cause	

													deterioration in status if not managed. This could have a negative effect on water quality during operation.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Appropriate licensing and HOF will be required. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Abstraction in river may have a negative effect if not properly monitored and licenced. The Lower Thames Gravels groundwater body is hydraulically connected to the Thames River and might be affected by the increased abstraction. WFD assessment states possible loss of river depth due to abstraction at low flows. A scheme to provide compensatory flows will need instigating. Without this the Environment Agency are unlikely to license.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	WFD assessment identifies further investigation required.	-1	-2	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected. WFD assessment states following best construction practice should mean any impacts are small, temporary and localised. During operation, WFD assessment states possible loss of recharge at time of low hydraulic heads depending on the connection to groundwater. Investigation may be required to confirm no deterioration.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Appropriate licensing and HOF will be required. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Abstraction may have a negative effect if not properly monitored and licenced. WFD assessment states that without instigation of a scheme to provide compensation flows by Thames Water then a reduction of river flow due to abstraction is anticipated and the Environment Agency are unlikely to license.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1		The new pipeline is within 10m of a number of Listed Buildings. There will be short term, temporary negative effects associated with construction of the pipeline. However, with appropriate mitigation and reinstatement of the affected land the residual effects during operation are predicted to be neutral.	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.9 AFF-RTR-WRZ3-1028

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	It is anticipated that the works will not cause significant interruptions to supply for local residents during construction. The improvement to supply infrastructure is anticipated to result in a minor long term positive impact on supply in operation. Pipeline passes through an area of BAP priority habitat (undefined) and passes approximately 50m from BAP priority habitat deciduous woodland. Potential for loss of, and disturbance to, priority habitats. The option will be likely to result in higher energy requirements during construction phase, therefore resulting in a higher carbon footprint. Operational energy increase is assumed to be minimal. The pipeline to Wicker Hall Reservoir crosses a tributary of River Rhee and there could be some impact on the hydromorphology. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines. The pipeline route crosses grade 3a agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 8Ml/d (peak output) equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The construction impacts are not likely to be significant as it is anticipated that the Hertfordshire Way footpath will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts identified.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The option requires a new pipeline. This crosses the Hertfordshire Way footpath, amongst others. It may cause short term disruption along public rights of way during construction. Additionally, the pipeline generally follows the existing road network and may reduce pedestrian access at crossing points during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. Well used roads will be affected by the scheme: B1039 2.5km, A10 crossed by pipeline (assumed 100m affected). B roads assessed due to greater length affected and greater likelihood of significant congestion impacts.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	-1	0	The scheme involves a new bidirectional main between Wicker Hall and Lowerfield, no additional infrastructure would be required.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	?	Re-route pipeline to avoid BAP priority habitats where possible. CEMP should be in place to avoid noise, light and dust disturbance to BAP priority habitat.	-1	0	Pipeline passes through an area of BAP priority habitat (undefined) and passes approximately 50m from BAP priority habitat deciduous woodland.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	-1	0	There is the potential for short-term temporary negative effects on landscape during the construction phase. It is predicted that there will be a residual neutral effect during operation following appropriate reinstatement of the land.	0

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	0	0	The pipeline to Wicker Hall Reservoir crosses a tributary of River Rhee and there could be some impact on the hydromorphology. WFD assessment concludes this option is screened out as water bodies crossed by the transfer main do not include other options likely to cause combined adverse impacts.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Treatment not dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is no anticipated loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	0	0	There is a Scheduled Monument approximately 550m from the proposed route for the new pipeline. It is considered unlikely that the construction phase would have any significant effects on this designated heritage asset. .	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts predicted	0

1.2.1.10 AFF-RTR-WRZ4-1038

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	It is anticipated that the works will not cause significant interruptions to supply for local residents during construction. The improvement to supply infrastructure is anticipated to result in a minor long term positive impact on supply in operation. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. Upgrades to booster pumping the new mains will require construction of new assets and the option will temporarily result in higher levels of waste production. The pipeline is adjacent to a section of the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. The pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI, both also part of the South West London Waterbodies Ramsar and SPA. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SPA/Ramsar and SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. HRA will be required. There is also the potential for BAP Priority habitats to be affected. The upgrade of Chishill Reservoir and new mains is likely to result in higher energy requirements during construction phase, therefore resulting in a higher carbon footprint. Operational energy increase is assumed to be minimal. Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The anticipated minor residual impacts on water quality or flow are not anticipated to be perceptible to the majority of informal bankside recreation users.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and assessment may be required.	0	?	The anticipated minor residual impacts on water quality or flow may be perceptible to the majority of informal bankside recreation users. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	Site assumed inaccessible to the public (no public rights of way or public facilities in site footprint). The pipeline route crosses footpaths and the River Thames's route is followed by the Thames Path footpath. These footpaths are anticipated to be well used due to the surrounding population density. It may cause short term disruption along public rights of way during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. Well used roads will be affected by the scheme: M4 0.9 (km), A4 0.1, B376 0.7, B470 1.2, Unclassified 7.The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	Upgrades to booster pumping the new mains will require construction of new assets.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	High	Low	Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Standard dust suppression measures should be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design.	-1	0	The HRA (2017) for the dWRMP found the following: An approximately 200m section of the pipeline would be within the carriageway of Welley Road adjacent to a section of the South West London Waterbodies Ramsar site and SPA (known as Sunnymeads Gravel Pits). The flooded gravel pits are in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline (and thus the need for dewatering of the excavation or risk of pollution) there is thus potential for changes in hydrology and water quality within the SPA. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. However, in practice any effects on the SPA can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. This would need to be developed further during detailed scheme design. In terms of dust generation, it is impossible to know at this point whether there will be any significant dust generating activities but there are standard dust suppression measures	-1

														that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	Low	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. Ecological surveys are required.	-2	-1	The pipeline is adjacent to Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. The pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	Low	Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Ecological surveys of BAP Priority habitats are required. The loss of BAP Priority habitat should be avoided where possible. Where this isn't possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats during construction; a CEMP should be in place.	-1	-1	The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. There is the potential for disturbance to BAP Priority habitats during construction. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The upgrade of booster pumps and existing buildings may also have a minor negative effect during construction; however, once mitigation is taking into account it is predicted that the residual effect during operation will be neutral.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M25 and M4 in the vicinity of the route. However, it is noted that the route is partially within the South Bucks AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Further abstraction may have a negative effect on the environment if not properly monitored and licenced. WFD assessment states that without instigation of a scheme to provide compensation flows by Thames Water then the environment may be adversely impacted (changes to water hydromorphology and river flow) and the Environment Agency are unlikely to license.	-2
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume from abstraction, and result in changes to water hydromorphology. Abstraction may lead to deterioration of the WFD status.	-2
	10.b. Improve water treatment and water quality before it returns to surface water bodies?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	N/A	Local	Low	WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	-1	-2	WFD assessment states potential for disturbance to water quality during construction due to the loss of habitat during installation of the pump and chamber. This is unlikely to be significant at water body scale (minor, temporary effects). WFD assessment concludes during operation potential impact on reduction in water quality with lower water levels and flows. Has potential to cause deterioration in status if not managed. This could have a negative effect on water quality during operation.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Appropriate licensing and HOF will be required. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Abstraction in river may have a negative effect if not properly monitored and licenced. WFD assessment states possible loss of river depth due to abstraction at low flows. A scheme to provide compensatory flows will need instigating. Without this the Environment Agency are unlikely to license.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	WFD assessment identifies further investigation required.	-1	-2	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected. WFD assessment states following best construction practice should mean any impacts are small, temporary and localised. During operation, WFD assessment states possible loss of recharge at time of low hydraulic heads depending on the connection to groundwater. Investigation may be required to confirm no deterioration.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Appropriate licensing and HOF will be required.	0	-2	Abstraction in river may have a negative effect if not properly monitored and licenced. WFD assessment states that without instigation of a scheme to provide compensation flows by Thames Water then levels of flows will be impacted and the Environment Agency are unlikely to license.	--2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Heritage impact assessment should be carried out to determine the effect of the pipeline on designated heritage assets.	-1	0	The pipeline passes within 100m of two Listed Buildings. There is potential for minor short term temporary negative effects during construction phase. However, the residual effect during operation are anticipated to be neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.11 AFF-RTR-WRZ4-1040

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline is adjacent to a section of the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. The pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI, both also part of the South West London Waterbodies Ramsar and SPA. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SPA/Ramsar and SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. HRA will be required. There is also the potential for BAP Priority habitats to be affected.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 100Ml/d equates to a significant positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The River Thames is accessible to water craft. This option is not anticipated to cause impacts to this access.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and assessment may be required.	0	?	Water craft activities may be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No changes to access are anticipated as a result of this scheme.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. Well used roads will be affected by the scheme: M4 0.9 (km), A4 0.1, B376 0.7, B470 1.2, Unclassified 7.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

											routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	The option requires the construction of pumps, mains and surge vessels	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		High	Low	Medium term (5 -25 years)	Mediu m term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Standard dust suppression measures should be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design.	-1	0	The HRA (2017) for the dWRMP found the following: An approximately 200m section of the pipeline would be within the carriageway of Welley Road adjacent to a section of the South West London Waterbodies Ramsar site and SPA (known as Sunnymeads Gravel Pits). The flooded gravel pits are in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline (and thus the need for dewatering of the excavation or risk of pollution) there is thus potential for changes in hydrology and water quality within the SPA. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. However, in practice any effects on the SPA can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. This would need to be developed further during detailed scheme design. In terms of dust generation, it is impossible to know at this point whether there will be any significant dust generating activities but there are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during	-1

															construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	Low	Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. Ecological surveys are required.	-2	-1	The pipeline is adjacent to Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. The pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Ecological surveys of BAP Priority habitats are required. The loss of BAP Priority habitat should be avoided where possible. Where this isn't possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats during construction; a CEMP should be in place.	-1	-1	The abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. There is the potential for disturbance to BAP Priority habitats during construction. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate landscaping and re-instatement post construction of pipeline.	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The upgrade of booster pumps and existing buildings may also have a minor negative effect during construction; however, once mitigation is taking into account it is predicted that the residual effect during operation will be neutral.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M25 and M4 in the vicinity of the route. However, it is noted that the route is partially within the South Bucks AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1

	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity and transfer supply, this option should result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced. WFD assessment states that without instigation of a scheme to provide compensation flows by Thames Water then the environment may be adversely impacted (changes to water hydromorphology and river flow) and the Environment Agency are unlikely to license.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume from abstraction, and result in changes to water hydromorphology. Abstraction may lead to deterioration of the WFD status.	-2
	10.b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	-1	-2	WFD assessment states potential for disturbance to water quality during construction due to the loss of habitat during installation of the pump and chamber. This is unlikely to be significant at water body scale (minor, temporary effects). WFD assessment concludes during operation potential impact on reduction in water quality with lower water levels and flows. Has potential to cause deterioration in status if not managed. This could have a negative effect on water quality during operation.	

	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Appropriate licensing and HOF will be required. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Abstraction in river may have a negative effect if not properly monitored and licenced. The Lower Thames Gravels groundwater body is hydraulically connected to the Thames River and might be affected by the increased abstraction. WFD assessment states possible loss of river depth due to abstraction at low flows. A scheme to provide compensatory flows will need instigating. Without this the Environment Agency are unlikely to license.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	WFD assessment identifies further investigation required.	-1	-2	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected. WFD assessment states following best construction practice should mean any impacts are small, temporary and localised. During operation, WFD assessment states possible loss of recharge at time of low hydraulic heads depending on the connection to groundwater. Investigation may be required to confirm no deterioration.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Appropriate licensing and HOF will be required. WFD assessment identifies further investigation required – confirm with discussions with Thames Water that a compensation scheme can be used with volume to be abstracted.	0	-2	Abstraction may have a negative effect if not properly monitored and licenced. WFD assessment states that without instigation of a scheme to provide compensation flows by Thames Water then a reduction of river flow due to abstraction is anticipated and the Environment Agency are unlikely to license.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.			The new pipeline is within 10m of approximately three Listed Buildings. There is therefore potential for minor negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.12 AFF-RTR-WRZ5-1047

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is a like-for-like trade of water between Affinity Water and Anglian Water. A new 30km 400mm diameter from Braintree to Sibleys Reservoir will be required along with 4 x 75kW pumps to be installed at Braintree. A 10Ml upgrade of Sibleys Reservoir is also required. There may be minor short term negative residual effects during construction on public rights of way and transport corridors which in turn may negatively affect critical infrastructure and services. There may also be negative effects on the High Wood SSSI from construction. Surface water bodies might be affected during construction where the pipeline crosses river beds. There will be likely to be significantly negative impacts on heritage assets due to their proximity to the proposed route. The route may also travel through grade 2 agricultural land. This option should provide positive impacts in terms of Affinity Water's resilience to climate change. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience. The pipeline crosses several river channels whose hydro morphology could potentially be impacted.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts on navigability of rivers or covered reservoir.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is anticipated that any impacts from installation of new main would have minor impacts during construction and no lasting impacts during operation. It is anticipated that these changes would not be perceived by recreational users.	
	2c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires a new 30km 400mm diameter pipeline from Braintree to Sibleys Reservoir. This crosses numerous footpaths along its length, including Harcamlow Way. It may cause short term disruption along public rights of way during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated route of the new main follows roads for the majority of its course. Minor impacts on congestion are therefore anticipated. It follows numerous strategic transport infrastructure routes including the A120 and numerous B roads. Construction traffic is not anticipated to be sufficiently concentrated in any one area such that impacts would be significant	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

										delivery of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	The option requires a new 30km 400mm diameter pipeline from Braintree to Sibleys Reservoir along with 4 x 75kW pumps to be installed at Braintree. This will require construction of new assets.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	?	?	?	?	?	Local	Moderate	If using undeveloped land, minor adjustments to the route to previously developed land	-1	0	Potential impact of land take dependent on width of construction corridor - if not using previously developed land on Unfavourable - no change SSSI - High Wood which is adjacent to the pipeline route,	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	?	?	?	?	?	?	?	Low	N/A	-1	0	Potential land take, disturbance and changes in hydrology, dependent on width of construction corridor - if not using previously developed land for habitats. Cannot know presence of species without detailed ecological surveys	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	-1	0	WFD assessment identifies potential impact to watercourse during construction, however following best construction practices should mean any impacts are small, temporary and localised. Height of pipework crossing in relation to river levels is unclear at this stage. WFD assessment concludes no likely impact to hydromorphology during operation – assuming pipework is above water level.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best construction practice.	0	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Abstraction not dealt in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of	0

														hardstanding within the option location.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-2	0	The new transfer route is within 50m of a Scheduled Monument and Registered Park and Garden as well as within 50m of a significant number of Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.13 AFF-RTR-WRZ1-1066

(In the Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is the cascade of water from the Severn Trent Minworth Sewerage Treatment Plant via the Grand Union Canal for abstraction at Hemel Hempstead. From here raw water would be transferred to a new Boxted Treatment Works for treatment and ultimately storage in an expanded Boxted Reservoir. The increase will provide an additional 50 Ml/d during both peak and average conditions for use within WRZ1 and potential onwards transfer into WRZ2 or WRZ3. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, and road infrastructure. Key issues during operation relate to potential long-term effects on the landscape and on surface and groundwater levels and flows.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a minor positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is expected that the River Grand Union Canal is well used by water craft. This option is not expected to have an impact on this.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The anticipated levels (minor significant impact at construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The Grand Union Canal is accessible to water craft. This scheme is not anticipated to cause impacts to this access.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option will require a new raw water intake, 4 x 315 kW booster pumps, a new treatment works, a 50 Ml reservoir capacity upgrade, a new 4 x 37 kW booster pump set and 2.9 km of new 800 mm diameter transfer main.	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5–25 years)	Temporary	Temporary	Local	High	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative	

						and Long term >25 years							effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required	0	0	The Option is 1.0km from Little Heath Pit SSSI. The site's Plio-Pleistocene deposits of Little Heath Pit are thought to be amongst the earliest "plateau deposits" preserved in Britain. The site is in favourable condition. Due to the distance and the nature of the SSSI, no effects are anticipated.	
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5–25 years) and Long term >25 years	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option involves moving water between the Grand Union Canal and Boxsted Reservoir and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route and new WTW but this is uncertain at this stage. Potential for water quality changes and subsequent loss of suitable habitat. Mitigation could include monitoring water levels to inform the use of Hands off Flow conditions/ restrict release of water to maintain suitable water levels for the river habitats and associated species they support. Potential for acoustic, light and dust disturbance during construction. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The pipeline is 296m from a parcel of ancient woodland. The pipeline also passes adjacent to three parcels of BAP Priority habitat deciduous woodland, and is within 300m of four additional parcels of this habitat. The proposed new treatment works is adjacent to one parcel of BAP Priority habitat deciduous woodland, and is 65m from a parcel of BAP Priority habitat traditional orchard. There is the potential for disturbance (through noise, light, dust etc.) to BAP Priority habitats during construction. A CEMP should be in place and ecological surveys are required. The abstraction and installation of pumps has the potential to affect river habitats and associated species, through disturbance (light, noise, pollution etc.) and changes in water quality. This has the potential to occur during construction. A CEMP should be in place during construction and ecological surveys are required. Assuming standard practices to prevent entrapment of river species during abstraction are implemented, no operational effect is anticipated.	-1
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, treatment works, and reservoir. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	High	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Permanent	Regional	High	A landscape impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. New structures (such as new treatment works and reservoir upgrade) should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase.	-2	-1	There are likely to be moderate negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect of the new treatment works and visible infrastructure during operational phase. It should be noted that the Chilterns AONB is approximately 600m from this option. At this stage it is not clear if there are any significant views from the AONB to the new visible infrastructure.	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	There is the potential for minor negative effects during construction, but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment found that this option would have no impact in terms of hydromorphological status. The Grand Union Canal is an artificial water body and therefore will not be affected.	-2
	10.b. Improve water treatment and water quality before it	High	High	Short term (> 5 years)	Medium term (5–25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river	-1	-2	Potential impact to the Grand Union Canal during construction. During operation, the WFD assessment identifies that abstraction	

	returns to surface water bodies?					and Long term >25 years				environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. In terms of operational impacts, further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. As a result it is recommended that the water levels in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body are monitored.			has the potential for a reduction in water quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body with lower water levels and flows. This has potential to cause deterioration in status if not managed.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Low	Further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. As a result it is recommended that the water levels in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body are monitored.	0	-2	During operation, the WFD assessment identifies that abstraction has the potential for a reduction in water quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body with lower water levels and flows. This has potential to cause deterioration in status if not managed.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	It should be taken into consideration preventative measures to ensure water quality is not compromised during the construction of the reservoir treatment works.	0	0	Potential for negative impact effect during construction of reservoir treatment works where located on Mid Chilterns Chalk groundwater body but appropriate mitigation should ensure residual effects are neutral. The WFD assessment found that this option will not increase the risk of saline or other intrusions.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Low	Further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. As a result it is recommended that the water levels in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body are monitored.	0	-2	The WFD assessment identifies that abstraction has the potential for a reduction in water quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body with lower water levels and flows. This has potential to cause deterioration in status if not managed.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures to be explored further at the detailed design stage and be set out in any applications for Flood Defence Consents where these are required for any river construction works.	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	Listed building just over 200m from the new treatment works and expanded reservoir. There are three listed buildings within 90m of the new pipeline. Potential for a minor negative effect during construction of the new visible infrastructure and pipeline.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected by this scheme.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

1.2.1.14 AFF-RTR-WRZ3-1067

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option requires an new 50 Ml service reservoir at Sundon, a new pumping station from Sundon WTW to the service reservoir (4 x 30 kW Booster Pumps) and new booster pumps for transfer to Preston Reservoir (4 x 55 kW) and 27.1 km of new 800 mm diameter transfer main from Sundon WTW to Bulls Green Reservoir. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. It is anticipated that works traffic will be timed to avoid congestion impacts. There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines. The option will temporarily result in higher levels of waste production. The new pipeline route and service reservoir at Sundon is located 750m away from Smithcombe, Starpenhoe & Sundon Hills SSSI and is 300m away from Galley & Warden Hills SSSI which is also designated as a Local Nature Reserve (LNR). Wain Wood SSSI is also 300m from the proposed pipeline route. The pipeline route also passes adjacent to Knebworth Woods SSSI. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint, although currently this is not expected to be a significant increase. The pipeline also passes 600m from Mardley Heath LNR. There is the potential for disturbance (through noise, light, dust etc.) to designated sites within approximately 500m during construction. The proposed pipeline	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. It is anticipated that works traffic will be timed to avoid congestion impacts. Well used roads will be affected by the scheme: A1 0.1(km), B197 0.1, B656 3.1, B651 0.1, A505 0.1, A6 0.1, Unclassified 3.4.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	passes through BAP Priority habitat of deciduous woodland including woodland at Haycock Spinney, Icknield Way, and at Bulls Green Reservoir. Bulls Green Reservoir is also adjacent to BAP Priority habitat deciduous woodland to the north and east, which may be lost depending on the direction of the expansion. The pipeline also passes within approximately 100m of several other parcels of BAP Priority habitat, including deciduous woodland and traditional orchard habitats. New visible infrastructure within the Chilterns AONB. Potential for a moderate negative effect during construction of the new infrastructure. Potential for a minor negative effect during operation once mitigation it taken into account.	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	This scheme requires an new 50 Ml service reservoir at Sundon, a new pumping station from Sundon WTW to the service reservoir (4 x 30 kW Booster Pumps) and new booster pumps for transfer to Preston Reservoir (4 x 55 kW) and 27.1 km of new 800 mm diameter transfer main from Sundon WTW to Bulls Green Reservoir.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option proposes a transfer of raw water supplied by Anglian Water and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction.	-1	0	The proposed pipeline passes through BAP Priority habitat of deciduous woodland including woodland at Haycock Spinney, Icknield Way, and at Bulls Green Reservoir. Bulls Green Reservoir is also adjacent to BAP Priority habitat deciduous woodland to the north and east, which may be lost depending on the direction of the expansion. The pipeline also passes within approximately 100m of several other parcels of BAP Priority habitat, including deciduous woodland and traditional orchard habitats. The pipeline route passes adjacent to seven parcels of Ancient Woodland, and within approximately 100m of approximately five additional Ancient Woodland parcels. The pipeline crosses a ditch to the north-west of Bulls Green Reservoir. The Option potentially passes through hedgerow habitats. The loss of notable habitat should be avoided if possible. If unavoidable, compensatory habitat is likely to be required. There is the potential for disturbance (through noise, light, dust etc.) to BAP Priority habitats during construction, a CEMP should be implemented during construction and ecological surveys are required.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new infrastructure. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Medium	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Regional	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to	-3	-1	This option requires the construction of new infrastructure within the Chilterns AONB. During construction there is the potential for a major negative effect. However, once mitigation is taken into account, including appropriate screening and the burying of the new main, it is predicted that there will be a residual minor negative effect during operation.	-1

										the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.				
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	N/A	Construction and operation activities should follow sustainable design principles.	-2	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Pipeline option does not cross any water bodies	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No treatment covered in option	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No abstraction within option	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No aquifers affected by option	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No abstraction within option	0

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	The new pipeline is within 10m of a significant number of Listed Buildings and passes close to two Registered Parks and Gardens. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. The new pipeline is within 10m of a significant number of Listed Buildings and passes close to two Registered Parks and Gardens. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.2.1.15 AFF-RTR-WRZ6-1094

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	No new infrastructure is required with this scheme as it is a reduction to the existing treated water export that will only involve decommission. Abstraction is not dealt in this scheme. No HRA implications identified as existing infrastructure will be used for the reduction to the existing treated water export Egham to South East Water at Surrey Hills. However, if abstraction is required to support this option under another scheme/ option, in combination HRA may be required. There are no other anticipated impacts as no infrastructure change.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found the following: The existing water export is located 1.2km from Thursley, Ash, Pirbright & Chobham SAC and 1.4km from South West London Waterbodies SPA and Ramsar Site. As this Option uses existing infrastructure, there is assumed to be no impact from this Option on	?

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A - existing infrastructure to be used for used for the reduction to the existing treated water export Egham to South East Water at Surrey Hills.	0	0	the European designated sites. However, if increased abstraction is required to support this Option under another scheme, an in-combination assessment may be required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A - existing infrastructure to be used for used for the reduction to the existing treated water export Egham to South East Water at Surrey Hills.	0	0	N/A - existing infrastructure to be used for used for the reduction to the existing treated water export Egham to South East Water at Surrey Hills.	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - existing infrastructure to be used for used for the reduction to the existing treated water export Egham to South East Water at Surrey Hills.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is a reduction of an existing treated water export supply - there is no new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is a reduction of an existing treated water export supply - there is no new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is a reduction of an existing treated water export supply - there is no new infrastructure required. Therefore, no AQMAs will be affected.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme will not result in an increase in energy use.	
	8.b. Maximise the company's resilience to a changing climate?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0

10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0
	10.b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impacts as no infrastructure change.	0

1.2.1.16 AFF-RTR-WRZ7-0639

(In the Aspirational, Expected, High Growth, Supply-side Challenging, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Affinity Water South East currently has an agreement with Southern Water for the import of up to 4Ml/d via the Deal Connection. This scheme is a continuation of the existing agreement beyond 2020 to continue the average import of 0.0714Ml/d up to 4Ml/d when required. No new infrastructure is required for this scheme. No key issues identified during construction or operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.74Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	5.c. Impact on non-native species?		?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	5.e. Provide opportunities for biodiversity enhancement?		?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	8.b. Maximise the company's resilience to a changing climate?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	10.b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0

1.2.1.17 AFF-RTR-WRZ7-0909

(In the Aspirational, Expected, High Growth, Supply-side Challenging, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Affinity Water South East currently has an agreement with South East Water for the import of 2Ml/d via the Barham connection. This scheme is a continuation of the existing agreement beyond 2019/20 to continue the import of up to 2Ml/d. No new infrastructure is required for this scheme. The scheme will continue to provide 2Ml/d during both peak and average conditions for use within WRZ7. No key issues identified during construction or operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	5.c. Impact on non-native species?		?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	5.e. Provide opportunities for biodiversity enhancement?		?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	8.b. Maximise the company's resilience to a changing climate?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
	10.b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure. No anticipated impact.	0

1.2.1.18 AFF-RTR-WRZ7-0301

(In the Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	An agreement between Affinity Water and South East Water exists for the import of 2 Ml/d via the Barham Interconnection Point. This scheme is the increase of this import by 2 Ml/d to a total of 4 Ml/d for transfer to Chalksole Reservoir. This scheme will require a 2 Ml upgrade of Chalksole Service Reservoir where water will be distributed into the Chalksole Supply Zone. The scheme will provide a 2Ml/d benefit during both peak and average conditions for use within WRZ7. Key issues during construction phase relate to the delivery of new/upgraded infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape and the historic environment. Key issues during operation relate to potential long-term effects on the landscape.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reservoir site assumed inaccessible to the public (no public rights of way or public facilities in site footprint).	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reservoir site assumed inaccessible to the public (no public rights of way or public facilities in site footprint).	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Works anticipated to occur on existing site with no public access.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Works anticipated to occur on existing site with no public access.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	It is assumed that the upgrade to Chalksole Green reservoir will result in the provision of a similar structure to the existing reservoir (i.e. above ground concrete tank structure) but expanded outwards to increase capacity.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction.	0	0	Chalksole Green Service Reservoir is located 590m south east of Lydden and Swingfield Woods SSSI. This SSSI comprises several woodlands situated on the steep slopes of dry chalk valleys. A number of uncommon plants occur including lady orchid *Orchis purpurea* in the woods and burnt orchid *Orchis ustulata* in the grassland. The site is in favorable and unfavourable – recovering condition. The option has the potential for noise, light and dust disturbance during the construction phase. However due to the distance from the site it is not anticipated that the option will significantly impact upon the SSSI.	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option is a raw water transfer and therefore has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	Low	There is likely to be significant loss of ancient deciduous woodland BAP Priority Habitat for the expansion of the reservoir. Loss of notable BAP Priority Habitat should be avoided if possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the reservoir, but this is uncertain at this stage. Detailed ecological surveys required. A CEMP should be implemented during construction.	-2	0	Chalksole Green Service Reservoir is surrounded by ancient deciduous woodland Priority Habitat which is also listed as Ancient and Semi-Natural Woodland. There is potential for works to result in considerable loss of habitat. Potential indirect impacts include acoustic, light and dust disturbance during construction.	

	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the reservoir. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	Medium	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures (such as the above ground concrete tank structure associated with the reservoir upgrade) should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase. More detailed mitigation measures should be set out at the detailed design stage.	-2	-1	The option requires an upgrade to Chalksole Service Reservoir. This will result in the provision of a similar structure to the existing reservoir (i.e. above ground concrete tank structure) but expanded outwards to increase capacity. The site is located within the Kent Downs AONB, and the expansion of the reservoir has the potential for a moderate negative effect during construction and a residual minor negative effect during operation.	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given the scale of the scheme and that it is not within any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	-1
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity and transfer supply, this option should result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A No WFD assessment required.	0

	removal of artificial structures or channel modifications?														
	10.b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	There are two listed buildings approximately 200m from the reservoir upgrade site. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected by this scheme.		
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0	

1.2.1.20 AFF-RTR-WRZ4-1029

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d equates to a minor positive effect. Because this is a contractual agreement for an inter-company water transfer with the use of existing infrastructure, there are no other effects predicated.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	

	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
	10.b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This is a contractual agreement for an inter-company water transfer with the use of existing infrastructure.	0

1.2.1.21 AFF-RTR-WRZ1-4020

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is the cascade of water from the Severn Trent Minworth Sewerage Treatment Plant via the Grand Union Canal for abstraction at Hemel Hempstead. From here raw water would be transferred to a new Boxted Treatment Works for treatment and ultimately storage in an expanded Boxted Reservoir. The increase will provide an additional 50 Ml/d during both peak and average conditions for use within WRZ1 and potential onwards transfer into WRZ2 or WRZ3. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, and road infrastructure. Key issues during operation relate to potential long-term effects on the landscape and on surface and groundwater levels and flows.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 100 Ml/d equates to a major positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is expected that the River Grand Union Canal is well used by water craft. This option is not expected to have an impact on this.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The anticipated levels (minor significant impact at construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The Grand Union Canal is accessible to water craft. This scheme is not anticipated to cause impacts to this access.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option will require a new raw water intake, 4 x 315 kW booster pumps, a new treatment works, a 100 Ml reservoir capacity upgrade, a new 4 x 37 kW booster pump set, 2.8km of new 1200mm main, and 100m of new 800 mm main.	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5–25 years) and Long term >25	Temporary	Temporary	Local	High	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	

					years										
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required	0	0	The Option is 2.5km from Chilterns Beechwoods SAC. However, due to this distance and the nature of the SAC, no effects are anticipated.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required	0	0	The Option is 1.0km from Little Heath Pit SSSI. The site's Plio-Pleistocene deposits of Little Heath Pit are thought to be amongst the earliest "plateau deposits" preserved in Britain. The site is in favourable condition. Due to the distance and the nature of the SSSI, no effects are anticipated.	
	5.c. Impact on non-native species?	?	Moderate	?	Medium term (5–25 years) and Long term >25 years	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option involves abstracting from the Grand Union Canal at Hemel Hempstead and transferred to Boxted Reservoir, and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route and new WTW but this is uncertain at this stage. Potential for water quality changes and subsequent loss of suitable habitat. Mitigation could include monitoring water levels to inform the use of Hands off Flow conditions/ restrict release of water to maintain suitable water levels for the river habitats and associated species they support. Potential for acoustic, light and dust disturbance during construction. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The pipeline is 296m from a parcel of ancient woodland. The pipeline also passes adjacent to three parcels of BAP Priority habitat deciduous woodland, and is within 300m of four additional parcels of this habitat. The proposed new treatment works is adjacent to one parcel of BAP Priority habitat deciduous woodland, and is 65m from a parcel of BAP Priority habitat traditional orchard. There is the potential for disturbance (through noise, light, dust etc.) to BAP Priority habitats during construction. A CEMP should be in place and ecological surveys are required. The abstraction and installation of pumps has the potential to affect river habitats and associated species, through disturbance (light, noise, pollution etc.) and changes in water quality. This has the potential to occur during construction. A CEMP should be in place during construction and ecological surveys are required. Assuming standard practices to prevent entrapment of river species during abstraction are implemented, no operational effect is anticipated.	-1
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, treatment works, and reservoir. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are	

													explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	High	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Permanent	Regional	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures (such as new treatment works and reservoir upgrade) should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase.	-2	-1	There are likely to be moderate negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect of the new treatment works and visible infrastructure during operational phase. It should be noted that the Chilterns AONB is approximately 600m from this option. At this stage it is not clear if there are any significant views from the AONB to the new visible infrastructure.	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	There is the potential for minor negative effects during construction, but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Permanent	Permanent	National	N/A	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. This option is likely to increase the continuity of supply and should therefore result in positive effects on the resilience of Affinity Waters climate change resilience.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1

10. Protect and improve surface and groundwater body status?	10.a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment found that this option would have no impact in terms of hydromorphological status. The Grand Union Canal is an artificial water body and therefore will not be affected.	-2
	10.b. Improve water treatment and water quality before it returns to surface water bodies?		High	High	Short term (> 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. In terms of operational impacts, further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. As a result it is recommended that the water levels in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body are monitored.	-1	-2	Potential impact to the Grand Union Canal during construction. During operation, the WFD assessment identifies that abstraction has the potential for a reduction in water quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body with lower water levels and flows. This has potential to cause deterioration in status if not managed.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Low	Further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. As a result it is recommended that the water levels in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body are monitored.	0	-2	The WFD assessment identifies that abstraction has the potential for a reduction in water quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body with lower water levels and flows. This has potential to cause deterioration in status if not managed.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	It should be taken into consideration preventative measures to ensure water quality is not compromised during the construction of the reservoir treatment works.	0	0	Potential for negative impact effect during construction of reservoir treatment works where located on Mid Chilterns Chalk groundwater body but appropriate mitigation should ensure residual effects are neutral. The WFD assessment found that this option will not increase the risk of saline or other intrusions.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Low	Further investigative work and detailed assessments are likely to be required to determine the likelihood and significance of effects along with suitable mitigation measures. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. As a result it is recommended that the water levels in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body are monitored.	0	-2	The WFD assessment identifies that abstraction has the potential for a reduction in water quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body with lower water levels and flows. This has potential to cause deterioration in status if not managed.	-2

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures to be explored further at the detailed design stage and be set out in any applications for Flood Defence Consents where these are required for any river construction works.	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency) However re-instatement measures should avoid any loss of useable floodplain and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	Listed building just over 200m from the new treatment works and expanded reservoir. There are three listed buildings within 90m of the new pipeline. Potential for a minor negative effect during construction of the new visible infrastructure and pipeline.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected by this scheme.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

1.2.1.22 AFF-RTR-WRZ1-4010

(In the Aspirational, Expected, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Harefield Treatment Works (Option AFF-NTW-WRZ1-1011) and then transfer by a new main for storage at Harefield Reservoir. Water will be discharged from a new South East Strategic Reservoir for subsequent re-abstraction downstream from the River Thames at Sunnymead. The increased abstraction will provide an additional 50 Ml/d during both peak and average conditions for use within WRZ1. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, agricultural land, surface and groundwater body status, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on biodiversity, the landscape and historic environment.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	2	It is assumed that the new raw water reservoir will be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities. SEA work carried out for Thames Water rdWRMP19 states that mitigation proposed includes recreational facilities including a visitor centre with facilities to accommodate schools study centre; outdoor educational water science park; heritage/ archaeological centre; dedicated school study centre with a focus on wildlife and nature; water garden; water feature (major fountain); water sports club house and associated facilities (pier, slipway, boat park); land based formal outdoor sports areas; car park provision for informal recreation; events area; passenger ferry; coarse game fishing and angling; cycle hire; equestrian centre and associated bridleways; artists' studio and sculptures; lagoons and coves; woodland & scrub / grassland areas. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1

	2.b. Alter water levels that affect water-based recreation assets?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	SEA work carried out for Thames Water rdWRMP19 states that releases from the reservoir will be regulated.	0	-1	SEA work carried out for Thames Water rdWRMP19 states that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. However, there may be adverse effects on navigation and associated businesses, although releases from the reservoir will be regulated. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	High	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-2	1	SEA work carried out for Thames Water rdWRMP19 states that the delivery of the new reservoir will cause disruption to public rights of way during the construction period (9.1 years). The Thames Water SEA concludes major adverse effects during the construction phase. The Thames Water SEA however also identifies that there is also the potential creation of a visitor centre to provide information about water provision, in addition to the provision of recreational facilities such as footpaths and boating facilities that would improve health and well-being. Major beneficial effects anticipated during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	High	Medium term (5 - 25 years)	Medium term (5- 25 years) and long term (> 25 years)	Temporary	Permeant	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	-1	The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. However, the construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. SEA work carried out for Thames Water rdWRMP19 states that adverse impacts are anticipated during construction of the new reservoir. This is as a result of the HGV movements (estimated at some 23,700 HGVs over the 9.1 year construction period). The Thames Water SEA further states that adverse effects during operation will include an increase in traffic in the local area -for maintenance works and the car movements associated with potential visitors. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

										of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	High	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-3	0	This option will require 4 x 315 kW Intake Pumps, 4 x 110 kW Booster Pumps, 23.4 km of 800 mm Diameter Main, 2 x 65 m3 Surge Vessels, 1 x 5 m3 Surge Vessel, 1 x 800 mm Pressure Sustaining Valve and the construction of a new raw water reservoir (Thames Water). In terms of demolition of assets, there will be a small number of commercial properties and household properties that will have to be demolished to build the reservoir.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	High	Moderate	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	National	High	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. It is recommended through Affinity Water's HRA (2019) for the rdWRMP19 that the inclusion of this option within the WRMP is accompanied by an explicit commitment to ensure that the programming and construction processes for the new pipeline to the water treatment works as part of this scheme take into account the proximity of the South West London Waterbodies SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA/Ramsar site are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. It is recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline to the treatment works, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. With these recommendations included, it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option.	-2	-1	The pipeline that will lie within the Affinity Water supply area is adjacent to a section of the South West London Waterbodies Ramsar and SPA. This European site is designated for its internationally important wintering populations of gadwall and shoveler. The birds frequently move between waterbodies (for example in response to disturbance) such that the entire complex is of importance although average bird numbers on some waterbodies are much lower than on others. The interest features of the SPA/Ramsar site are therefore sensitive to noise and visual disturbance during the period October to March inclusive. This impact cannot be investigated in more detail for this assessment as it would require details of the scheme design and construction methods, including noise estimates for construction plant and information on the number of construction workers and duration of the construction period. However, there is a high degree of confidence that adverse effects on the integrity of the SPA/Ramsar site through disturbance can be avoided: In addition to the low risk of noise-related disturbance the flooded gravel pits (including Wraysbury No. 1) are obviously in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline there is thus potential for changes in hydrology and water quality within the SPA and Ramsar site. It is very likely that the pipeline will be installed relatively shallowly and thus be well above the water table. With the recommendations identified by the HRA (2019) of the rdWRMP19 (discussed left), it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option.	-1

														This Option includes Thames Water and Affinity Water jointly developing the South East Strategic Reservoir . The HRA of the rdWRMP has concluded that the South East Strategic Reservoir Option is not likely to have any significant effects on any European sites.
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Moderate	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Potential for water quality changes and subsequent loss of suitable habitat. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction licence and environmental permit conditions for this scheme. Detailed ecological surveys required. The loss of BAP Priority habitat and species should be avoided where possible. Where this isn't possible, the loss of habitats and species would need to be mitigated for through licensing and compensation. A CEMP should be in place. The Thames Water SEA for the rdWRMP19 states that construction of the reservoir and associated abstraction and discharge facilities will be managed by best construction practices to mitigate effects due to construction including identification of suitable traffic routes. Construction mitigation measures will also be in the form of extensive vegetation planting around the reservoir margin as well as compensatory measures to enhance lower quality habitat in the vicinity of the reservoir to replace lost habitat will be developed in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities. Where applicable, and depending on updated bird surveys to be carried out as part of the detailed design of the scheme, these measures may be developed in advance of reservoir construction so as to minimise effects on identified bird species. Once constructed and filled, the reservoir water body itself which will provide new habitat for waders and waterfowl. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/compensation measures have established. The assessment of this scheme through Affinity Water's rdWRMP19	-2	-1	The re-abstraction point from the River Thames at Sunnymeads is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline to the water treatment works passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. The pipeline also passes 14m and 79m from two parcels of ancient woodland east of Chandlers Hill, 52m from ancient woodland at Ruislip Woods, adjacent to French Grove and Battlers Wells Wood ancient woodland and 88m from ancient woodland north of French Grove. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. The increase in abstraction and installation of pumps has the potential to affect river habitats and associated species, through disturbance (light, noise etc.) and change in water quality. The pipeline passes adjacent to houses, through residential areas. These have the potential to support roosting bats or nesting birds. There is the potential for species associated with the SPA and Ramsar to be affected. SEA work carried out for Thames Water rdWRMP19 states that the construction of the reservoir and associated abstraction and discharge facilities will result in the loss of non-designated terrestrial (priority habitats) during the 9.1 year construction period and the initial operational phases. This will lead to moderate adverse effects. Construction will be managed by best construction practices to mitigate effects due to construction including identification of suitable traffic routes. The WFD assessment concludes that construction impacts will not cause deterioration of the WFD water bodies. The Thames Water SEA highlights that during operation, the WFD assessment identifies that the habitat types most at risk during operation are the weir pools in the

										has not identified any additional or further mitigation.			River Thames due to the potential change in their level and flow regime. Overall it is expected that the ecological status will remain the same with flows regulated and discharges subject to licensing from the Environment Agency. The provision of three drawdown towers will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. Further assessment of the water quality of the releases is required and therefore low certainty but it is expected that any water quality impacts relating to temperature or deployable output (DO) issues can be mitigated. The Thames Water SEA further states that discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency and is not expected to have an adverse impact on water quality or ecology. The regulated reservoir releases could also provide a benefit to aquatic ecosystems during times of low flow. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option will result in the transfer of water from a reservoir to surface water, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	Moderate	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible and ensure an appropriate buffer between any new infrastructure. In practice impacts of the pipeline to the water treatment works can be avoided through careful design and construction, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that water levels and quality would be protected. This would need to be developed further during detailed scheme design. There are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be	-2	-1	The pipeline to the water treatment works that will lie within the Affinity Water supply area is adjacent to a section of the South West London Waterbodies Ramsar and SPA and Ramsar site (discussed under objective 5.a), which is also designated as Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall *Anas Strepera*. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the Sunnymeads re-abstraction point. The pipeline to the water treatment works is 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. Wraysbury & Hythe End Gravel Pits supports nationally important numbers of three species of wintering wildfowl together with an important assemblage of	

											timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. SEA work carried out for Thames Water states that construction mitigation measures for the reservoir and associated abstraction and discharge facilities will also be in the form of extensive vegetation planting around the reservoir margin as well as compensatory measures to enhance lower quality habitat in the vicinity of the reservoir to replace lost habitat will be developed in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities. Where applicable, and depending on updated bird surveys to be carried out as part of the detailed design of the scheme, these measures may be developed in advance of reservoir construction so as to minimise effects on identified bird species. Once constructed and filled, the reservoir water body itself which will provide new habitat for waders and waterfowl. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/compensation measures have established.			breeding birds associated with open waters and wetland habitats. In addition the site supports two nationally scarce invertebrates and a number of locally uncommon plants. Wraysbury Reservoir SSSI supports nationally important numbers of wintering cormorant *Phalacrocorax carbo*, great crested grebe *Podiceps cristatus* and shoveler *Anas clypeata*. Both sites are currently in a favourable condition. There is the potential for increased abstraction from the River Thames to affect the hydrology of these sites. This may lead to adverse effects during operation. . The pipeline to the water treatment works is 360m from Kingcup Meadows and Oldhouse Wood SSSI, designated for its intimate mosaic of habitats adjacent to the River Alderbourne, which includes woodland, unimproved pastures and semi and unimproved meadowland. This SSSI is meeting favourable and unfavourable recovering condition status. The pipeline to the water treatment works is 40m from Fray's Farm Meadows LNR and SSSI, designated for being one of the last remaining examples of relatively unimproved wet alluvial grassland in Greater London and the Colne Valley. Approximately 53.3% of this SSSI is in favourable condition, with the remainder unfavourable declining. The unfavourable declining is as a result of dense litter/thatch cover (high cover of graminoids/tall herbs). The vegetation throughout is very dense and under-managed. The pipeline to the water treatment works is 52m from Ruislip Woods NNR and SSSI, designated for its ancient semi-natural woodland, including some of the largest unbroken blocks that remain in Greater London. The SSSI is in favourable and unfavourable – recovering condition status. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs. There is also the potential for disturbance (noise, light, dust etc.) to the sites during construction. In practice any effects on the SSSIs identified above can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that water levels and quality would be protected. This would need to be developed further during detailed scheme design. There are standard dust suppression measures that could be		

													introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. SEA work carried out for Thames Water rdWRMP19 states that there are no designated nature conservation sites within the reservoir site. There are SSSIs and ancient woodland within 1km and 3km, although works are not expected to impact these designations. The Thames Water SEA further highlights that during operation, the WFD assessment identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Overall it is expected that the ecological status will remain the same with flows regulated and discharges subject to licensing from the Environment Agency. The provision of three drawdown towers will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. Further assessment of the water quality of the releases is required and therefore low certainty but it is expected that any water quality impacts relating to temperature or deployable output (DO) issues can be mitigated. The Thames Water SEA states that discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency and is not expected to have an adverse impact on water quality or ecology, including the ecology of Culham Brake SSSI. The regulated reservoir releases could also provide a benefit to aquatic ecosystems during times of low flow. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5-25 years) and long term (> 25 years)	?	Permanent	Regional	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the pipelines and reservoir. SEA work carried out for Thames Water rdWRMP19 states that once constructed and filled, the reservoir water body itself will provide new habitat for waders and waterfowl. It is anticipated that the development of the reservoir offers potential benefits in terms of biodiversity gains through habitat creation, this would comprise of sensitive design and landscape treatment around the

														new reservoir, which would integrate the new feature into the wider landscape through ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/compensation measures have established. Moderate beneficial effects anticipated.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan.. New structures (such as the new reservoir) should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage. New opportunities are to be created for improved access, recreation and amenity provision across the area of the reservoir to reduce adverse effects during the operation phase.	-3	-2	The SEA work carried out for Thames Water rdWRMP19 states that during construction of the South East Strategic Reservoir (Thames Water) there would be extensive disruption to views, visual amenity and landscape character, including the removal of existing landscape features, earthmoving and major construction works. The construction of the new reservoir will also impact the setting of the North Wessex Downs. The Thames Water SEA therefore concludes that the construction of South East Strategic Reservoir is likely to have major negative effects on the landscape during the construction phase. The construction of the pipeline and overhead powerlines will have minor temporary negative effects on the landscape in the short-term during construction. Overall, given the presence of the AONB and its setting, a major negative effect on landscape is anticipated during construction. The pipeline to the water treatment works and overhead powerlines (to be delivered by Affinity Water) would be buried during operation, minimising impacts. The Thames Water SEA states that the new Reservoir ancillary infrastructure would be a prominent new feature in the landscape during operation, with three towers, seen against the visual context of the North Wessex Downs AONB to the south and east. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. Overall, it is concluded by Thames Water SEA and through the assessment of this scheme through Affinity Water's rdWRMP19, that there is the potential for a moderate negative effect during operation. It is recognised that the Thames Water SEA also concludes moderate beneficial effects during operation after the landscaping has matured. However this is not considered under this SEA	-2

													Objective and is subsequently addressed under SEA Objective 6.b. .	
	6.b. Provide opportunities for landscape enhancement?		?	High	?	Medium term (5-25 years) and long term (> 25 years)	?	Permanent	Regional	Moderate	N/A	?	2	SEA work carried out for Thames Water rdWRMP19 states that the scheme presents opportunities for landscape enhancements and improvements in relation to the new reservoir. Specific mitigation measures and enhancements will be developed in the detailed design stages, in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities and further engagement with stakeholders will be undertaken as part of the development of this option. The Thames Water SEA assessment recognises the AONB and its setting and acknowledges the landscape impact of the proposed scheme and potential benefits and enhancements. Further detailed assessment work will be undertaken as part of an application for development consent. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	Moderate	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. A railway siding is also proposed for delivery of construction materials to the new reservoir site.	-2	-1	Affinity Water's pipeline to the water treatment works is located within Hillingdon AQMA. The SEA work carried out for Thames Water rdWRMP19 states that the works for the new reservoir are in close proximity to Abingdon and Marcham AQMAs. Therefore moderate negative effects on air quality in the short-term during construction are anticipated. The construction of the pipeline to the treatment works and South East Strategic Reservoir (and associated abstraction and discharge facilities) is likely to result in increased traffic in localised areas. The Thames Water SEA states that this is due to the anticipated large number of deliveries by HGVs (23,700 HGV movements over 9.1 years). This has the potential to increase the levels of atmospheric pollution from vehicles. Additionally, the construction phase will result in increased emissions from rail freight	-1

														and an energy requirement of 11,000MWh. Mitigation measures include the development of railway siding to deliver materials by rail to reduce HGV movements and traffic management measures such as avoiding HGV movements during peak traffic periods on local roads. The Thames Water SEA identifies adverse impacts during operation of the reservoir due to emissions from maintenance vehicles and visitor vehicles and an annual energy requirement for the reservoir air diffusers of 2,350MWh. Mitigation measures include control of dust through dampening haul roads and earthworks and aggregate processing plant (standard good practice for large construction sites). Residual minor negative effect is therefore anticipated during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles. Energy efficient pumps should be adopted to reduce the carbon footprint of the operation process.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5-25 years) and long term (> 25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the water transfer and reservoir storage capacity, this option should result in positive effects on the resilience of the local environment and Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5-25 years) and long term (> 25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	This option could have negative effects on SSSIs and crosses several surface water bodies.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Temporary	Local	Low	WFD assessment states that the implementation of CoCP and Best Practice Measures during construction and operation will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. No deterioration of status anticipated. SEA for Thames Water states that further mitigation measures will be set out in any applications for Flood Defence Consents where these are required for any river construction works. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	-1	-1	The SEA work carried out for Thames Water's rdWRMP19 states that there are no significant surface water dependant features in the area. However, construction of the reservoir will involve the removal and rerouting of several small watercourses, locally unique geomorphological features including the larger East Hanney and West Hanney Ditches and removal of the remnant's of the Wilts and Berks Canal. Plans assume that the rivers will be rerouted and restored and the canal may be regenerated. Temporary impacts due to construction would not cause any deterioration and any diversions of watercourses are to be agreed with the Environment Agency to ensure no deterioration of status and no	-1

													adverse effects on river environment, with opportunities to enhance the water environment as part of the watercourse diversion works. The Thames Water SEA further states that no impacts to groundwater are anticipated from the construction of the reservoir as the underlying bedrock, on the whole, is not classed as an aquifer. It is noted that the Corallian Group aquifer is at depth in this location and potential impacts of the additional mass of water in the reservoir on this deeper aquifer will be subject to further investigation during the detailed design process. There may be some localised dewatering of superficial deposits as the reservoir is dug, although these are unlikely to impact local watercourses or aquifers. During operation, the Thames Water SEA for the rdWRMP19 refers to the WFD assessment, which identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Supplementary work for the WRMP identified that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. Affinity Water's WFD assessment for the rdWRMP19 identifies that this option has the potential for positive benefits on the hydromorphological status of a number of surface water bodies during operation. It also identifies that a reduction of river flow due to abstraction is expected; however, if abstraction at Sunnymeads is managed under the LTOA abstraction regime and supported by releases from the reservoir the abstraction will not lead to any adverse effects on the flow regime downstream of the re-abstraction point and loss of recharge to groundwater should only be minor. Taking a precautionary approach the potential for a minor negative effect has been identified during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		High	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	WFD assessment states that the implementation of CoCP and Best Practice Measures during construction and operation will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. Specifically, the Thames Water SEA for the rdWRMP19 states that	-1	-1	During construction there is potential for impacts to water quality given proximity of watercourses as a result of site run off and pollution. Good practice construction methods will ensure that any impacts are minor, localised and temporary. The WFD assessment found that there would be no water quality change anticipated as water abstracted and discharged in the

											construction mitigation will include the diversion of watercourses, and adoption of standard good practices to avoid pollution of watercourses and control of earthworks drainage. Consents will be obtained from the Environment Agency for any in river works. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. In terms of operation, the weir will be designed to help mitigate potential impacts on sediment dynamics on the river bed and the potential for erosion of river banks. Thames Water SEA concludes the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.			same water body. However, if water is abstracted during floods it could potentially be contaminated and pollutants released at low flows. SEA work carried out for Thames Water's rdWRMP19 states that water would be abstracted from the river, through fine screens and a manifold situated on the river bank. For draw off purposes, the tower will have three draw off points at different levels and positions within the tower to allow abstraction at different levels. This will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. In addition, the reservoir would be equipped with air mixing diffusers set on the reservoir bed to keep it aerated and minimise water quality issues. Water stored in and released from the reservoir will be subject to regular testing to avoid releasing poor quality water back to the river. Discharges into the river would be by means of a curved concrete stepped gravity weir, approximately 20m long. Further assessment of the water quality of the releases is required but it is expected that any water quality impacts relating to temperature or DO issues can be mitigated. Draw off water discharged back into the river would be of similar water quality to the abstracted water from this reach. The discharge would be subject to consent by the Environment Agency and therefore the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5-25 years) and long term (> 25 years)	N/A	Temporary	Local	Low	Appropriate licensing and HOF will be required. To confirm sustainability of abstraction, progress with pumping tests and further modelling work and if the tests prove no impact, have a time limited licence while collecting monitoring data for review. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction licence and environmental permit conditions for this scheme.	0	-1	Abstraction in river may have a negative effect if not properly monitored and licensed. The Lower Thames Gravels groundwater body is hydraulically connected to the Thames River and has the potential to be affected by the increased abstraction. The SEA work carried out for Thames Water's rdWRMP19 states that the intake and outfall would be a combined structure located on the right bank of the River Thames near to the entrance to the Culham lock cut. Water would be abstracted from the river, through fine screens and a manifold situated on the river bank, into a culvert which drops the water into a shaft. Abstractions to the reservoir would be controlled through licensing conditions to protect low flows. There are no other abstractors at the site which can be impacted by the construction or operation of the scheme. However, the operation of the scheme during dry periods would lessen the pressure on other	

														sources that abstract from more limited water resources that could be under particular pressure at such times. Considering this scheme could provide up to 50 Ml/d for Affinity Water, indirect potential positive effects are anticipated through this scheme. The Affinity Water WFD assessment for the rdWRMP19 found that changes in flow velocities and characteristics may affect water levels.. Neutral effects are considered overall.
10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Medium term (5-25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Temporary	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Mitigation may also include undertaking a borehole integrity check. Make sure headworks are properly sealed to surface water run-off. Specific mitigation should be explored further at the detailed design stage. In terms of operation, the Thames Water SEA for the rdWRMP19 states that the weir will be designed to help mitigate potential impacts on sediment dynamics on the river bed and the potential for erosion of river banks. Thames Water SEA concludes the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	-1	-1	Affinity Water's WFD assessment found that there is the potential for minor negative impacts during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are minor, localised and temporary. It also identified that temporary and localised dewatering may be required along the route of new mains. Abstracted water returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. SEA work carried out for Thames Water's rdWRMP19 states that Water would be abstracted from the river, through fine screens and a manifold situated on the river bank. For draw off purposes, the tower will have three draw off points at different levels and positions within the tower to allow abstraction at different levels. This will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. In addition, the reservoir would be equipped with air mixing diffusers set on the reservoir bed to keep it aerated and minimise water quality issues. Water stored in and released from the reservoir will be subject to regular testing to avoid releasing poor quality water back to the river. Discharges into the river would be by means of a curved concrete stepped gravity weir, approximately 20m long. Further assessment of the water quality of the releases is required but it is expected that any water quality impacts relating to temperature or DO issues can be mitigated. Draw off water discharged back into the river would be of similar water quality to the abstracted water from this reach. The discharge would be subject to consent by the Environment Agency and therefore the risk to deterioration in WFD status is low. Vehicles and chemical/oil storage to be fully bunded to prevent accidental pollution of groundwater or watercourses.

														The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Moderate	Medium term (5-25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Temporary	Regional	Moderate	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction licence and environmental permit conditions for this scheme.	-1	-1	Affinity Water's WFD assessment found that there is the Potential for minor negative impacts effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are minor, localised and temporary. It also identified that temporary and localised dewatering may be required along the route of new mains. Abstracted water returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. Affinity Water's WFD assessment for the rdWRMP19 identifies that this option has the potential for positive benefits on the hydromorphological status of a number of surface water bodies during operation. It also identifies that a reduction of river flow due to abstraction is expected; however, if managed under the LTOA, abstraction should only occur at high flows and loss of recharge to groundwater should only be minor. Taking a precautionary approach the potential for a minor negative effect has been identified during operation. SEA work carried out for Thames Water's rdWRMP19 states that during operation, the WFD assessment identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Supplementary work for the Thames Water WRMP identified that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	High	N/A	Medium term (5-25 years) and long term (> 25 years)	N/A	Permanent	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. The scheme would not affect flood	0	-1	Sections of this option are located within a floodplain area (identified by the Environment Agency). Specifically, SEA work carried out for Thames Water's rdWRMP19 states that construction work for the new reservoir is located within an area of flood risk zone 2 and 3 and will result in the loss of flood plain. This will be mitigated for by provision of flood plain compensation storage in the local area in line with the NPPF requirements to ensure no net loss of flood plain storage.	-1

											storage once operational and the necessary flood plain compensation complete. SEA work carried out for Thames Water's WRMP19 states that flood compensation for loss of flood storage will be provided close to proposed reservoir site. The design has had regard to the area safeguarded for flood risk management, as identified in the local plan. Scheme mitigation includes the provision of 80.9ha flood compensation areas for loss of flood plain, construction good practice and construction area to be sited away from flood areas. In addition it is proposed that earthworks sequencing is undertaken to include cofferdam formation to avoid flooding of the borrow area during construction. During future design development, further work will be needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any potential remaining housing allocations contained in the Local Plan. The assessment of this scheme through Affinity Water's WRMP19 has not identified any additional or further mitigation.			The assessment of this scheme through Affinity Water's WRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. There will be no increase in fluvial flood risk as the scheme will only be operational and making releases when flows in the Thames are low and there is no risk of flooding. Liaison with the Environment Agency has ensured that the Environment Agency's proposed Abingdon Flood Alleviation Scheme will not be compromised by development of the reservoir. In response to representations on Thames Water's rdWRMP19, a technical note (Appendix K of the Statement of Response 2) was produced to review the flood risk associated with the delivery of the SESR. The conclusions of this note do not require any changes to the assessment of this scheme under this SEA objective. The assessment has regard to potential new housing developments allocated in the Vale of White Horse Local Plan 2031. During future design development, further work will be needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any potential remaining housing allocations contained in the Local Plan.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include re-routing the new pipelines to avoid damaging Listed Buildings, Scheduled Monuments and Registered Parks and Gardens, especially those within 10m / working area. Use of complex directional drilling underneath the sites to avoid permanent damage should also be investigated. Additionally mitigation should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the likely archaeological significance of the site, detailed archaeological investigations will be required. This will likely include: • A desk-based assessment, which should include a	-3	-2	The new pipeline to the water treatment works to be delivered by Affinity Water is within 10m of approximately three Listed Buildings. The SEA work carried out for Thames Water rdWRMP19 states that the new South East Strategic Reservoir land acquisition area is within 1km of Scheduled Monuments and Registered Parks and Gardens. There is therefore potential for negative effects during the construction phase. The scheme involves the permanent removal and rerouting of the East Hanney and West Hanney Ditches which are considered to be important historical features in the area. This will directly impact these assets during the construction phase with the potential for a major negative effect. The reservoir site spans several Pleistocene river terraces and the Holocene floodplain area and as a result, the 'overburden' (thought to be c 2 – 5m deep) that overlies the bedrock clays has potential to contain evidence of human activity from the Palaeolithic onwards. The scale of the site means that any evidence preserved will have	-2

											geoarchaeological deposit model, identifying the likely depth and distribution of deposits of archaeological potential across the site for the full Quaternary sequence; as well as an assessment of the potential for Palaeolithic remains. • Preliminary field evaluation (geophysical and borehole survey); • Use of 1 and 2 to target trenches (and deeper test pits) for a further stage of field evaluation; • Targeted excavation during ground reduction of the overburden where archaeology has been identified (alongside strip / map and sample and a watching brief as appropriate).			greater significance, as it will represent archaeological activity and associations at a landscape scale. The scheme is therefore likely to impact on archaeological remains and the archaeological significance of the reservoir site. The bedrock clays will likely be excavated during construction to produce the reservoir and other features within the scheme. This archaeology will likely be destroyed by the excavation. Given the likely significance of the site, detailed archaeological investigations will be required. During operation there are potential negative effects on the visual setting of assets including Listed Buildings, Conservation Areas and the wider landscape. The Thames Water SEA highlights Conservation Areas associated with nearby historic villages including Steventon, East Hanney, Drayton and Marcham. New residential development at Steventon and Drayton will mitigate direct impacts on these Conservation Areas. Potential impacts on the East Hanney Conservation Area are considered more likely during operation due to the proximity of the South East Strategic Reservoir. It is considered through the Thames Water SEA that there is potential for minor negative effects during the operation phase. HE note that the SESR may be visible from the Priory, which is grade II* listed and its rural context is very important. This will need to be considered at the detailed design stage. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.		
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		High	Moderate	Medium term (5 - 25 years)	Medium term (5-25 years) and long term (> 25 years)	Temporary	Permanent	Local	Moderate	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	-2	-1	The SEA work carried out for Thames Water rdWRMP19 identifies that results from previous surveys and excavations of the reservoir site identifies moderate archaeological potential (prehistoric and roman). Archaeological remains will be impacted by the construction of the reservoir. Aggregate use associated with the scheme would place further pressure on the buried archaeological remains present in local deposits of minerals (especially of sand and gravel). The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	High	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route to the water treatment works crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However,	-1

														appropriate re-instatement and mitigation measures should result in this effect being temporary. The SEA work carried out for Thames Water rdWRMP19 states that the provision of a new fully bunded reservoir at Abingdon would result in a large loss of mainly Grade 3 agricultural land. Part of the proposed site area has however already been consented for uses other than agriculture and the Local Plan has the site area designated for reservoir storage. The assessment of this scheme through Affinity Water’s rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	

1.2.1.23 AFF-RTR-WRZ4-4011

(In the Aspirational, Expected, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Iver 2 Water Treatment Works. Water will be discharged from a new South East Strategic Reservoir for subsequent re-abstraction downstream from the River Thames at Sunnymead. The increased abstraction will provide an additional 50 Ml/d during both peak and average conditions for use within WRZ4. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, agricultural land, surface and groundwater body status, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on biodiversity, the landscape and historic environment.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	2	It is assumed that the new raw water reservoir will be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities. SEA work carried out for Thames Water rdWRMP19 states that mitigation proposed includes recreational facilities including a visitor centre with facilities to accommodate schools study centre; outdoor educational water science park; heritage/ archaeological centre; dedicated school study centre with a focus on wildlife and nature; water garden; water feature (major fountain); water sports club house and associated facilities (pier, slipway, boat park); land based formal outdoor sports areas; car park provision for informal recreation; events area; passenger ferry; coarse game fishing and angling; cycle hire; equestrian centre and associated bridleways; artists' studio and sculptures; lagoons and coves; woodland & scrub / grassland areas. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1

	2.b. Alter water levels that affect water-based recreation assets?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	SEA work carried out for Thames Water rdWRMP19 states that releases from the reservoir will be regulated.	0	-1	SEA work carried out for Thames Water rdWRMP19 states that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. However, there may be adverse effects on navigation and associated businesses, although releases from the reservoir will be regulated. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	High	Medium term (5-25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	1	SEA work carried out for Thames Water rdWRMP19 states that the delivery of the new reservoir will cause disruption to public rights of way during the construction period (9.1 years). The Thames Water SEA concludes major adverse effects during the construction phase. The Thames Water SEA however also identifies that there is also the potential creation of a visitor centre to provide information about water provision, in addition to the provision of recreational facilities such as footpaths and boating facilities that would improve health and well being. Major beneficial effects anticipated during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	-1	The anticipated pipeline route, to be delivered by Affinity Water, follows the footprints of several roads and so is anticipated to cause such impacts. However, the construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. The anticipated pipeline route follows the footprints of several roads and so is anticipated to cause such impacts. However, the construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. SEA work carried out for Thames Water rdWRMP19 states that adverse impacts are anticipated during construction of the new reservoir. This is as a result of the HGV movements (estimated at some 23,700 HGVs over the 9.1 year construction period). The Thames Water SEA further states that adverse effects during operation will include an increase in traffic in the local area -for maintenance works and the car	-1

													movements associated with potential visitors. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines and new reservoir.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	High	Medium term (5 - 25 years)		Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-3	0	This option will require 4 x 132 kW Intake booster pumps, 11.1 km of 800 mm Diameter Main, and the construction of a new raw water reservoir (Thames Water). In terms of demolition of assets, there will be a small number of commercial properties and household properties that will have to be demolished to build the reservoir.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. It is recommended through Affinity Water's HRA (2019) for the rdWRMP19 that the inclusion of this option within the WRMP is accompanied by an explicit commitment to ensure that the programming and construction processes for the new pipeline as part of this scheme take into account the proximity of the South West London Waterbodies SPA/ Ramsar site and that construction works on the short section of pipeline adjacent to the SPA/ Ramsar site are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. It is recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth	-2	-1	The pipeline that will lie within the Affinity Water supply area is adjacent to a section of the South West London Waterbodies Ramsar and SPA. This European site is designated for its internationally important wintering populations of gadwall and shoveler. The birds frequently move between waterbodies (for example in response to disturbance) such that the entire complex is of importance although average bird numbers on some waterbodies are much lower than on others. The interest features of the SPA/ Ramsar site are therefore sensitive to noise and visual disturbance during the period October to March inclusive. This impact cannot be investigated in more detail for this assessment as it would require details of the scheme design and construction methods, including noise estimates for construction plant and information on the number of construction workers and duration of the construction period. However, there is a high degree of confidence that adverse effects on the integrity of the SPA/ Ramsar site through disturbance can be avoided: In addition to the low risk of noise-related disturbance the flooded gravel pits (including Wraysbury No. 1) are obviously in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline there is thus potential for changes in hydrology and water quality within the SPA and Ramsar site. It is very likely that the pipeline will be	-1

											and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. With these recommendations included, it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option			installed relatively shallowly and thus be well above the water table. With the recommendations identified by the HRA (2019) of the rdWRMP (discussed left), it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option. This Option includes Thames Water and Affinity Water jointly developing the South East Strategic Reservoir. The HRA of the Thames Water rdWRMP19 concluded that the South East Strategic Reservoir Option is not likely to have any significant effects on any European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Potential for water quality changes and subsequent loss of suitable habitat. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions and associated species they support. Detailed ecological surveys required. The loss of BAP Priority habitat and species should be avoided where possible. Where this isn't possible, the loss of habitats and species would need to be mitigated for through licensing and compensation. A CEMP should be in place. The Thames Water SEA for the rdWRMP19 states that construction of the reservoir and associated abstraction and discharge facilities will be managed by best construction practices to mitigate effects due to construction including identification of suitable traffic routes. Construction mitigation measures will also be in the form of extensive vegetation planting around the reservoir margin as well as compensatory measures	-2	-1	The re-abstraction point from the River Thames at Sunnymeads is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. The increase in abstraction and installation of pumps has the potential to affect river habitats and associated species, through disturbance (light, noise etc.) and change in water quality. The pipeline passes adjacent to houses, through residential areas. These have the potential to support roosting bats or nesting birds. There is the potential for species associated with the SPA and Ramsar to be affected. SEA work carried out for Thames Water rdWRMP19 states that the	

											to enhance lower quality habitat in the vicinity of the reservoir to replace lost habitat will be developed in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities. Where applicable, and depending on updated bird surveys to be carried out as part of the detailed design of the scheme, these measures may be developed in advance of reservoir construction so as to minimise effects on identified bird species. Once constructed and filled, the reservoir water body itself which will provide new habitat for waders and waterfowl. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/ compensation measures have established. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.			construction of the reservoir and associated abstraction and discharge facilities will result in the loss of non-designated terrestrial (priority habitats) during the 9.1 year construction period and the initial operational phases. This will lead to moderate adverse effects. Construction will be managed by best construction practices to mitigate effects due to construction including identification of suitable traffic routes. The WFD assessment concludes that construction impacts will not cause deterioration of the WFD water bodies. The Thames Water SEA highlights that during operation, the WFD assessment identifies that the habitat types most at risk during operation are the weir pools in the River Thames due to the potential change in their level and flow regime. Overall it is expected that the ecological status will remain the same with flows regulated and discharges subject to licensing from the Environment Agency. The provision of three drawdown towers will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. Further assessment of the water quality of the releases is required and therefore low certainty but it is expected that any water quality impacts relating to temperature or deployable output (DO) issues can be mitigated. The Thames Water SEA further states that discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency and is not expected to have an adverse impact on water quality or ecology. The regulated reservoir releases could also provide a benefit to aquatic ecosystems during times of low flow. Thames Water rdWRMP19. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option will result in the transfer of water from a reservoir to surface water, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible and ensure an appropriate buffer between any new infrastructure. In practice impacts of the pipeline can be avoided through careful design and construction, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that water levels and quality would be protected. This would need to be developed further during detailed scheme design. There are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. SEA work carried out for Thames Water states that construction mitigation measures for the reservoir and associated abstraction and discharge facilities will also be in the form of extensive vegetation planting around the reservoir margin as well as compensatory measures to enhance lower quality habitat in the vicinity of the reservoir to replace lost habitat will be developed in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities. Where applicable, and depending on updated bird surveys to be carried out as part of the detailed design of the scheme, these measures may be developed in advance of reservoir construction so as to minimise effects on identified bird species. Once constructed and filled, the reservoir water body itself which will provide new habitat for waders and waterfowl. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/ compensation measures have established.	-2	-1	The pipeline that will lie within the Affinity Water supply area is adjacent to a section of the South West London Waterbodies SPA and Ramsar site (discussed under objective 5.a), which is also designated as Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the Sunnymeads re-abstraction point. The SSSI is currently in a favourable condition. There is the potential for increased abstraction from the River Thames to affect the hydrology of this site. This may lead to adverse effects during operation. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSI. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. In practice any effects on the SSSI can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that water levels and quality would be protected. This would need to be developed further during detailed scheme design. There are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. SEA work carried out for Thames Water rdWRMP19 states that there are no designated nature conservation sites within the reservoir site. There are SSSIs and ancient woodland within 1km and 3km, although works are not expected to impact these designations. The Thames Water SEA further highlights that during operation, the WFD assessment identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Overall it is expected that the ecological status will remain the same with flows regulated and discharges subject to licensing from the Environment Agency. The provision of three drawdown towers will allow the	

													draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. Further assessment of the water quality of the releases is required and therefore low certainty but it is expected that any water quality impacts relating to temperature or deployable output (DO) issues can be mitigated. The Thames Water SEA states that discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency and is not expected to have an adverse impact on water quality or ecology, including the ecology of Culham Brake SSSI. The regulated reservoir releases could also provide a benefit to aquatic ecosystems during times of low flow. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	Regional	Moderate	N/A		Potential for enhancements to low quality habitats in the vicinity of the pipeline and reservoir. SEA work carried out for Thames Water WRMP19 states that once constructed and filled, the reservoir water body itself will provide new habitat for waders and waterfowl. It is anticipated that the development of the reservoir offers potential benefits in terms of biodiversity gains through habitat creation, this would comprise of sensitive design and landscape treatment around the new reservoir, which would integrate the new feature into the wider landscape through ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/compensation measures have established. Moderate beneficial effects anticipated.	?	2	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures (such as the new reservoir) should be designed sympathetically to fit in with the surrounding landscape, and/or	-3	-2	The scheme is not within a designated landscape area. The SEA work carried out for Thames Water WRMP19 states that during construction of the South East Strategic Reservoir (Thames Water) there would be extensive disruption to views, visual amenity and landscape character, including the removal of existing landscape features, earthmoving and major construction works. The construction of the new reservoir will also impact the setting of the North Wessex Downs. The Thames	-2

											screened as appropriate by landscaping and planting. The appropriate reinstatement of any land/ soil affected should help to minimise residual effects. Additionally, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage. New opportunities are to be created for improved access, recreation and amenity provision across the area of the reservoir to reduce adverse effects during the operation phase.			Water SEA therefore concludes that the construction of South East Strategic Reservoir is likely to have major negative effects on the landscape during the construction phase. The construction of the pipeline and overhead powerlines will have minor temporary negative effects on the landscape in the short-term during construction. The upgrade of booster pumps and existing buildings may also have a minor negative effect during construction. Overall, given the presence of the AONB and its setting, a major negative effect on landscape is anticipated during construction. The pipeline and overhead powerlines, delivered by Affinity Water, would be buried during operation, minimising impacts. Once mitigation is taking into account, it is predicted that the residual effect of upgrading booster pumps and existing buildings during operation will be neutral. The Thames Water SEA states that the new Reservoir ancillary infrastructure would be a prominent new feature in the landscape during operation, with three towers, seen against the visual context of the North Wessex Downs AONB to the south and east. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. Overall it is concluded by the Thames Water SEA and through the assessment of this scheme through Affinity Water's rdWRMP19 that there is the potential for a moderate negative effect during operation. It is recognised that the Thames Water SEA also concludes moderate beneficial effects during operation after the landscaping has matured. However this is not considered under this SEA Objective and is subsequently addressed under SEA Objective 6.b.
	6.b. Provide opportunities for landscape enhancement?		?	High	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	?	Regional	Moderate	?	2	SEA work carried out for Thames Water rdWRMP19 states that the scheme presents opportunities for landscape enhancements and improvements in relation to the new reservoir. Specific mitigation measures and enhancements will be developed in the detailed design stages, in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities and further engagement with stakeholders will be undertaken as part of the development of this option. The Thames Water SEA assessment recognises the AONB and its setting and acknowledges the landscape impact of the proposed

														scheme and potential benefits and enhancements. Further detailed assessment work will be undertaken as part of an application for development consent. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. A railway siding is also proposed for delivery of construction materials to the new reservoir site.	-2	-1	The new pipeline, to be delivered by Affinity Water, is located within the South Bucks AQMA. The SEA work carried out for Thames Water rdWRMP19 states that the works for the new reservoir are in close proximity to Abingdon and Marcham AQMAs. Therefore moderate negative effects on air quality in the short-term during construction are anticipated. However, given the presence of the M25 and M4 in the vicinity of the pipeline route it is considered that construction and operational impacts may be lessened. The construction of the pipeline and South East Strategic Reservoir (and associated abstraction and discharge facilities) is likely to result in increased traffic in localised areas. The Thames Water SEA states that this is due to the anticipated large number of deliveries by HGVs (23,700 HGV movements over 9.1 years). This has the potential to increase the levels of atmospheric pollution from vehicles. Additionally, the construction phase will result in increased emissions from rail freight and an energy requirement of 11,000MWh. Mitigation measures include the development of railway siding to deliver materials by rail to reduce HGV movements and traffic management measures such as avoiding HGV movements during peak traffic periods on local roads. The Thames Water SEA identifies adverse impacts during operation of the reservoir due to emissions from maintenance vehicles and visitor vehicles and an annual energy requirement for the reservoir air diffusers of 2,350MWh. Mitigation measures include control of dust through dampening haul roads and earthworks and aggregate processing plant (standard good practice for large construction sites). Residual minor negative effect is therefore anticipated during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles. Energy efficient pumps should be adopted to reduce the carbon footprint of the operation process.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the water transfer and reservoir storage capacity this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		Low	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	This option could have negative effects on SSSIs and crosses several surface water bodies.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	WFD assessment states that the implementation of CoCP and Best Practice Measures during construction and operation will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. No deterioration of status anticipated. SEA for Thames Water states that further mitigation measures will be set out in any applications for Flood Defence Consents where these are required for any river construction works. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	-1	-1	The SEA work carried out for Thames Water's rdWRMP19 states that there are no significant surface water dependent features in the area. However, construction of the reservoir will involve the removal and rerouting of several small watercourses, locally unique geomorphological features including the larger East Hanney and West Hanney Ditches and removal of the remnant's of the Wilts and Berks Canal. Plans assume that the rivers will be rerouted and restored and the canal may be regenerated. Temporary impacts due to construction would not cause any deterioration and any diversions of watercourses are to be agreed with the Environment Agency to ensure no deterioration of status and no adverse effects on river environment with opportunities to enhance the water environment as part of the watercourse diversion works. The Thames Water SEA further states that no impacts to groundwater are anticipated from the construction of the reservoir as the underlying bedrock, on the whole, is not classed as an aquifer. It is noted that the Corallian Group aquifer is at depth in this location and potential impacts of the additional mass of water in the reservoir on this deeper aquifer will be subject to further investigation during the detailed design process. There may be some localised dewatering of superficial deposits as the reservoir is dug, although these are unlikely to impact local watercourses or aquifers. During operation, the Thames Water SEA for the rdWRMP19 refers to the WFD assessment, which identifies that the habitat types most at risk are the weir pools in the River Thames due to the	-1

														potential change in their level and flow regime. Supplementary work for the WRMP identified that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. Affinity Water's WFD assessment for the rdWRMP19 identifies that this option has the potential for positive benefits on the hydromorphological status of a number of surface water bodies during operation. It also identifies that a reduction of river flow due to abstraction is expected; however, if abstraction at Sunnymeads is managed under the LTOA abstraction regime and supported by releases from the reservoir, the abstraction will not lead to any adverse effects on the flow regime downstream of the re-abstraction point and loss of recharge to groundwater should only be minor. Taking a precautionary approach the potential for a minor negative effect has been identified during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		High	High	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	WFD assessment states that the implementation of CoCP and Best Practice Measures during construction and operation will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. Specifically, the Thames Water SEA for the rdWRMP19 states that construction mitigation will include the diversion of watercourses, and adoption of standard good practices to avoid pollution of watercourses and control of earthworks drainage. Consents will be obtained from the Environment Agency for any in river works. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. In terms of operation, the weir will be designed to help mitigate potential impacts on sediment dynamics on the river bed and the potential for erosion of river banks. Thames Water SEA concludes the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	-1	-1	During construction there is potential for impacts to water quality given proximity of watercourses as a result of site run off and pollution. Good practice construction methods will ensure that any impacts are minor, localised and temporary. The WFD assessment found that there would be no water quality change anticipated as water abstracted and discharged in the same water body. However, if water is abstracted during floods it could potentially be contaminated and pollutants released at low flows. SEA work carried out for Thames Water's rdWRMP19 states that water would be abstracted from the river, through fine screens and a manifold situated on the river bank. For draw off purposes, the tower will have three draw off points at different levels and positions within the tower to allow abstraction at different levels. This will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. In addition, the reservoir would be equipped with air mixing diffusers set on the reservoir bed to keep it aerated and minimise water quality issues. Water stored in and released from the reservoir will be subject to regular testing to avoid releasing poor quality water back to the river. Discharges into the river would be by means of a curved concrete stepped gravity weir, approximately 20m long. Further

													assessment of the water quality of the releases is required but it is expected that any water quality impacts relating to temperature or DO issues can be mitigated. Draw off water discharged back into the river would be of similar water quality to the abstracted water from this reach. The discharge would be subject to consent by the Environment Agency and therefore the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	Appropriate licensing and HOF will be required. To confirm sustainability of abstraction, progress with pumping tests and further modelling work and if the tests prove no impact, have a time limited license while collecting monitoring data for review. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction license and environmental permit conditions for this scheme.	0	-1	Abstraction in river may have a negative effect if not properly monitored and licensed. The Lower Thames Gravels groundwater body is hydraulically connected to the Thames River and has the potential to be affected by the increased abstraction. The SEA work carried out for Thames Water's rdWRMP19 states that the intake and outfall would be a combined structure located on the right bank of the River Thames near to the entrance to the Culham lock cut. Water would be abstracted from the river, through fine screens and a manifold situated on the river bank, into a culvert which drops the water into a shaft. Abstractions to the reservoir would be controlled through licensing conditions to protect low flows. There are no other abstractors at the site which can be impacted by the construction or operation of the scheme. However, the operation of the scheme during dry periods would lessen the pressure on other sources that abstract from more limited water resources that could be under particular pressure at such times. Considering this scheme could provide up to 50Ml/d for Affinity Water, indirect potential positive effects are anticipated through this scheme. The Affinity Water WFD assessment for the rdWRMP19 found that changes in flow velocities and characteristics may affect water levels. Neutral effects are considered overall.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality.	-1	-1	Affinity Water's WFD assessment found that there is the potential for minor negative impacts during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are minor, localised and temporary. It also identified that temporary and localised dewatering may be required along the route of new mains. Abstracted water	

											Consents will be obtained from the Environment Agency for any in river works. Mitigation may also include undertaking a borehole integrity check. Make sure headworks are properly sealed to surface water run-off. Specific mitigation should be explored further at the detailed design stage. In terms of operation, the Thames Water SEA for the rdWRMP19 states that the weir will be designed to help mitigate potential impacts on sediment dynamics on the river bed and the potential for erosion of river banks. Thames Water SEA concludes the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.			returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. SEA work carried out for Thames Water's rdWRMP19 states that water would be abstracted from the river, through fine screens and a manifold situated on the river bank. For draw off purposes, the tower will have three draw off points at different levels and positions within the tower to allow abstraction at different levels. This will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. In addition, the reservoir would be equipped with air mixing diffusers set on the reservoir bed to keep it aerated and minimise water quality issues. Water stored in and released from the reservoir will be subject to regular testing to avoid releasing poor quality water back to the river. Discharges into the river would be by means of a curved concrete stepped gravity weir, approximately 20m long. Further assessment of the water quality of the releases is required but it is expected that any water quality impacts relating to temperature or DO issues can be mitigated. Draw off water discharged back into the river would be of similar water quality to the abstracted water from this reach. The discharge would be subject to consent by the Environment Agency and therefore the risk to deterioration in WFD status is low. Vehicles and chemical/oil storage to be fully bunded to prevent accidental pollution of groundwater or watercourses. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Low	Medium term (5 - 25 years) to Long term (>25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the	0	-1	Affinity Water's WFD assessment found that there is the potential for minor negative impacts effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are minor, localised and temporary. It also identified that temporary and localised dewatering may be required along the route of new mains. Abstracted water returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. Affinity Water's WFD assessment for the rdWRMP19 identifies that this option has the potential for	-1

											Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction licence and environmental permit conditions for this scheme.			positive benefits on the hydromorphological status of a number of surface water bodies during operation. It also identifies that a reduction of river flow due to abstraction is expected; however, if managed under the LTOA, abstraction should only occur at high flows and loss of recharge to groundwater should only be minor. Taking a precautionary approach the potential for a minor negative effect has been identified during operation. SEA work carried out for Thames Water's rdWRMP19 states that during operation, the WFD assessment identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Supplementary work for the Thames Water WRMP identified that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete. SEA work carried out for Thames Water's WRMP19 states that flood compensation for loss of flood storage will be provided close to proposed reservoir site. The design has had regard to the area safeguarded for flood risk management, as identified in the local plan. Scheme mitigation includes the provision of 80.9ha flood compensation areas for loss of flood plain, construction good practice and construction area to be sited away from flood areas. In addition it is proposed that earthworks sequencing is undertaken to include cofferdam formation to avoid flooding of the borrow area during construction. During future design development, further work will be	0	-1	Sections of this option are located within a floodplain area (identified by the Environment Agency). Specifically, SEA work carried out for Thames Water's WRMP19 states that construction work for the new reservoir is located within an area of flood risk zone 2 and 3 and will result in the loss of flood plain. This will be mitigated for by provision of flood plain compensation storage in the local area in line with the NPPF requirements to ensure no net loss of flood plain storage. The assessment of this scheme through Affinity Water's WRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. There will be no increase in fluvial flood risk as the scheme will only be operational and making releases when flows in the Thames are low and there is no risk of flooding. Liaison with the Environment Agency has ensured that the Environment Agency's proposed Abingdon Flood Alleviation Scheme will not be compromised by development of the reservoir. In response to representations on Thames Water's rdWRMP19, a technical note (Appendix K of the Statement of Response 2) was produced to review the flood risk associated with the delivery of the SESR. The conclusions of this note do not require any changes to the assessment of this scheme under	-1

											needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any potential remaining housing allocations contained in the Local Plan. The assessment of this scheme through Affinity Water's WRMP19 has not identified any additional or further mitigation.			this SEA objective. The assessment has regard to potential new housing developments allocated in the Vale of White Horse Local Plan 2031. During future design development, further work will be needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any potential remaining housing allocations contained in the Local Plan.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include re-routing the new pipelines to avoid damaging Listed Buildings, Scheduled Monuments and Registered Parks and Gardens, especially those within 10m / working area. Use of complex directional drilling underneath the sites to avoid permanent damage should also be investigated. Additionally, mitigation should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the likely archaeological significance of the site, detailed archaeological investigations will be required. This will likely include: • A desk-based assessment, which should include a geoarchaeological deposit model, identifying the likely depth and distribution of deposits of archaeological potential across the site for the full Quaternary sequence; as well as an assessment of the potential for Paleolithic remains. • Preliminary field evaluation (geophysical and borehole survey); • Use of 1 and 2 to target trenches (and deeper test pits) for a further stage of field evaluation; • Targeted excavation during ground reduction of the overburden where archaeology has been identified (alongside strip / map and sample and a watching brief as appropriate).	-3	-2	The new pipeline, to be delivered by Affinity Water, is within 10m of approximately three listed Buildings. The SEA work carried out for Thames Water rdWRMP19 states that the new South East Strategic Reservoir land acquisition area is within 1km of Scheduled Monuments and Registered Parks and Gardens. There is therefore potential for negative effects during the construction phase. The scheme involves the permanent removal and rerouting of the East Hanney and West Hanney Ditches which are considered to be important historical features in the area. This will directly impact these assets during the construction phase with the potential for a major negative effect. The reservoir site spans several Pleistocene river terraces and the Holocene floodplain area and as a result, the 'overburden' (thought to be c 2 – 5m deep) that overlies the bedrock clays has potential to contain evidence of human activity from the Paleolithic onwards. The scale of the site means that any evidence preserved will have greater significance, as it will represent archaeological activity and associations at a landscape scale. The scheme is therefore likely to impact on archaeological remains and the archaeological significance of the reservoir site. The bedrock clays will likely be excavated during construction to produce the reservoir and other features within the scheme. This archaeology will likely be destroyed by the excavation. Given the likely significance of the site, detailed archaeological investigations will be required. During operation there are potential negative effects on the visual setting of assets including Listed Buildings, Conservation Areas and the wider landscape. The Thames Water SEA highlights Conservation Areas associated with nearby historic villages including Steventon, East Hanney, Drayton and Marcham. New residential	-2

													development at Steventon and Drayton will mitigate direct impacts on these Conservation Areas. Potential impacts on the East Hanney Conservation Area are considered more likely during operation due to the proximity of the South East Strategic Reservoir. It is considered through the Thames Water SEA that there is potential for minor negative effects during the operation phase. HE note that the SESR may be visible from the Priory, which is grade II* listed and its rural context is very important. This will need to be considered at the detailed design stage. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	-2	-1	The SEA work carried out for Thames Water rdWRMP19 identifies that results from previous surveys and excavations of the reservoir site identifies moderate archaeological potential (prehistoric and roman). Archaeological remains will be impacted by the construction of the reservoir (Thames Water). Aggregate use associated with the scheme would place further pressure on the buried archaeological remains present in local deposits of minerals (especially of sand and gravel). The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	High	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route, to be delivered by Affinity Water, crosses grade 1 agricultural land, therefore short-term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The SEA work carried out for Thames Water rdWRMP19 states that the provision of a new fully bunded reservoir at Abingdon would result in a large loss of mainly Grade 3 agricultural land. Part of the proposed site area has however already been consented for uses other than agriculture and the Local Plan has the site area designated for reservoir storage. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1

1.2.1.24 AFF-RTR-WRZ4-4012

(In the High Growth Future)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Iver 2 Water Treatment Works. Water will be discharged from a new South East Strategic Reservoir for subsequent re-abstraction downstream from the River Thames at Sunnymead. The increased abstraction will provide an additional 100 Ml/d during both peak and average conditions for use within WRZ4. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, agricultural land, surface and groundwater body status, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on biodiversity, the landscape and historic environment.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 100Ml/d equates to a moderate positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	It is assumed that the new raw water reservoir will be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities. SEA work carried out for Thames Water rdWRMP19 states that mitigation proposed includes recreational facilities including a visitor centre with facilities to accommodate schools study centre; outdoor educational water science park; heritage/ archaeological centre; dedicated school study centre with a focus on wildlife and nature; water garden; water feature (major fountain); water sports club house and associated facilities (pier, slipway, boat park); land based formal outdoor sports areas; car park provision for informal recreation; events area; passenger ferry; coarse game fishing and angling; cycle hire; equestrian centre and associated bridleways; artists' studio and sculptures; lagoons and coves; woodland & scrub / grassland areas. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1

	2.b. Alter water levels that affect water-based recreation assets?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Regional	Moderate	SEA work carried out for Thames Water rdWRMP19 states that releases from the reservoir will be regulated.	0	-1	SEA work carried out for Thames Water rdWRMP19 states that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. However, there may be adverse effects on navigation and associated businesses, although releases from the reservoir will be regulated. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	High	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	-2	1	SEA work carried out for Thames Water rdWRMP19 states that the delivery of the new reservoir will cause disruption to public rights of way during the construction period (9.1 years). The Thames Water SEA concludes major adverse effects during the construction phase. The Thames Water SEA however also identifies that there is also the potential creation of a visitor centre to provide information about water provision, in addition to the provision of recreational facilities such as footpaths and boating facilities that would improve health and well being. Major beneficial effects anticipated during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	-1	The anticipated pipeline route, to be delivered by Affinity Water, follows the footprints of several roads and so is anticipated to cause such impacts. However, the construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. SEA work carried out for Thames Water rdWRMP19 states that adverse impacts are anticipated during construction of the new reservoir. This is as a result of the HGV movements (estimated at some 23,700 HGVs over the 9.1 year construction period). The Thames Water SEA further states that adverse effects during operation will include an increase in traffic in the local area -for maintenance works and the car movements associated with potential visitors. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Medium	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.		
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Long term >25 years	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-3	0	This option will require 4 x 132 kW Intake booster pumps, 11.1 km of 800 mm Diameter Main, and the construction of a new raw water reservoir. In terms of demolition of assets, there will be a small number of commercial properties and household properties that will have to be demolished to build the reservoir.	0	
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. It is recommended through the Affinity Water HRA (2019) that the inclusion of this option within the rdWRMP is accompanied by an explicit commitment to ensure that the programming and construction processes for the new pipeline as part of this scheme take into account the proximity of the South West London Waterbodies SPA/ Ramsar Site and that construction works on the short section of pipeline adjacent to the SPA/ Ramsar Site are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. It is recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. With these recommendations included, it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option	-2	-1	The pipeline that will lie within the Affinity Water supply area is adjacent to a section of the South West London Waterbodies Ramsar and SPA. This European site is designated for its internationally important wintering populations of gadwall and shoveler. The birds frequently move between waterbodies (for example in response to disturbance) such that the entire complex is of importance although average bird numbers on some waterbodies are much lower than on others. The interest features of the SPA/ Ramsar Site are therefore sensitive to noise and visual disturbance during the period October to March inclusive. This impact cannot be investigated in more detail for this assessment as it would require details of the scheme design and construction methods, including noise estimates for construction plant and information on the number of construction workers and duration of the construction period. However, there is a high degree of confidence that adverse effects on the integrity of the SPA/ Ramsar Site through disturbance can be avoided: In addition to the low risk of noise-related disturbance the flooded gravel pits (including Wraysbury No. 1) are obviously in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline there is thus potential for changes in hydrology and water quality within the SPA and Ramsar site. It is very likely that the pipeline will be installed relatively shallowly and thus be well above the water table. With the recommendations identified by the HRA (2019) of the Affinity Water WRMP19 (discussed	-1	

													left), it is considered that an adequate mechanism was in place to ensure that adverse effects on integrity could be avoided for this option. This Option includes Thames Water and Affinity Water jointly developing the South East Strategic Reservoir. The HRA of the Thames Water rdWRMP19 concluded that the South East Strategic Reservoir Option is not likely to have any significant effects on any European sites.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Potential for water quality changes and subsequent loss of suitable habitat. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions and associated species they support. Detailed ecological surveys required. The loss of BAP Priority habitat and species should be avoided where possible. Where this isn't possible, the loss of habitats and species would need to be mitigated for through licensing and compensation. A CEMP should be in place. The Thames Water SEA for the rdWRMP19 states that construction of the reservoir and associated abstraction and discharge facilities will be managed by best construction practices to mitigate effects due to construction including identification of suitable traffic routes. Construction mitigation measures will also be in the form of extensive vegetation planting around the reservoir margin as well as compensatory measures to enhance lower quality habitat in the vicinity of the reservoir to replace lost habitat will be developed in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities. Where applicable, and depending on updated bird surveys to be carried out as part of the detailed design of the scheme, these measures may be developed in advance of reservoir construction so as to minimise effects on identified bird species. Once constructed and filled, the reservoir water body itself which will provide new habitat for waders and waterfowl. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/ compensation measures have established. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or	-2	-1	The re-abstraction point from the River Thames at Sunnymeads is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. The increase in abstraction and installation of pumps has the potential to affect river habitats and associated species, through disturbance (light, noise etc.) and change in water quality. The pipeline passes adjacent to houses, through residential areas. These have the potential to support roosting bats or nesting birds. There is the potential for species associated with the SPA and Ramsar to be affected. SEA work carried out for Thames Water rdWRMP19 states that the construction of the reservoir and associated abstraction and discharge facilities will result in the loss of non-designated terrestrial (priority habitats) during the 9.1 year construction period and the initial operational phases. This will lead to moderate adverse effects. Construction will be managed by best construction practices to mitigate effects due to construction including identification of suitable traffic routes. The WFD assessment concludes that construction impacts will not cause deterioration of the WFD water bodies. The Thames Water SEA highlights that during operation, the WFD assessment identifies that the habitat types most at risk during operation are the weir pools in the River Thames due to the potential change in their level and flow	

											further issues that are likely to arise or require mitigation.			regime. Overall it is expected that the ecological status will remain the same with flows regulated and discharges subject to licensing from the Environment Agency. The provision of three drawdown towers will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. Further assessment of the water quality of the releases is required and therefore low certainty but it is expected that any water quality impacts relating to temperature or deployable output (DO) issues can be mitigated. The Thames Water SEA further states that discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency and is not expected to have an adverse impact on water quality or ecology. The regulated reservoir releases could also provide a benefit to aquatic ecosystems during times of low flow. Thames Water rdWRMP19. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option will result in the transfer of water from a reservoir to surface water, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible and ensure an appropriate buffer between any new infrastructure. In practice impacts of the pipeline can be avoided through careful design and construction, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that water levels and quality would be protected. This would need to be developed further during detailed scheme design. There are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point)	-2	-1	The pipeline that will lie within the Affinity Water supply area is adjacent to a section of the South West London Waterbodies SPA and Ramsar site (discussed under objective 5.a), which is also designated as Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the Sunnymeads re-abstraction point. The SSSI is currently in a favourable condition. There is the potential for increased abstraction from the River Thames to affect the hydrology of this site. This may lead to adverse effects during operation. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSI.	

											works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. SEA work carried out for Thames Water states that construction mitigation measures for the reservoir and associated abstraction and discharge facilities will also be in the form of extensive vegetation planting around the reservoir margin as well as compensatory measures to enhance lower quality habitat in the vicinity of the reservoir to replace lost habitat will be developed in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities. Where applicable, and depending on updated bird surveys to be carried out as part of the detailed design of the scheme, these measures may be developed in advance of reservoir construction so as to minimise effects on identified bird species. Once constructed and filled, the reservoir water body itself which will provide new habitat for waders and waterfowl. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/compensation measures have established.			There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. In practice any effects on the SSSI can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that water levels and quality would be protected. This would need to be developed further during detailed scheme design. There are standard dust suppression measures that could be introduced in line with the relevant British Standard. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. SEA work carried out for Thames Water rdWRMP19 states that there are no designated nature conservation sites within the reservoir site. There are SSSIs and ancient woodland within 1km and 3km, although works are not expected to impact these designations. The Thames Water SEA further highlights that during operation, the WFD assessment identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Overall it is expected that the ecological status will remain the same with flows regulated and discharges subject to licensing from the Environment Agency. The provision of three drawdown towers will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. Further assessment of the water quality of the releases is required and therefore low certainty but it is expected that any water quality impacts relating to temperature or deployable output (DO) issues can be mitigated. The Thames Water SEA states that discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency and is not expected to have an adverse impact on water quality or ecology, including the ecology of Culham Brake SSSI. The regulated reservoir releases could also provide a benefit to aquatic ecosystems during times of low flow.	

													The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5-25 years) and Long term (>25 years)	?	Permanent	Regional	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the pipeline and reservoir. SEA work carried out for Thames Water WRMP19 states that once constructed and filled, the reservoir water body itself will provide new habitat for waders and waterfowl. It is anticipated that the development of the reservoir offers potential benefits in terms of biodiversity gains through habitat creation, this would comprise of sensitive design and landscape treatment around the new reservoir, which would integrate the new feature into the wider landscape through ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. Overall, there will be a net gain in biodiversity in the longer-term once the reservoir has filled and the terrestrial habitat mitigation/compensation measures have established. Moderate beneficial effects anticipated.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures (such as the new reservoir) should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. The appropriate reinstatement of any land/ soil affected should help to minimise residual effects. Additionally, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland will reduce the residual effect during operational phase. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.	-3	-2	The scheme is not within a designated landscape area. The SEA work carried out for Thames Water WRMP19 states that during construction of the South East Strategic Reservoir (Thames Water) there would be extensive disruption to views, visual amenity and landscape character, including the removal of existing landscape features, earthmoving and major construction works. The construction of the new reservoir will also impact the setting of the North Wessex Downs. The Thames Water SEA therefore concludes that the construction of South East Strategic Reservoir is likely to have major negative effects on the landscape during the construction phase. The construction of the pipeline and overhead powerlines will have minor temporary negative effects on the landscape in the short-term during construction. The upgrade of booster pumps and existing buildings may also have a minor negative effect during construction. Overall, given the presence of the AONB and its setting, a major	-2

											New opportunities are to be created for improved access, recreation and amenity provision across the area of the reservoir to reduce adverse effects during the operation phase.			negative effect on landscape is anticipated during construction. The pipeline and overhead powerlines, delivered by Affinity Water, would be buried during operation, minimising impacts. Once mitigation is taking into account, it is predicted that the residual effect of upgrading booster pumps and existing buildings during operation will be neutral. The Thames Water SEA states that the new Reservoir ancillary infrastructure would be a prominent new feature in the landscape during operation, with three towers, seen against the visual context of the North Wessex Downs AONB to the south and east. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. Overall it is concluded by the Thames Water SEA and through the assessment of this scheme through Affinity Water's rdWRMP that there is the potential for a moderate negative effect during operation. It is recognised that the Thames Water SEA also concludes moderate beneficial effects during operation after the landscaping has matured. However this is not considered under this SEA Objective and is subsequently addressed under SEA Objective 6.b	
	6.b. Provide opportunities for landscape enhancement?		?	High	?	Medium term (5-25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	SEA work carried out for Thames Water rdWRMP19 states that the scheme presents opportunities for landscape enhancements and improvements in relation to the new reservoir. Specific mitigation measures and enhancements will be developed in the detailed design stages, in close dialogue with regulatory bodies, planning authorities, interested stakeholders and local communities and further engagement with stakeholders will be undertaken as part of the development of this option. The Thames Water SEA assessment recognises the AONB and its setting and acknowledges the landscape impact of the proposed scheme and potential benefits and enhancements. Further detailed assessment work will be undertaken as part of an application for development consent. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. A railway siding is also proposed for delivery of construction materials to the new reservoir site.	-2	-1	The new pipeline, to be delivered by Affinity Water, is located within the South Bucks AQMA. The SEA work carried out for Thames Water rdWRMP19 states that the works for the new reservoir are in close proximity to Abingdon and Marcham AQMAs. Therefore moderate negative effects on air quality in the short-term during construction are anticipated. However, given the presence of the M25 and M4 in the vicinity of the pipeline route it is considered that construction and operational impacts may be lessened. The construction of the pipeline and South East Strategic Reservoir (and associated abstraction and discharge facilities) is likely to result in increased traffic in localised areas. The Thames Water SEA states that this is due to the anticipated large number of deliveries by HGVs (23,700 HGV movements over 9.1 years). This has the potential to increase the levels of atmospheric pollution from vehicles. Additionally, the construction phase will result in increased emissions from rail freight and an energy requirement of 11,000MWh. Mitigation measures include the development of railway siding to deliver materials by rail to reduce HGV movements and traffic management measures such as avoiding HGV movements during peak traffic periods on local roads. The Thames Water SEA identifies adverse impacts during operation of the reservoir due to emissions from maintenance vehicles and visitor vehicles and an annual energy requirement for the reservoir air diffusers of 2,350MWh. Mitigation measures include control of dust through dampening haul roads and earthworks and aggregate processing plant (standard good practice for large construction sites). Residual minor negative effect is therefore anticipated during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	-1
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles. Energy efficient pumps should be adopted to reduce the carbon footprint of the operation process.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long	N/A	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. By upgrading the water transfer and reservoir storage capacity this option should result in	

						term (>25 years)								positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		Low	Low	Medium term (5 – 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	This option could have negative effects on SSSIs and crosses several surface water bodies. WF	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Low	WFD assessment states that the implementation of CoCP and Best Practice Measures during construction and operation will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. No deterioration of status anticipated. SEA for Thames Water states that further mitigation measures will be set out in any applications for Flood Defence Consents where these are required for any river construction works. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	-1	-1	The SEA work carried out for Thames Water's rdWRMP19 states that there are no significant surface water dependent features in the area. However, the construction of the reservoir will involve the removal and rerouting of several small watercourses, locally unique geomorphological features including the larger East Hanney and West Hanney Ditches and removal of the remnant's of the Wilts and Berks Canal. Plans assume that the rivers will be rerouted and restored and the canal may be regenerated. Temporary impacts due to construction would not cause any deterioration and any diversions of watercourses are to be agreed with the Environment Agency to ensure no deterioration of status and no adverse effects on river environment with opportunities to enhance the water environment as part of the watercourse diversion works. The Thames Water SEA further states that no impacts to groundwater are anticipated from the construction of the reservoir as the underlying bedrock, on the whole, is not classed as an aquifer. It is noted that the Corallian Group aquifer is at depth in this location and potential impacts of the additional mass of water in the reservoir on this deeper aquifer will be subject to further investigation during the detailed design process. There may be some localised dewatering of superficial deposits as the reservoir is dug, although these are unlikely to impact local watercourses or aquifers. During operation, the Thames Water SEA for the rdWRMP19 refers to the WFD assessment, which identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Supplementary work for the WRMP identified that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. Affinity Water's WFD assessment for the rdWRMP19 identifies that this option has the potential for	-1

														positive benefits on the hydromorphological status of a number of surface water bodies during operation. It also identifies that a reduction of river flow due to abstraction is expected; however, if abstraction at Sunnymeads managed under the LTOA abstraction regime is supported by releases from the reservoir, the abstraction will not lead to any adverse effects on the flow regime downstream of the re-abstraction point and should only occur at high flows and loss of recharge to groundwater should only be minor. Taking a precautionary approach the potential for a minor negative effect has been identified during operation. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		High	High	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	WFD assessment states that the implementation of CoCP and Best Practice Measures during construction and operation will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts in relation to the overall size of the water body. Specifically, the Thames Water SEA for the rdWRMP19 states that construction mitigation will include the diversion of watercourses, and adoption of standard good practices to avoid pollution of watercourses and control of earthworks drainage. Consents will be obtained from the Environment Agency for any in river works. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. In terms of operation, the weir will be designed to help mitigate potential impacts on sediment dynamics on the river bed and the potential for erosion of river banks. Thames Water SEA concludes the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	-1	-1	During construction there is potential for impacts to water quality given proximity of watercourses as a result of site run off and pollution. Good practice construction methods will ensure that any impacts are minor, localised and temporary. The WFD assessment found that there would be no water quality change anticipated as water abstracted and discharged in the same water body. However, if water is abstracted during floods it could potentially be contaminated and pollutants released at low flows. SEA work carried out for Thames Water's rdWRMP19 states that water would be abstracted from the river, through fine screens and a manifold situated on the river bank. For draw off purposes, the tower will have three draw off points at different levels and positions within the tower to allow abstraction at different levels. This will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. In addition, the reservoir would be equipped with air mixing diffusers set on the reservoir bed to keep it aerated and minimise water quality issues. Water stored in and released from the reservoir will be subject to regular testing to avoid releasing poor quality water back to the river. Discharges into the river would be by means of a curved concrete stepped gravity weir, approximately 20m long. Further assessment of the water quality of the releases is required but it is expected that any water quality impacts relating to temperature or DO issues can be mitigated. Draw off water discharged back into the river would be of similar water quality to	

													the abstracted water from this reach. The discharge would be subject to consent by the Environment Agency and therefore the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	Appropriate licensing and HOF will be required. To confirm sustainability of abstraction, progress with pumping tests and further modelling work and if the tests prove no impact, have a time limited license while collecting monitoring data for review. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction license and environmental permit conditions for this scheme.	0	-1	Abstraction in river may have a negative effect if not properly monitored and licensed. The Lower Thames Gravels groundwater body is hydraulically connected to the Thames River and has the potential to be affected by the increased abstraction. The SEA work carried out for Thames Water's rdWRMP19 states that the intake and outfall would be a combined structure located on the right bank of the River Thames near to the entrance to the Culham lock cut. Water would be abstracted from the river, through fine screens and a manifold situated on the river bank, into a culvert which drops the water into a shaft. Abstractions to the reservoir would be controlled through licensing conditions to protect low flows. There are no other abstractors at the site which can be impacted by the construction or operation of the scheme. However, the operation of the scheme during dry periods would lessen the pressure on other sources that abstract from more limited water resources that could be under particular pressure at such times. Considering this scheme could provide up to 100Ml/d for Affinity Water, indirect potential positive effects are anticipated through this scheme. The Affinity Water WFD assessment for the rdWRMP19 found that changes in flow velocities and characteristics may affect water levels. Neutral effects are considered overall.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Mitigation may also include undertaking a borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	-1	-1	Affinity Water's WFD assessment found that there is the potential for minor negative impacts during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are minor, localised and temporary. It also identified that temporary and localised dewatering may be required along the route of new mains. Abstracted water returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding.	

										Specific mitigation should be explored further at the detailed design stage. In terms of operation, the Thames Water SEA for the rdWRMP19 states that the weir will be designed to help mitigate potential impacts on sediment dynamics on the river bed and the potential for erosion of river banks. Thames Water SEA concludes the risk to deterioration in WFD status is low. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.			SEA work carried out for Thames Water's rdWRMP19 states that water would be abstracted from the river, through fine screens and a manifold situated on the river bank. For draw off purposes, the tower will have three draw off points at different levels and positions within the tower to allow abstraction at different levels. This will allow the draw off to be controlled to minimise any potential water quality issues and manage the quality of the water released. In addition, the reservoir would be equipped with air mixing diffusers set on the reservoir bed to keep it aerated and minimise water quality issues. Water stored in and released from the reservoir will be subject to regular testing to avoid releasing poor quality water back to the river. Discharges into the river would be by means of a curved concrete stepped gravity weir, approximately 20m long. Further assessment of the water quality of the releases is required but it is expected that any water quality impacts relating to temperature or DO issues can be mitigated. Draw off water discharged back into the river would be of similar water quality to the abstracted water from this reach. The discharge would be subject to consent by the Environment Agency and therefore the risk to deterioration in WFD status is low. Vehicles and chemical/oil storage to be fully bunded to prevent accidental pollution of groundwater or watercourses. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	During construction there is potential for contamination from site runoff and pollution as the new pipeline crosses several watercourses. Mitigation could include diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Consents will be obtained from the Environment Agency for any in river works. Mitigation includes monitoring river flows to inform the release of water from the reservoir to maintain suitable water flow conditions for the river habitats and associated species they support. Abstraction from the Middle Thames to the reservoir will be subject to a Hands Off Flow condition to protect river flows. Such mitigation measures are expected to be included in the relevant abstraction licence and	0	-1	Affinity Water's WFD assessment found that there is the potential for minor negative impacts effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are minor, localised and temporary. It also identified that temporary and localised dewatering may be required along the route of new mains. Abstracted water returned to groundwater or adjacent surface waters. Underground mains may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. Affinity Water's WFD assessment for the rdWRMP19 identifies that this option has the potential for positive benefits on the hydromorphological status of a number of surface water bodies during operation. It also identifies that a reduction of river flow due to	-1

											environmental permit conditions for this scheme.			abstraction is expected; however, if managed under the LTOA, abstraction should only occur at high flows and loss of recharge to groundwater should only be minor. Taking a precautionary approach the potential for a minor negative effect has been identified during operation. SEA work carried out for Thames Water's rdWRMP19 states that during operation, the WFD assessment identifies that the habitat types most at risk are the weir pools in the River Thames due to the potential change in their level and flow regime. Supplementary work for the Thames Water WRMP identified that the River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further issues that are likely to arise or require mitigation.	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete. SEA work carried out for Thames Water's WRMP19 states that flood compensation for loss of flood storage will be provided close to proposed reservoir site. The design has had regard to the area safeguarded for flood risk management, as identified in the local plan. Scheme mitigation includes the provision of 80.9ha flood compensation areas for loss of flood plain, construction good practice and construction area to be sited away from flood areas. In addition it is proposed that earthworks sequencing is undertaken to include cofferdam formation to avoid flooding of the borrow area during construction. During future design development, further work will be needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any	0	-1	Sections of this option are located within a floodplain area (identified by the Environment Agency). Specifically, SEA work carried out for Thames Water's WRMP19 states that construction work for the new reservoir is located within an area of flood risk zone 2 and 3 and will result in the loss of flood plain. This will be mitigated for by provision of flood plain compensation storage in the local area in line with the NPPF requirements to ensure no net loss of flood plain storage. The assessment of this scheme through Affinity Water's WRMP19 has not identified any additional or further issues that are likely to arise or require mitigation. There will be no increase in fluvial flood risk as the scheme will only be operational and making releases when flows in the Thames are low and there is no risk of flooding. Liaison with the Environment Agency has ensured that the Environment Agency's proposed Abingdon Flood Alleviation Scheme will not be compromised by development of the reservoir. In response to representations on Thames Water's rdWRMP19, a technical note (Appendix K of the Statement of Response 2) was produced to review the flood risk associated with the delivery of the SESR. The conclusions of this note do not require any changes to the assessment of this scheme under this SEA objective. The assessment has regard to potential new housing developments allocated in the Vale	-1

											potential remaining housing allocations contained in the Local Plan. The assessment of this scheme through Affinity Water's WRMP19 has not identified any additional or further mitigation.			of White Horse Local Plan 2031. During future design development, further work will be needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any potential remaining housing allocations contained in the Local Plan.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include re-routing the new pipelines to avoid damaging Listed Buildings, Scheduled Monuments and Registered Parks and Gardens, especially those within 10m / working area. Use of complex directional drilling underneath the sites to avoid permanent damage should also be investigated. Additionally, mitigation should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the likely archaeological significance of the site, detailed archaeological investigations will be required. This will likely include: • A desk-based assessment, which should include a geoarchaeological deposit model, identifying the likely depth and distribution of deposits of archaeological potential across the site for the full Quaternary sequence; as well as an assessment of the potential for Paleolithic remains. • Preliminary field evaluation (geophysical and borehole survey); • Use of 1 and 2 to target trenches (and deeper test pits) for a further stage of field evaluation; • Targeted excavation during ground reduction of the overburden where archaeology has been identified (alongside strip / map and sample and a watching brief as appropriate).	-3	-2	The new pipeline (to be delivered by Affinity Water) is within 10m of approximately three listed Buildings. The SEA work carried out for Thames Water rdWRMP19 states that the new South East Strategic Reservoir land acquisition area is within 1km of Scheduled Monuments and Registered Parks and Gardens. There is therefore potential for negative effects during the construction phase. The scheme involves the permanent removal and rerouting of the East Hanney and West Hanney Ditches which are considered to be important historical features in the area. This will directly impact these assets during the construction phase with the potential for a major negative effect. The reservoir site spans several Pleistocene river terraces and the Holocene floodplain area and as a result, the 'overburden' (thought to be c 2 – 5m deep) that overlies the bedrock clays has potential to contain evidence of human activity from the Paleolithic onwards. The scale of the site means that any evidence preserved will have greater significance, as it will represent archaeological activity and associations at a landscape scale. The scheme is therefore likely to impact on archaeological remains and the archaeological significance of the reservoir site. The bedrock clays will likely be excavated during construction to produce the reservoir and other features within the scheme. This archaeology will likely be destroyed by the excavation. Given the likely significance of the site, detailed archaeological investigations will be required. During operation there are potential negative effects on the visual setting of assets including Listed Buildings, Conservation Areas and the wider landscape. The Thames Water SEA highlights Conservation Areas associated with nearby historic villages including Steventon, East Hanney, Drayton and Marcham. New residential development at Steventon and Drayton will mitigate direct impacts on these Conservation Areas. Potential impacts on the East	-2

														Hanney Conservation Area are considered more likely during operation due to the proximity of the South East Strategic Reservoir. It is therefore considered through the Thames Water SEA that there is potential for minor negative effects during the operation phase. HE note that the SESR may be visible from the Priory, which is grade II* listed and its rural context is very important. This will need to be considered at the detailed design stage. The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		High	Moderate	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	-2	-1	The SEA work carried out for Thames Water rdWRMP19 identifies that results from previous surveys and excavations of the reservoir site identifies moderate archaeological potential (prehistoric and roman). Archaeological remains will be impacted by the construction of the reservoir. Aggregate use associated with the scheme would place further pressure on the buried archaeological remains present in local deposits of minerals (especially of sand and gravel). The assessment of this scheme through Affinity Water's rdWRMP19 has not identified any additional or further mitigation.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route, to be delivered by Affinity Water, crosses grade 1 agricultural land, therefore short-term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The SEA work carried out for Thames Water rdWRMP19 states that the provision of a new fully bunded reservoir at Abingdon would result in a large loss of mainly Grade 3 agricultural land. Part of the proposed site area has however already been consented for uses other than agriculture and the Local Plan has the site area designated for reservoir storage. The Thames Water SEA concludes residual moderate adverse effects. The assessment of this scheme through Affinity Water's rdWRMP19	-1


has not identified any additional or
further mitigation.

1.2.1.25 AFF-RTR-WRZ3-4013

Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
		Probability		Duration		Permanence					Con	Opp		Worst
		Con	Op	Con	Op	Con	Op							
1.a. Provide affordable access to clean water adequate to support health?	This option is a transfer of 50Ml/d of raw water by a new main from a reservoir to be built by Anglian Water in South Lincolnshire (Grafham) to a new treatment works at Sundon. The scheme will require 5 x 315kW Booster Pumps to be installed at South Lincolnshire reservoir, a new 50.26km 1100mm diameter main from South Lincolnshire Reservoir to Sundon Treatment works and a new Treatment Works at Sundon. The option will also involve the creation of a new reservoir 50,000Ml in size (which is being delivered by Anglian Water). Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to recreation, material consumption, biodiversity, landscape, historic environment, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on biodiversity and Affinity Water's carbon footprint.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a minor positive effect.	2
1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	It is assumed that the new raw water reservoir will be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities.	0
2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is anticipated that any impacts from installation of new main would have minor impacts during construction and no lasting impacts during operation. It is anticipated that these changes would not be perceived by recreational users. The scheme will not significantly affect water levels.	
2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	The option requires over 100km of new pipelines well as other infrastructure. These pipelines cross numerous footpaths along and may cause short term disruption along public rights of way during construction.	
3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	The option requires over 100km of new pipelines well as other infrastructure. This is route cuts across several A roads. There is likely to be moderate temporary negative effects during construction. The flooding of an area to create the reservoir may involve permanent diversion of North Drove Bank Road. This is also likely to have moderate temporary effects during construction.	0
3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines and construction of new reservoir.	
4.a. Require significant new construction or demolition of existing assets?		High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	N/A	Materials for construction should be re-used or sourced locally where possible.	-3	0	This scheme will require 4 x 200kW Booster Pumps to be installed at South Lincolnshire reservoir, over 100km of new pipeline and a new Treatment Works at Sundon. It will also involve the creation of the South Lincolnshire new reservoir 50,000Ml in size which is being delivered by Anglian Water.	0

4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5.a. Impact on European sites?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design.	0	0	The Affinity Water scheme is dependent on a new South Lincolnshire Reservoir being delivered by Anglian Water, which will free capacity at Grafham Water for Affinity Water to take. The new South Lincolnshire Reservoir will include a river intake on the River Witham and a raw water delivery system to the downstream network. There are few European sites in Lincolnshire so the new reservoir can be located by Anglian Water without an adverse effect on European sites and the River Witham is not a European site. Since there are no relevant pathways of impact from the Affinity Water component (the pipeline from Grafham Water to Sundon) there is no scope for an effect in combination. If the Anglian Water scheme cannot be delivered for any reason the Affinity Water scheme will not be delivered either.	
5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Moderate	Detailed ecological surveys required. The loss of BAP Priority habitat and species should be avoided where possible. Where this isn't possible, the loss of habitats and species would need to be mitigated for through licensing and compensation. A CEMP should be in place.	-1	0	Construction of the new sewage treatment works at Sundon, south of Streatley Road borders an area of priority habitat deciduous woodland. The area for construction appears to currently be in use as arable field and is bordered by hedgerow to the north and east, there is another small copse of woodland bordering the south of the works area. There are potential impacts including the removal of hedgerows and potential impacts to the canopy and roots of the areas of woodland bordering the works area. Arable margins are also important features and would reduce habitat diversity with their removal. The new pipeline is set to be constructed through the Smithcombe, Sharpenhoe and Sundon Hills SSSI north of Streatley (TL07092961). This area is designated for unimproved calcareous grassland on chalk escarpment, species rich scrub and mature beech woodland. This will cause impacts through direct land take for the construction of the new main, habitat loss of priority habitats including chalk grassland and mature deciduous woodland. The pipeline also goes into the Grafham Water SSSI which is designated for its nationally important waterfowl populations as well as areas of grassland, scrub, marsh and temporarily inundated shoreline. This will cause impacts through the loss of habitats potentially including marsh and grassland through the construction of the new pipeline. The pipeline travels within the boundaries of roads passed several large and small areas of woodland including Centenary Wood (TL06253501) and Sheerhatch Wood (TL13404769). There is the potential to cause damage to priority habitat (woodland) through damaging the tree canopies or root systems depending on the distance from the tree base/canopy, the extent of the trenches and the plant used for construction of the new main. The construction of the pipeline severs at least two area of linear deciduous woodland. Deciduous woodland is a priority habitat	-2

												and therefore there is an impact with the overall loss of this habitat. The two areas are: east of Southhill Road (TL10674557) which follows a dismantled railway and north east of Charlton (TL14045066). The pipeline construction goes through an area of priority habitat which includes good quality semi-improved grassland, floodplain grazing marsh and deciduous woodland north of Firs Farm (TL07723722). There are potential hydrological impacts with the marshland due to the construction of the main, in addition to this the loss of deciduous woodland is also an impact. The construction currently appears to go through a waterbody at (TL07053592), this would cause the loss of this habitat and any protected species associated with it, the construction of the new main must avoid this waterbody. Four booster stations will be required to be constructed at Grafham Water SSSI. This will cause the loss of habitats for which the SSSI is designated.
5.c. Impact on non-native species?		?	Moderate	?	Medium term (5–25 years) and Long term >25 years	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	-1	There is the potential to introduce INNS during construction. It is also considered that the scheme may result in the spread of INNS during operation, given the scheme proposes the transfer of raw water. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.

5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	High	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	Regional	High	The pipeline route should avoid designated sites and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. Mitigation may include: - Ensuring abstraction from the Rivers are taken at appropriate times and volumes to avoid detrimental effects on water dependent designated sites such as SSSIs. - Undertake investigations to understand how the new reservoir may affect groundwater levels and therefore the surrounding water dependent designated sites - Ensuring that the option does not lead to a transfer of invasive species, appropriate filtration systems must be in place. - For all designated sites that are affected, further work will need to be undertaken to understand the sites to assist in design avoidance of effects, develop a mitigation plan, and implement this plan. Enhancement Opportunities: Create habitat within the new reservoir in keeping with the local habitats, over and above any mitigation required for any habitat lost by the reservoir creation and operation.	-2	-2	The initial route of the new pipeline passes through the Smithcombe, Sharpenhoe and Sundon Hills SSSI north of Streatley (TL07092961). This area is designated for unimproved calcareous grassland on chalk escarpment, species rich scrub and mature beech woodland. However, there is existing infrastructure (Sharpenhoe Road) that the pipeline could follow through the SSSI. It is therefore assumed that the construction of the pipeline will not pass directly through the SSSI nor lead to the direct loss of any designated habitat. The calcareous grassland and beech woodland could be affected by dust emissions during construction if the new pipeline follows Sharpenhoe Road. In terms of dust generation, there are standard dust suppression measures that could be introduced in line with the relevant British Standard. Given the interest features noise and light pollution will not have any impacts. It is also considered that there is suitable mitigation available to avoid any significant impacts on hydrology. During operation there would be no impacts on this SSSI. The existing Grafham reservoir is a SSSI, which is designated for its nationally important waterfowl populations as well as areas of grassland, scrub, marsh and temporarily inundated shoreline. It is currently 100% in a favourable condition. The precise location of the new raw water pumping station is not known at this stage. During construction there is the potential for impacts on the SSSI interest features through the loss and fragmentation of habitat, pollution and disturbance. The location of the pumping station and route of the raw water pipeline will need to avoid important habitats and areas used by the breeding/ wintering birds. The location should be informed by detailed ecological surveys carried out at the detailed design stage. Construction of the new pump station and main in proximity to Grafham Water SSSI should be carried out mid-August to end of September to avoid disturbance to any breeding or wintering birds. There is the potential for a moderate negative effect during construction; however, it is anticipated that the significance of residual effects can be reduced through the identification of more detailed mitigation measures at the detailed design stage. During operation, there is not likely to be any significant impacts as a result of the abstraction on the Grafham Water SSSI. A new South Lincolnshire reservoir will be constructed by Anglian Water, and will be used instead of Grafham Water as the feed to the Ruthamford South WRZ (via Ruthamford North WRZ), resulting in additional water being available for abstraction from Grafham Water. This scheme will therefore use the surplus remaining for abstraction and transfer to Sundon. As a result it will not result in any	

													further drawdown of the existing reservoir than was already occurring as a result of abstractions by Anglian Water. In terms of the infrastructure to be delivered by Anglian Water as part of this scheme, this includes the creation of a new reservoir (approx. 50,000Ml in size), new WTW and approx. 66km of pipeline. There are three SSSIs within 5km of the River Witham to reservoir transfer, the closest being 1.5km. There are seven SSSIs within 5km of the reservoir to WTW transfer, the closest being within 10m (Deeping Gravel Pits and Nene Washes SSSI). There are four SSSIs within 5km of the River Trent to River Witham transfer, the closest being within 1.2km. There is one SSSI 3km from the reservoir. Some of these SSSIs are likely to be geological SSSIs and are discussed elsewhere. The construction and operation of the South Lincolnshire reservoir may influence the surrounding Baston and Thurlby Fens SSSIs. Interest features include lowland ditch systems, swamps and reed-beds as well as dragonflys, Spined Loach and vascular plant assemblage. It is assessed by NE as having a favourable condition status. The filling of the reservoir with water will mean there will be a body of water close to them from the construction stage, and the storage of water may affect groundwater levels/ flows. It is assumed that any new mains/ transfers to be delivered by Anglian Water as part of this scheme can be routed at the detailed design stage to avoid SSSIs and ensure appropriate buffers are in place. The WFD assessment concluded that this scheme would only have minor, localised and temporary impacts.
5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the new treatment works, reservoir and main. Once constructed and filled, the new raw water reservoir will provide new habitat for waders and waterfowl. Potential for a net gain in biodiversity in the long-term.

6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Regional	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the scheme, in particular the new reservoir, as well as more specific mitigation measures. Mitigation: - Including planting/screening around the new water treatment works. - Incorporate measures to enable the reservoir to merge into the landscape (i.e. planting of trees as screening or design the shape to be in keeping with the current fens waterbodies in the landscape)	-3	-1	This option requires the construction of new water treatment works and approx. 2.7km of new main within the Chilterns AONB. The option includes a further 127km of new mains. During construction there is the potential for a major negative effect. However, once mitigation is taken into account, including appropriate screening and the burying of the new main, it is predicted that there will be a residual minor negative effect during operation. The National Character Area of the area of the proposed reservoir is classified as The Fens. The area is characterised by its historic and human-influenced wetland landscape lying to the west of the Wash estuary, which formerly constituted the largest wetland area in England its large-scale, flat, open landscape with extensive vistas to level horizons. The level, open topography shapes the impression of huge skies which convey a strong sense of place, tranquility, and inspiration. The creation of the reservoir is likely to change the views and landscape character of the area, adding a large body of water which is not currently part of the landscape. There are therefore likely to be major temporary construction effects and minor permanent operational effects on the landscape once mitigation has been taken into consideration.	-1
6.b. Provide opportunities for landscape enhancement?		?	Moderate	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	1	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, but this is uncertain. The delivery of the new reservoir has the potential for a long-term minor positive effect on the landscape. It provides an opportunity to deliver a new valued landscape that is used by people for recreation.	
7.a. Impact an AQMA?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic; however, these can be mitigated through good construction practices and traffic management.	0
8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 - 25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-3	-3	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-3

8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Long term >25 years	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By improving supply this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Long term >25 years	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. a. Contribute to the naturalization of water bodies, for example through the removal of artificial structures or channel modifications?		High	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Regional	Low	Best practice construction.	-1	0	The transfer pipeline crosses several surface water bodies. There is the potential for hydrological impacts to all waterbodies which are bisected by the construction of the new main, but also impacts through water quality from potential pollution associated with the construction. Neutral effect during operation anticipated. The WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	
10. b. Improve water treatment and water quality before it returns to surface water bodies?		High	High	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Regional	Low	WFD assessment may be required.	-1	-1	The transfer pipeline crosses several surface water bodies. There is the potential for hydrological impacts to all waterbodies which are bisected by the construction of the new main, but also impacts through water quality from potential pollution associated with the construction. The pipe also passes through or past a number of moderate sized ponds (TL07053592), (TL07464109) and (TL13794862). There is the potential at each of these ponds for changes in hydrology due to construction of the main and the potential for pollution spill into each of these ponds. There is potential for reduction in water quality at Grafham Water SSSI reservoir through the release of pollutants during construction of the five booster stations. However, measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts. Anglian Water WFD screening determined that the option would also have a negative effect on one or more waterbodies during the operational phases. Minor negative effect anticipated during construction and operation. The Affinity Water WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	-1
10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Long term >25 years	N/A	Permanent	Local	Low	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licencing of water abstraction.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced. The Affinity Water WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	
10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral. The Affinity Water WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	
11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0

(e.g. due to additional areas of hard standing)?													
13. a. Conserve and/or enhance heritage assets and the historic environment?	High	Low	Short term (< 5 years)	Long term >25 years	Temporary	?	Local	Moderate	Heritage impact assessment should be carried out to determine the effect of the pipeline or new structures on designated heritage assets. An archaeological survey should be carried out as part of any excavation / construction work to determine the presence of unknown archaeological assets at the upgraded reservoir site or along the new pipeline route. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-1	0	The new pipeline passes in close proximity to a significant number of designated heritage assets, including Scheduled Monuments, Registered Parks and Gardens and Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. There are no designated heritage assets likely to be affected by the new treatment works nor the new reservoir. There is the potential for archaeological activity/remains at the site, which would likely be impacted by the construction of the reservoir cell and associated infrastructure. Archaeological investigations should be carried out prior to any construction work	0
13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	High	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	High	Where possible, mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route crosses Grade 1 and 2 agricultural land. Short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The reservoir is located in land which is a classified as Grade 1. This shows that the reservoir (50,000 Ml) is likely to cause the permanent loss of a large area of good quality agricultural land.	-1

1.2.1.26 AFF-RTR-WRZ3-4014

(In the High Growth Future)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is a transfer of 100Ml/d of raw water by a new main from a reservoir to be built by Anglian Water in South Lincolnshire (Grafham) to a new treatment works at Sundon. The scheme will require 5 x 315kW Booster Pumps to be installed at South Lincolnshire reservoir, a new 50.26km 1100mm diameter main from South Lincolnshire Reservoir to Sundon Treatment works and a new Treatment Works at Sundon. The option will also involve the creation of a new reservoir 50,000Ml in size (which is being delivered by Anglian Water). Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to recreation, material consumption, biodiversity, landscape, historic environment, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on biodiversity and Affinity Water's carbon footprint.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 100Ml/d equates to a moderate positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	It is assumed that the new raw water reservoir will be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is anticipated that any impacts from installation of new main would have minor impacts during construction and no lasting impacts during operation. It is anticipated that these changes would not be perceived by recreational users. The scheme will not significantly affect water levels.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	-2	0	The option requires over 100km of new pipelines well as other infrastructure. These pipelines cross numerous footpaths along and may cause short term disruption along public rights of way during construction.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	The option requires over 100km of new pipelines well as other infrastructure. This is route cuts across several A roads. There is likely to be moderate temporary negative effects during construction. The flooding of an area to create the reservoir may involve permanent diversion of North Drove Bank Road. This is also likely to have moderate temporary effects during construction.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines and construction of new reservoir.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	N/A	Long term >25 years	N/A	Permanent	N/A	Local	N/A	N/A	-3	0	This scheme will require 4 x 200kW Booster Pumps to be installed at South Lincolnshire reservoir, over 100km of new pipeline and a new Treatment Works at Sundon. It will also involve the creation of the South Lincolnshire new reservoir 50,000Ml in size which is being delivered by Anglian Water.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design.	0	0	The Affinity Water scheme is dependent on a new South Lincolnshire Reservoir being delivered by Anglian Water, which will free capacity at Grafham Water for Affinity Water to take. The new South Lincolnshire Reservoir will include a river intake on the River Witham and a raw water delivery system to the downstream network. There are few European sites in Lincolnshire so the new reservoir can be located by Anglian Water without an adverse effect on European sites and the River Witham is not a European site. Since there are no relevant pathways of impact from the Affinity Water component (the pipeline from Grafham Water to Sundon) there is no scope for an effect in combination. If the Anglian Water scheme cannot be delivered for any reason the Affinity Water scheme will not be delivered either.	-2
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Moderate	Detailed ecological surveys required. The loss of BAP Priority habitat and species should be avoided where possible. Where this isn't possible, the loss of habitats and species would need to be mitigated for through licensing and compensation. A CEMP should be in place.	-1	0	Construction of the new sewage treatment works at Sundon, south of Streatley Road borders an area of priority habitat deciduous woodland. The area for construction appears to currently be in use as arable field and is bordered by hedgerow to the north and east, there is another small copse of woodland bordering the south of the works area. There are potential impacts including the removal of hedgerows and potential impacts to the canopy and roots of the areas of woodland bordering the works area. Arable margins are also important features and would reduce habitat diversity with their removal. The new pipeline is set to be constructed through the Smithcombe, Sharpenhoe and Sundon Hills SSSI north of Streatley (TL07092961). This area is designated for unimproved calcareous grassland on chalk escarpment, species rich scrub and mature beech woodland. This will cause impacts through direct land take for the construction of the new main, habitat loss of priority habitats including chalk grassland and mature deciduous woodland. The pipeline also goes into the	

													Grafham Water SSSI which is designated for its nationally important waterfowl populations as well as areas of grassland, scrub, marsh and temporarily inundated shoreline. This will cause impacts through the loss of habitats potentially including marsh and grassland through the construction of the new pipeline. The pipeline travels within the boundaries of roads passed several large and small areas of woodland including Centenary Wood (TL06253501) and Sheerhatch Wood (TL13404769). There is the potential to cause damage to priority habitat (woodland) through damaging the tree canopies or root systems depending on the distance from the tree base/canopy, the extent of the trenches and the plant used for construction of the new main. The construction of the pipeline severs at least two area of linear deciduous woodland. Deciduous woodland is a priority habitat and therefore there is an impact with the overall loss of this habitat. The two areas are: east of Southhill Road (TL10674557) which follows a dismantled railway and north east of Charlton (TL14045066). The pipeline construction goes through an area of priority habitat which includes good quality semi-improved grassland, floodplain grazing marsh and deciduous woodland north of Firs Farm (TL07723722). There are potential hydrological impacts with the marshland due to the construction of the main, in addition to this the loss of deciduous woodland is also an impact. The construction currently appears to go through a waterbody at (TL07053592), this would cause the loss of this habitat and any protected species associated with it, the construction of the new main must avoid this waterbody. Four booster stations will be required to be constructed at Grafham Water SSSI. This will cause the loss of habitats for which the SSSI is designated.
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5–25 years) and Long term >25 years	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation	?	-1	There is the potential to introduce INNS during construction. It is also considered that the scheme may result in the spread of INNS during operation, given the scheme proposes the transfer of raw water. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.

											measures to avoid the introduction and spread of INNS.					
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	High	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	Regional	High	The pipeline route should avoid designated sites and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. Mitigation may include: - Ensuring abstraction from the Rivers are taken at appropriate times and volumes to avoid detrimental effects on water dependent designated sites such as SSSIs. - Undertake investigations to understand how the new reservoir may affect groundwater levels and therefore the surrounding water dependent designated sites - Ensuring that the option does not lead to a transfer of invasive species, appropriate filtration systems must be in place. - For all designated sites that are affected, further work will need to be undertaken to understand the sites to assist in design avoidance of effects, develop a mitigation plan, and implement this plan. Enhancement Opportunities: Create habitat within the new reservoir in keeping with the local habitats, over and above any mitigation required for any habitat lost by the reservoir creation and operation.	-2	-2	The initial route of the new pipeline passes through the Smithcombe, Sharpenhoe and Sundon Hills SSSI north of Streatley (TL07092961). This area is designated for unimproved calcareous grassland on chalk escarpment, species rich scrub and mature beech woodland. However, there is existing infrastructure (Sharpenhoe Road) that the pipeline could follow through the SSSI. It is therefore assumed that the construction of the pipeline will not pass directly through the SSSI nor lead to the direct loss of any designated habitat. The calcareous grassland and beech woodland could be affected by dust emissions during construction if the new pipeline follows Sharpenhoe Road. In terms of dust generation, there are standard dust suppression measures that could be introduced in line with the relevant British Standard. Given the interest features noise and light pollution will not have any impacts. It is also considered that there is suitable mitigation available to avoid any significant impacts on hydrology. During operation there would be no impacts on this SSSI. The existing Grafham reservoir is a SSSI, which is designated for its nationally important waterfowl populations as well as areas of grassland, scrub, marsh and temporarily inundated shoreline. It is currently 100% in a favourable condition. The precise location of the new raw water pumping station is not known at this stage. During construction there is the potential for impacts on the SSSI interest features through the loss and fragmentation of habitat, pollution and disturbance. The location of the pumping station and route of the raw water pipeline will need to avoid important habitats and areas used by the breeding/ wintering birds. The location should be informed by detailed ecological surveys carried out at the detailed design stage. Construction of the new pump station and main in proximity to Grafham Water SSSI should be carried out mid-August to end of		

														September to avoid disturbance to any breeding or wintering birds. There is the potential for a moderate negative effect during construction; however, it is anticipated that the significance of residual effects can be reduced through the identification of more detailed mitigation measures at the detailed design stage. During operation, there is not likely to be any significant impacts as a result of the abstraction on the Grafham Water SSSI. A new South Lincolnshire reservoir will be constructed by Anglian Water, and will be used instead of Grafham Water as the feed to the Ruthamford South WRZ (via Ruthamford North WRZ), resulting in additional water being available for abstraction from Grafham Water. This scheme will therefore use the surplus remaining for abstraction and transfer to Sundon. As a result it will not result in any further drawdown of the existing reservoir than was already occurring as a result of abstractions by Anglian Water. In terms of the infrastructure to be delivered by Anglian Water as part of this scheme, this includes the creation of a new reservoir (approx. 50,000Ml in size), new WTW and approx. 66km of pipeline. There are three SSSIs within 5km of the River Witham to reservoir transfer, the closest being 1.5km. There are seven SSSIs within 5km of the reservoir to WTW transfer, the closest being within 10m (Deeping Gravel Pits and Nene Washes SSSI). There are four SSSIs within 5km of the River Trent to River Witham transfer, the closest being within 1.2km. There is one SSSI 3km from the reservoir. Some of these SSSIs are likely to be geological SSSIs and are discussed elsewhere. The construction and operation of the South Lincolnshire reservoir may influence the surrounding Baston and Thurlby Fens SSSIs. Interest features include lowland ditch systems, swamps and reed-beds as well as dragonflys, Spined Loach and vascular plant assemblage. It is assessed by NE as having a favourable condition status. The filling of the reservoir with water will mean there will be a body of water close to them from the construction stage, and the storage of water may affect groundwater levels/ flows. It is assumed that any new mains/ transfers to be delivered by Anglian	

													Water as part of this scheme can be routed at the detailed design stage to avoid SSSIs and ensure appropriate buffers are in place. The WFD assessment concluded that this scheme would only have minor, localised and temporary impacts.
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the new treatment works, reservoir and main. Once constructed and filled, the new raw water reservoir will provide new habitat for waders and waterfowl. Potential for a net gain in biodiversity in the long-term.

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the scheme, in particular the new reservoir, as well as more specific mitigation measures. Mitigation: - Including planting/screening around the new water treatment works. - Incorporate measures to enable the reservoir to merge into the landscape (i.e. planting of trees as screening or design the shape to be in keeping with the current fens waterbodies in the landscape)	-3	-1	This option requires the construction of new water treatment works and approx. 2.7km of new main within the Chilterns AONB. The option includes a further 127km of new mains. During construction there is the potential for a major negative effect. However, once mitigation is taken into account, including appropriate screening and the burying of the new main, it is predicted that there will be a residual minor negative effect during operation. The National Character Area of the area of the proposed reservoir is classified as The Fens. The area is characterised by its historic and human-influenced wetland landscape lying to the west of the Wash estuary, which formerly constituted the largest wetland area in England its large-scale, flat, open landscape with extensive vistas to level horizons. The level, open topography shapes the impression of huge skies which convey a strong sense of place, tranquility, and inspiration. The creation of the reservoir is likely to change the views and landscape character of the area, adding a large body of water which is not currently part of the landscape. There are therefore likely to be major temporary construction effects and minor permanent operational effects on the landscape once mitigation has been taken into consideration.	-1
	6.b. Provide opportunities for landscape enhancement?		?	Moderate	?	Medium term (5 - 25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	1	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, but this is uncertain. The delivery of the new reservoir has the potential for a long-term minor positive effect on the landscape. It provides an opportunity to deliver a new valued landscape that is used by people for recreation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic; however, these can be mitigated through good construction practices and traffic management.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 - 25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	3	-3	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-3
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Long term >25 years	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. By improving supply this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Long term >25 years	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalization of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Regional	Low	Best practice construction.	-1	0	The transfer pipeline crosses several surface water bodies. There is the potential for hydrological impacts to all waterbodies which are bisected by the construction of the new main, but also impacts through water quality from potential pollution associated with the construction. Neutral effect during operation anticipated. The WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		High	High	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Low	WFD assessment may be required.	-1	-1	The transfer pipeline crosses several surface water bodies. There is the potential for hydrological impacts to all waterbodies which are bisected by the construction of the new main, but also impacts through water quality from potential pollution associated with the construction. The pipe also passes through or past a number of moderate sized ponds (TL07053592), (TL07464109) and (TL13794862). There is the potential at each of these ponds for changes in hydrology due to construction of the main and the potential for pollution spill into each of these ponds. There is potential for reduction in water quality at Grafham Water SSSI reservoir through the release of pollutants during construction of the five booster stations. However, measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts. Anglian Water WFD screening determined that the option would also have a negative effect on one or more waterbodies during the operational phases. Minor negative effect anticipated during construction and operation.	

													The Affinity Water WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Low	N/A	Long term >25 years	N/A	Permanent	Local	Low	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licencing of water abstraction	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced. The Affinity Water WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral. The Affinity Water WFD assessment concluded that any impacts are likely to be minor, temporary and localised.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	Low	Short term (< 5 years)	Long term >25 years	Temporary	?	Local	Moderate	Heritage impact assessment should be carried out to determine the effect of the pipeline or new structures on designated heritage assets. An archaeological survey should be carried out as part of any excavation / construction work to determine the presence of unknown archaeological assets at the upgraded reservoir site or along the new pipeline route. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-1	0	The new pipeline passes in close proximity to a significant number of designated heritage assets, including Scheduled Monuments, Registered Parks and Gardens and Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. There are no designated heritage assets likely to be affected by the new treatment works nor the new reservoir. There is the potential for archaeological activity/remains at the site, which would likely be impacted by the construction of the reservoir cell and associated infrastructure. Archaeological investigations should be carried out prior to any construction work.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Local	High	Where possible, mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route crosses Grade 1 and 2 agricultural land. Short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The reservoir is located in land which is a classified as Grade 1. This shows that the reservoir (50,000 Ml) is likely to cause the permanent loss of a large area of good quality agricultural land. M	-1

1.2.1.27 AFF-RTR-WRZ4-4023

SEA Objective	Assessment questions (would the options / programme…?)	Impact description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option seeks to increase the import from Fortis green to 27ML/D for 24 hours by operating existing valves to control the head from Arkley Reservoirs. The scheme will not require any new infrastructure, but will require the upgrade of existing values to provide automation and visibility on SCADA. The Fortis Green BPS will also need to be upgraded, however it is noted that this is a Thames Water pumping station and therefore is outside the scope of this assessment. This option will provide minor positive effects against all objective 1 sub objectives. No tourism, waste, air quality, soil quality, heritage or landscape implications are anticipated given no new infrastructure is required. Additionally, no HRA implications identified as there are no internationally designated (nor nationally designated) sites within 10km of the valve locations. Two of the valve locations are within close proximity to Dollis Brook and water bodies on the South Herts Golf Course. There is the potential, without mitigation cause an impact to water quality during the upgrading of the valves. This may lead to the loss or degradation of priority habitats/species; however without survey, it is not possible to know what species are present within the brook. Minor adverse effects therefore anticipated during operation. Two of the valves are located on the Great North Road and therefore minor traffic impacts are expected during the construction phase due to temporary closure of this road. No significant impacts are anticipated during operation. Two of the valve locations are within close proximity to Dollis Brook and water bodies on the South Herts Golf Course. There is the potential, without mitigation e.g. CEMP to cause an impact to water quality during the upgrading of the valves. Predicted climatic changes in England include hotter and drier summers. By increasing the import from Fortis Green this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 27Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is not anticipated to result in long term significant changes in water quality or flow that would be perceptible to informal recreation users.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is access to the site. Two of the valves are located south of Western Way in a green area accessible through Dollis Valley Greenwalk footpath The scheme does not involve new infrastructure and therefore is not anticipated to affect the access to the Dolly Brook and/or result in significant impacts to water quality/levels. It is not expected to impact upon angling activities where they do occur.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Two of the valves that require an upgrade are located on the Great North Road. The scheme is therefore anticipated to result in digging up and/or temporary closure of this A road during construction. Work related traffic impacts are not expected to last more than a few weeks. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect minor negative effects on critical services and industries due to congestion etc. caused by construction works.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impact as the option does not involve new infrastructure.	0

	4.b. Result in higher levels of reuse of waste?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impact as the option does not involve new infrastructure.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impact as there are no internationally designated sites within 10km of the valve locations.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	N/A	Short term (< 5 years)	N/A	?	N/A	Local	Moderate	A CEMP must be adhered to during the works at the valve locations in order to ensure no pollution enters Dollis Brook watercourse or other waterbodies at those locations to prevent damage to water quality and any protected/notable species which reside within the brook.	-1	0	Two of the valve locations are within close proximity to Dollis Brook and water bodies on the South Herts Golf Course. There is the potential, without mitigation e.g. CEMP to cause an impact to water quality during the upgrading of the valves. Minor negative effects anticipated. No other priority habitats will be affected by insitu upgrades to the valves. Without survey, it is not possible to know what species are present within the brook, however it may contain notable aquatic species e.g. fish/invertebrates or notable macrophytes. The other two valves are located on the A1000, which is located between rows of housing. There are mature trees close to the Cherry Hill valve location, any work undertaken must ensure no damage to the roots or canopy of the trees.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option will result in the transfer of raw water, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impact as there are no nationally designated sites within 10km of the valve locations.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated opportunities as the option does not involve new infrastructure.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impact as the option does not involve new infrastructure.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given no new infrastructure is required. It is noted that the scheme is located within London Borough of Barnet AQMA	0

													however the AQMA is not expected to be adversely affected. Overall effects are anticipated to be negligible.	
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By increasing the import from Fortis Green this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Long term >25 years	Temporary	Permanent	Regional	Low	A CEMP must be adhered to during the works at the valve locations in order to ensure no pollution enters Dollis Brook watercourse or other waterbodies at those locations to prevent damage to water quality.	-1	0	Two of the valve locations are within close proximity to Dollis Brook and water bodies on the South Herts Golf Course. There is the potential, without mitigation e.g. CEMP to cause an impact to water quality during the upgrading of the valves. However following best construction practice should mean any impacts are small, temporary and localised. Neutral effect during operation anticipated.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Low	A CEMP must be adhered to during the works at the valve locations in order to ensure no pollution enters Dollis Brook watercourse or other waterbodies at those locations to prevent damage to water quality.	-1	0	Two of the valve locations are within close proximity to Dollis Brook and water bodies on the South Herts Golf Course. There is the potential, without mitigation e.g. CEMP to cause an impact to water quality during the upgrading of the valves. However it is anticipated that measures during construction will ensure potential impacts to water quality are limited to temporary, spatially limited and/or minor impacts. Neutral effect during operation anticipated.	0
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this option.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No aquifers affected by this option.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this option.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme involves the upgrading of existing valves. No new infrastructure is required. Therefore, no heritage assets will be affected.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No anticipated impact as the option does not involve new infrastructure.	0

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SEA Objective	Assessment questions (would the options / programme…?)	Impact description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an import of water from Essex & Suffolk Water, transferred to a new Ardleigh Treatment Works and then pumped into distribution. This scheme requires a new treatment works, approximately 1400m of new 250mm diameter gravity main from Essex & Suffolk Water's break tank to existing Ardleigh Reservoir Pumping Station, and approximately 200m of new 250mm pipework connecting from the new treatment works to the existing booster pumping station. This option will provide minor positive effects against all objective 1 sub objectives. The pipeline route follows the footprint of roads and therefore minor negative effects are anticipated during construction in this respect. As a result of increased traffic there may also be minor negative effects on air quality and on critical services and industries during construction. The pipeline route crosses Grade 2 agricultural land, and therefore short-term negative effects are expected resulting from loss of top soil during construction phase. The new pipeline passes in close proximity to a significant number of designated heritage assets, and through small residential areas along Colchester Road. Minor negative effects are therefore predicted in during the construction phase in relation to heritage and landscape. There are no internationally or nationally designated sites within close proximity to the option. There is however potential for minor adverse effects on species and habitats during construction. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint. The pipeline does not cross any brooks or streams; however Ardleigh Reservoir is situated to the west of the new WTW and new pipeline. Water pollution protocols must be adhered to throughout the construction to ensure no run off into the reservoir. Predicted	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	In-stream activities currently take place at Ardleigh Reservoir (Ardleigh Sailing Club) but the scheme is not anticipated to have any impacts (positive or negative) on these. The scheme is not anticipated to impact on the water quality/level of the reservoir.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is assumed that there is no public access to the Ardleigh treatment works and that informal recreation does not therefore currently take place on site.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of roads; therefore the construction of the new pipeline is anticipated to result in digging up or closure of roads. The construction traffic impact is not anticipated to last longer than a few months at any one location (section/site). There is likely to be minor temporary negative effects during construction. No impacts are anticipated during the normal course of operation although there may be occasional disturbance for the purposes of maintenance or repair. No significant traffic related impacts are anticipated from the construction or operation of the new treatment works at Ardleigh.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	climatic changes in England include hotter and drier summers. By providing an additional flow of up to 4Ml/d this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	N/A	N/A	-3	0	This scheme requires a new treatment works at Ardleigh, approximately 1400m of new 250mm diameter gravity main from Essex & Suffolk Water's break tank to existing Ardleigh Reservoir Pumping Station via the new Ardleigh treatment works, and approximately 200m of new 250mm pipework connecting from the new treatment works to the existing booster pumping station.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme is remote from European sites and there are no identified pathways for impacts.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	?	N/A	Local	Moderate	The pipeline route should avoid priority habitats and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. This could include restricting construction to the roadway and ensuring that it is a suitable distance from important habitats.	-1	0	The works for the new WTW will occur within the current water treatment works site. The area allocated for the works appears to be, (from Google imaging, 2018), short mown amenity grassland surrounded by single storey buildings and concrete roads. It is unlikely that any priority habitats will be affected due to this works. In terms of species, buildings next to the new WTW may require a bat roost potential survey to determine if there is potential for a roost which could be disturbed during the construction of the new WTW. Water pollution protocols must be undertaken throughout the project to ensure that no run off from site enters Ardleigh Reservoir. This will contribute towards protecting any protected/notable aquatic life within the Reservoir. It is assumed that the new pipe will be constructed within the concrete and asphalt roadways along the route to the covered reservoir from the new WTW. Habitats adjacent to the roadways include hedgerow, arable field, pasture grassland, trees, buildings and amenity grassland. Trees and hedgerows may be affected if construction is being undertaken within 5m of the base of the trees/hedgerow. This is the root zone; any roots cut can cause canopy die back. Hedgerows have the potential to support common breeding birds which may be disturbed during construction of the pipeline. The larger arable fields also have the potential to support wintering birds which may be disturbed during the construction of the pipeline. Minor negative effects therefore anticipated during construction.	

	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option will result in the transfer of raw water, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no SSSIs within 500m of the new WTW or the new mains. The closest designated site is Ardleigh Gravel Pit SSSI 1.3km east or Bullock Wood SSSI 1.6km south-west. At this distance the SSSI's will not be affected by the works.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	A landscape and visual impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures.	-1	0	The pipeline route travels through small residential areas along Colchester Road. Therefore, there will be short-term minor temporary negative effects on landscape and residents associated with the pipeline construction. The landscape, nor residential views are not anticipated to be affected by the pipeline during the operational phase as it will be buried. The new treatment works is not likely to affect the landscape or residents given its location within the existing treatment works site and the mitigation available.	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. There are likely to be negative effects on air quality during construction of the new pipeline and treatment works as a result of increased traffic, however these are expected to be minor and short-term.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Long term >25 years	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2

	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Long term >25 years	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By providing an additional flow of up to 4Ml/d this option should result in positive effects on the resilience of Affinity Water's assets to climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Long term >25 years	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No abstraction within option.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	0	0	The pipeline does not cross any brooks or streams; however Ardleigh Reservoir is situated to the west of the new WTW and new pipeline. Water pollution protocols must be adhered to throughout the construction to ensure no run off into the reservoir.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	0	0	The pipeline does not cross any brooks or streams; however Ardleigh Reservoir is situated to the west of the new WTW and new pipeline. Water pollution protocols must be adhered to throughout the construction to ensure no run off into the reservoir.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No direct abstraction dealt with in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Heritage impact assessment should be carried out to determine the effect of the pipeline and in particular the new reservoir on designated heritage assets.	-1	0	The new pipeline passes within 40m of a Scheduled Monument. There is also a listed building (Milepost on West Verge approximately 10 metres north of Lodge Lane) located adjacent to the pipeline, and another three listed buildings (Lodge Farmhouse, Barn approximately 40 metres north west of Lodge Farm House, and De Bois Hall) within 115m of the pipeline. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. It is assumed that there will be appropriate mitigation to ensure that the visible infrastructure does not have a significant negative effect on the historic environment.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets,	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	

	including paleo-environmental deposits?										determine the location of potential unknown archaeological assets.				
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

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SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Iver 2 Water Treatment Works. This option also includes a supported conveyance pipeline from Deerhurst on the River Severn to Culham on the River Thames with a 500 Ml/d capacity and a total length 88km. This option will provide moderate positive effects against all objective 1 sub objectives. The pipeline route follows the footprints of several roads and construction traffic is anticipated to generate an estimated 9,500 HGV movements. Moderate adverse impacts are therefore predicted during construction. Given the new pipeline is located within South Bucks AQMA and in close proximity to additional AQMAs, moderate adverse effects are predicted during construction in the short-term for air quality. Minor negative effects are predicted during operation as a result of emissions from chemical deliveries and sludge removal associated with the treatment works (estimated to be approximately 1964 vehicle movements per year), and operational vehicle movements (e.g. associated with the delivery of treatment chemicals). The Deerhurst to Culham pipeline route and individual above ground site locations are predominantly within rural locations with at least 45km of the route within the Cotswolds AONB. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. The final part of the Deerhurst to Culham route near Culham is 5.5km north of the North Wessex Downs AONB and passes a number of promoted viewpoints. The construction compounds and pipeline route would be temporary prominent features in the landscape during construction due to temporary removal of distinctive landscape features. Along the pipeline route and at the majority of above ground sites, there is a network of PROW and trails. Sensitive recreational receptors would be expected to have views of construction of most of the pipeline route and above ground assets. It is therefore anticipated that there will be major negative effects	N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	Moderate	N/A	Medium term (5 - 25 years) to long term (<25 years)	N/A	Permanent	Local	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		Moderate	N/A	Short term (< 5 years)	N/A	Short term (< 5 years)	N/A	Local	Low	N/A	-1	0	The River Thames is accessible to water craft. The construction of the scheme will involve crossing of a number of watercourses with associated temporary disruption to users. In operation, there will be limited effects on any recreation associated with the River Severn or River Thames in respect of recreation activities (e.g. walking, angling) or navigation activities.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity. The anticipated levels (minor significant impact during construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation includes that all reasonable effort will be made to avoid temporary closure of Public Rights of Way with footpath/bridleway diversions provided instead. The SEA for Severn Thames WRMP19 states that Public Rights of Way will be reinstated following construction completion. Careful siting and use of screening where work locations are in proximity to Public Rights of Way and other affected recreational assets will be undertaken. There is the opportunity to improve footpaths and connections in and around proposed pipeline route as part of the construction work, giving rise to a permanent minor beneficial effect. Use of directional drilling of the pipeline laying is also proposed to reduce the scale of disruption at river and road crossings.	-2	0	The SEA for Severn Thames WRMP19 states that during construction, there would the potential for significant temporary disruption to recreation activities considering the scale of the scheme and the well-connected network of Public Rights of Way and trails in proximity to the above ground construction sites and along the pipeline route. This includes the potential for temporary disruption to access to areas with high tranquility value including parts of the Cotswolds and North Wessex Downs AONB. The construction of the scheme will also involve crossing of a number of roads and watercourses with associated temporary disruption to users. In operation, there will be limited effects on any recreation associated with the River Severn or River Thames in respect of recreation activities (e.g. walking, angling) or navigation activities. There will a small amount of permanent	0

		during construction. In operation, pipeline and overhead powerlines would be buried. Fields boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. Moderate adverse effects are therefore anticipated during operation. There are a large number of designated heritage assets in proximity to the construction areas associated with the scheme including listed buildings, scheduled monuments and Registered Parks and Gardens (including Buckland House Registered Park and Garden. There could be some residual temporary adverse effects during operation; with respect to access and enjoyment of these assets. Additionally, archaeological remains may also be impacted during construction and should be further investigated. Moderate and minor adverse effects are therefore anticipated during construction and operation respectively. HRA screening identified that the construction and operation of the Deerhurts to Culham transfer pipelines would not have any adverse effect on the integrity of nearby internationally designated sites. In terms of the rest of the scheme, a section of pipeline is adjacent to the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. There is the potential for changes in hydrology at the SPA/Ramsar and SSSIs. Additionally, there the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. In operation, it is not anticipated that the upstream abstraction would have any significant adverse impact on the qualifying features of the Severn Estuary. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase												landtake which will involve the loss of greenfield land (for the Break Pressure Tank associated with the pipeline), however this is not anticipated to impact upon recreational access.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-2	-1	The anticipated pipeline routes follow the footprints of several roads, including the M4, and so is anticipated to cause such impacts. The construction traffic impact is anticipated to generate an estimated 9,500 HGV movements. Further HGV movements will be generated by the construction of the pipeline. Moderate adverse effects are therefore anticipated during construction. In operation, there will be requirement for chemical deliveries and sludge removal associated with the treatment works (estimated to be approximately 1964 vehicle movements per year). In addition, there will be the requirement for operational vehicle movements (e.g. associated with the delivery of treatment chemicals), primarily visiting the low lift pump station and the water treatment sites. Occasional maintenance works for all sites may require larger trucks / mobile cranes to bring / install replacement parts or plant on a minor scale. Minor adverse effects are therefore anticipated during operation.	-1
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This scheme requires the construction of 4 x 132 kW Intake booster pumps, 11.1 km of 800 mm Diameter Main, 64m3 Surge Vessel, and 88km of pipeline (including any associated infrastructure e.g. a break pressure tank and a tee off the main pipeline).	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	effects are likely to increase the footprint. Abstraction source and transfer pipeline crosses several surface water bodies the quality of which could be affected during construction works. The installation of the pumps also has the potential to affect water quality during construction works. Further abstraction may have a negative effect on the environment if not properly monitored and licenced. Predicted climatic changes in England include hotter and drier summers. This option is likely to reduce the vulnerability to drought risks associated with climate change and thus improving resilience to the likely effects of climate change.	High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Any proposal for this option should avoid designated sites where possible. Due to the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. HRA of the Affinity Water's WRMP concluded any effects on the SPA can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. This would need to be developed further during detailed scheme design. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. From aerial mapping, the boundary of the SPA and Ramsar appear to have a section of trees and shrubs screening the gravel pits from the road, therefore noise and light disturbance may be reduced due to the natural screening. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction. However, Natural England may want more detailed design information at this stage to support this conclusion due to the proximity of the SPA and Ramsar site.	-2	-1	The SEA work carried out for Thames Water WRMP19 states that the potential for effects on Cothill Fen SAC; Little Wittenham SAC; Bredon Hill SAC; and Dixton Wood SAC were considered in the Severn Thames HRA screening, which concluded no Likely Significant Effect in all cases. With regard to the Severn Estuary SAC, SPA and Ramsar, the HRA concluded that the construction and operation of the Deerhurts to Culham transfer pipelines would not have any adverse effect on the integrity of the designated sites, taking account of the Hands Off Flow condition that would control abstraction at Deerhurst to protect flows to the Severn Estuary and mitigation in the form of intake screens to guard against potential mortality of fish through abstraction. The Deerhurts to Culham transfer pipelines will not require land take from within the European Marine Site boundaries, and construction activities are at a sufficient distance from the European Site (approximately 23.9km at the closest point) that no significant impacts on the qualifying features are anticipated as a result of construction. In terms of the rest of the scheme, a section of pipeline is adjacent to the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. There is also the potential for disturbance (noise, light, dust etc.) to the designated sites during construction. From aerial mapping, the boundary of the SPA and Ramsar appear to have a section of trees and shrubs screening the gravel pits from the road, therefore noise and light disturbance may be reduced due to the natural screening. The flooded gravel pits are in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline (and thus the need for dewatering of the excavation or risk of pollution) there is thus potential for changes in hydrology and water quality within the SPA. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. Moderate adverse effects are therefore anticipated during construction. In operation, the abstraction of water from the River Severn at Deerhurst up to a maximum daily rate of 500Ml/d would not reduce flows downstream below a hands-off flow condition of 1,800Ml/d thus, only flows above this level would be affected downstream of the abstraction. Abstraction would be limited to a maximum of 275Ml/d if flows at Deerhurst are less than 2,486Ml/d. The volumes would be small in comparison to flows in the estuary (the Severn Estuary has a very large tidal	-1

														range) such that it is not anticipated that the upstream abstraction would have any significant adverse impact on the qualifying features of the site, which would be well habituated to fluctuating water levels and flows. However, as with the pipeline transfer, supported and phased canal transfers carry a minor risk of temporarily disrupting sea lamprey migration during low flow conditions by causing additional flow to pass over Upper Lode Weir on the River Severn, which may affect the ability of sea lamprey to pass the weir for short infrequent periods. Although there would be some minor modification to the flow regime as a consequence of the abstraction, these flow constraints will provide an acceptable level of protection to the downstream river environment and aquatic ecology, including migratory fish species. Significant impacts are therefore not anticipated during operation.		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. Due to the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. Detailed mitigation provided at 5.a.	-2	-1	There are two SSSIs within 1km of the Deerhurts to Culham transfer pipelines. Cleeve Common (0.6km from the pipelines) is one of the most extensive areas of limestone grassland in the Cotswolds and is of importance both for its grassland, and for its geological and physiographical features. This site is in favourable condition. Chimney Meadows (1km from the pipelines) consists of six neutral, unimproved and semi-improved alluvial meadows which support a botanically rich sward and are of local importance for breeding birds, particularly waders. This site is in unfavourable – recovering condition. The site has suffered two damaging events in successive years in 2007 and 2008 when the whole grassland area was flooded prior to hay cut. Hay cutting and aftermath grazing was not carried out in these years, resulting in major changes in the vegetation. At these distances from the pipeline construction, the potential for likely significant adverse effects on the grassland habitats and associated features (e.g. wading birds) are assessed as negligible. In terms of the rest of the scheme, a section of pipeline is adjacent to Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from		

													the River Thames at its closest, 440m from the abstraction point. This pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. Wraysbury & Hythe End Gravel Pits supports nationally important numbers of three species of wintering wildfowl together with an important assemblage of breeding birds associated with open waters and wetland habitats. In addition the site supports two nationally scarce invertebrates and a number of locally uncommon plants. Wraysbury Reservoir SSSI supports nationally important numbers of wintering cormorant Phalacrocorax carbo, great crested grebe Podiceps cristatus and shoveler Anas clypeata. Both sites are currently in a favourable condition. There is the potential for increased abstraction from the River Thames to affect the hydrology of these sites. The pipeline is also 360m from Kingcup Meadows and Oldhouse Wood SSSI, designated for its intimate mosaic of habitats adjacent to the River Alderbourne, which includes woodland, unimproved pastures and semi and unimproved meadowland. This SSSI is meeting favourable and unfavourable recovering condition status. The pipeline is also 40m from Fray's Farm Meadows LNR and SSSI, designated for being one of the last remaining examples of relatively unimproved wet alluvial grassland in Greater London and the Colne Valley. Approximately 53.3% of this SSSI is in favourable condition, with the remainder unfavourable declining. The unfavourable declining is as a result of dense litter/thatch cover (high cover of graminoids/tall herbs). The vegetation throughout is very dense and under-managed. The pipeline is 52m from Ruislip Woods NNR and SSSI, designated for its ancient semi-natural woodland, including some of the largest unbroken blocks that remain in Greater London. The SSSI is in favourable and unfavourable – recovering condition status. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs.
	5.c. Impact on non-native species?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The abstracted water will be pre-treated to address water quality risks and risks of the spread of INNS.	0	0	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. However, the SEA work carried out for Thames Water WRMP19 states that the abstracted water would be discharged into the River Thames at Culham which has been carefully selected as the discharge location to minimise any adverse effects on the river environment. The abstracted water will be pre-treated to address water quality risks and risks of the spread of INNS.

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Medium term (5 - 25 years) to Long term (>25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Mitigation measures where the pipeline route runs close to ancient woodland and wood pasture habitat areas includes tree surveys to assess risks and put in place applicable tree retention and protection measures to ensure the construction activities final pipeline route avoids any adverse effects on supporting root structures. In proximity to Ancient Woodland locations, where soil stripping is to be undertaken, the soils are to be stored and reinstated following construction in order to maintain seedbanks. In the event that site specific ecological assessments identify any permanent impacts on other protected species or habitats associated with these development works, appropriate mitigation measures including where appropriate relocation of such species or provision of compensatory habitat, will be undertaken in advance of the works being undertaken. Ecological surveys of BAP Priority habitats are required. The loss of BAP Priority habitat should be avoided where possible. Where this isn't possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction; a CEMP should be in place. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. Additional detailed mitigation provided at 5.a.	-1	-1	The abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. The pipeline also passes 14m and 79m from two parcels of ancient woodland east of Chandlers Hill, 52m from ancient woodland at Ruislip Woods, adjacent to French Grove and Battlers Wells Wood ancient woodland and 88m from ancient woodland north of French Grove. There are a number of areas of ancient woodland within 1km of the Deerhurst to Culham transfer pipeline route. Every effort will be made to ensure the final pipeline route avoids the need for the removal of other (non-Ancient Woodland) trees, hedgerows or other important vegetation, or adverse effect on supporting root structures. Any hedgerows affected will be reinstated. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. Additionally, The pipeline passes adjacent to houses, through residential areas. These have the potential to support roosting bats or nesting birds. There is therefore the potential for disturbance to BAP Priority habitats, species, and ancient woodland during construction; a CEMP should be in place. Minor adverse effects are anticipated. In terms of effects taking place during operation, the likely residual adverse effects of the discharge to the River Thames relate to the increases in the low flow to extreme low flow arising from the discharge of 400 Ml/d, in particular risks to the flow regime of the weir pools in the reaches below the discharge point - higher flows and/or more variable changes in flow under low flow conditions may lead to a loss of shallows and increased flow velocities which can reduce habitat availability for the full range of fish, invertebrates and plants living in these reaches. Detailed studies have identified that for flows of 400 Ml/d at Culham there may be some adverse effects on aquatic ecology that this reaches. Minor adverse effects are therefore also anticipated at a flow of 500 Ml/d.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-3	-2	The Deerhurst to Culham pipeline route and individual above ground site locations are predominantly within rural locations with at least 45km of the route within the Cotswolds AONB. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. The final part of the Deerhurst to Culham route near Culham is 5.5km north of the North Wessex Downs AONB. This pipeline route passes 2km north east of a promoted viewpoint at Cleve Hill and 1600m north east of a promoted viewpoint at Stockwell Common, 2.5km to the north east of a promoted viewpoint near St Paul's Epistle off A436. The scheme is located within the following NCAs, many of which have historic, cultural and distinctive landscape features that are potentially affected by the proposals: Severn and Avon Vales NCA (106) , Cotswolds NCA (107), Upper Thames Clay Vales NCA (108) and Mid vale Ridge NCA (109). The construction compounds and pipeline route would be temporary prominent features in the landscape during construction due to temporary removal of distinctive landscape features. Along the pipeline route there is a well connected network of PRoW and trails, including the Severn Way at the Intake Site. Although not publicly accessible, the construction works would be a visible feature from the Thames Path opposite. Sensitive recreational receptors would be expected to have views of construction of most of the pipeline route and any above ground assets. Sensitive residential receptors are located in individual properties, small villages, hamlets and towns along the route and would be expected to have views of the pipeline route. It is therefore anticipated that there will be major negative effects during construction. In operation, pipeline and overhead powerlines would be buried. Fields boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. In the short to medium term, 5 years after initial operation, fields would return to their original condition. In the long term, 15 years after initial operation, planting would mature and hedgerow connections re-established, aiding integration of the new facilities into the landscape and setting of the AONB. Moderate adverse effects are therefore anticipated during operation.	-2
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-2	0	The pipeline route passes within the South Bucks AQMA. There are also two further AQMAs within 3km of construction areas (Cheltenham Whole Borough AQMA and Tewkesbury Town Centre AQMA). HGV movements will be generated by the construction of the pipelines which will result in increased traffic in localised areas due to the anticipated large number of deliveries. However, given the presence of the M25 and M4 in the vicinity of the pipeline route it is considered that construction and operational impacts may be lessened to some extent. Nonetheless, moderate negative effects on air quality in the short-term during construction are anticipated. It is considered unlikely that the operational phase would result in significant impacts on local air quality.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-1	-1	This scheme requires the construction of 4 x 132 kW Intake booster pumps, 11.1 km of 800 mm Diameter Main, 64m3 Surge Vessel, and 88km of pipeline (including any associated infrastructure e.g. a break pressure tank and a tee off the main pipeline). T The construction of this new infrastructure will result in an increase of energy use. The operation of this new infrastructure will result in an increase in energy use. Construction and operational activities are therefore likely to increase Affinity Water's carbon footprint.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. The flow support elements of this scheme would enable the reliable transfer of water for the benefit of flows in the River Thames and resource availability in the London WRZs during times of low flow, therefore reducing the vulnerability to drought risks associated with climate change and thus improving resilience to the likely effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation includes requiring that the first flush of water through the pipeline will be tested and if required treated at a temporary holding lagoon. Once operational, the discharge will be treated to environmental standards at the water treatment works and this will provide sufficient quality of water for discharge taking account of the mixing and dilution that will occur within the receiving waters. The discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies (which are currently assessed as being at WFD moderate status). Peaks in suspended solids will be monitored and if there is an elevated level of suspended solids, the abstraction from the River Severn will be reduced to just the pipeline "sweetening" flows and will be treated prior to the main treatment works. The outfall to the River Thames will involve an aeration cascade structure to oxygenate the discharge water to minimise any adverse impacts on dissolved oxygen concentrations in the river.	-1	0	Construction activities that could affect water quality include construction of the intake at Deerhurst, the outfall at Culham and where the pipeline crosses watercourses. The pipeline route will have a number of major crossings including the River Coln and the River Thames. Construction of the intake and outfall will be managed by best construction practices and any residual construction risk to the associated water bodies is low. Minor adverse effects are therefore anticipated during construction. In operation, the abstraction of water from the River Severn at Deerhurst (WFD water body GB109054044404) is not anticipated to result in a change in the flow regime that would be materially significant such as to alter the chemical status of the river. The abstracted water will be treated at the nearby treatment works. The first flush of water through the pipeline after a period of non-use has the potential for adverse effects to water quality. The effects of the discharge at the discharge/flow augmentation point at Culham (Thames (Evenlode to Thame) GB106039030334) and the potentially impacted waterbodies downstream (GB106039030331; GB106039023233; GB106039023232) were considered in the WFD assessment. This concludes that there is the potential for some organic pollutants to be in the discharged, such as metaldehyde, as these pollutants are more difficult to treat and remove at the water treatment works. However, with the hands-off flow conditions set at appropriate levels to safeguard the aquatic environment, there should be no material adverse effects of the abstraction on the River Severn water quality or ecology. Neutral effects anticipated.	0

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation includes requiring that the first flush of water through the pipeline will be tested and if required treated at a temporary holding lagoon. Once operational, the discharge will be treated to environmental standards at the water treatment works and this will provide sufficient quality of water for discharge taking account of the mixing and dilution that will occur within the receiving waters. The discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies (which are currently assessed as being at WFD moderate status). Peaks in suspended solids will be monitored and if there is an elevated level of suspended solids, the abstraction from the River Severn will be reduced to just the pipeline "sweetening" flows and will be treated prior to the main treatment works. The outfall to the River Thames will involve an aeration cascade structure to oxygenate the discharge water to minimise any adverse impacts on dissolved oxygen concentrations in the river.	-1	0	Construction activities that could affect water quality include construction of the intake at Deerhurst, the outfall at Culham and where the pipeline crosses watercourses. The pipeline route will have a number of major crossings including the River Coln and the River Thames. Construction of the intake and outfall will be managed by best construction practices and any residual construction risk to the associated water bodies is low. Minor adverse effects are anticipated. In operation, the abstraction of water from the River Severn at Deerhurst (WFD water body GB109054044404) is not anticipated to result in a change in the flow regime that would be materially significant such as to alter the chemical status of the river. The abstracted water will be treated at the nearby treatment works. The first flush of water through the pipeline after a period of non-use has the potential for adverse effects to water quality. The effects of the discharge at the discharge/flow augmentation point at Culham (Thames (Evenlode to Thame) GB106039030334) and the potentially impacted waterbodies downstream (GB106039030331; GB106039023233; GB106039023232) were considered in the WFD assessment. This concludes that there is the potential for some organic pollutants to be in the discharged, such as metaldehyde, as these pollutants are more difficult to treat and remove at the water treatment works. However with the hands-off flow conditions set at appropriate levels to safeguard the aquatic environment, there should be no material adverse effects of the abstraction on the River Severn water quality or ecology. Neutral effects anticipated.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Low	Appropriate licensing and HOF will be required.	0	0	The abstraction of water from the River Severn at Deerhurst (GB109054044404) is to a maximum daily rate of 500Ml/d and would not reduce flows locally below a hands-off flow condition of 1,800Ml/d, protecting the downstream flow regime and flows to the Severn Estuary, ensuring a sustainable level of abstraction. Neutral effects anticipated.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Low	Appropriate licensing and HOF will be required.	-1	0	During construction, a number of watercourses will be intersected by the pipeline route. Any temporary flow diversions will be subject to agreement with the Environment Agency to avoid any material adverse effects on the river environment and ensuring WFD compliance. A number of river crossings are also required as part of pipeline route. The use of pipejacking will be adopted to mitigate impacts. Minor adverse effects anticipated during construction. In operation, the abstraction from the River Severn at Deerhurst would modify the flow regime downstream, reducing some of the flow variability at moderately low flows but this will be ameliorated by river flow support from upstream water sources as flows reduce towards the hands-off flow condition which prevents abstraction at low flows below 1800 Ml/d. Abstraction will be limited to 275 Ml/d at river flows below 2486 Ml/d. These flow constraints on abstraction will protect the low flow regime and flows to the Severn Estuary. Downstream of the discharge to the River Thames at Culham, the greatest proportion change in the flow would be increases in the low flow to extreme low flow and velocities in the reaches immediately downstream - the greatest effects would be in the receiving waterbody (Thames (Evenlode to Thame) GB106039030334), with effect reducing with distance downstream. The River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. No effects are anticipated on groundwater levels. At times of very low flows, the release of water to the River Thames may provide a minor benefit to the hydrological conditions. Measures will be taken to protect any temporary exposure of bare soil from runoff during heavy rainfall events. Neutral effects anticipated during operation.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Low	Adequate methods of construction (mitigation) to be provided includes the dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction.	-1	0	Sections of the pipeline route will be within the flood plain where high groundwater levels and high soil permeability are expected. Adequate methods of construction will be adopted to minimise the impact of localised flooding during construction. Minor adverse effects anticipated. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete. Neutral effects anticipated.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A watching brief, surveys and investigation will be required to minimise risk of harm to unknown assets. Mitigation also includes minimising the impact on the settings of existing heritage features such as Deerhurst Priory and Wightfield Manor, through the use of screening and avoiding stockpiling in these more sensitive locations. A buffer area between the proposed conveyance route works and heritage assets will be established to minimise development activity which would adversely affect these features and their setting.	-2	-1	There are a large number of designated assets in proximity to the construction areas associated with the scheme including listed buildings, scheduled monuments and Registered Parks and Gardens (including Buckland House Registered Park and Garden). Measures would be taken to avoid permanent disturbance to the setting of these designated assets, however, long term temporary impacts are likely to result during the construction phase. The routing of the pipeline and temporary nature of these works is likely to minimise adverse effects, although there could be some residual temporary adverse effects during operation; with respect to access and enjoyment of these assets. The alignment of the pipeline will be developed further during design development and further consultation with Historic England would be proposed during this process. In addition, the location of the proposed conveyance route is in close proximity to a number of scheduled monuments (i.e. Roman small town at Wycombe). Construction works therefore has the potential to adversely affect these heritage features and their setting. Moderate adverse effects are therefore anticipated during the construction phase.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	?	?	?	?	?	?	?	Further investigation required. This is likely to include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	?	?	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. The excavation required for scheme construction is large and therefore still represents a risk in respect of buried assets. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route crosses grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The permanent above ground components of the scheme (e.g. the Break Pressure Tank associated with the pipeline) would involve permanent landtake, some of which would be greenfield land/agricultural land. However this is not considered to be a significant amount. Therefore minor negative effects are anticipated during construction and operation.	-1

1.2.1.30 AFF-RTR-WRZ4-4018

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Iver 2 Water Treatment Works. This option also includes a supported conveyance pipeline from Deerhurst on the River Severn to Culham on the River Thames with a 500 Ml/d capacity and a total length 88km. This option will provide major positive effects against all objective 1 sub objectives.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	3	This option will provide positive effects against all sub objectives. The significance of the effect is assessed against the DO provided by the option. 100Ml/d equates to a major positive effect.	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?	The pipeline route follows the footprints of several roads and construction traffic is anticipated to generate an estimated 9,500 HGV movements. Moderate adverse impacts are therefore predicted during construction. Given the new pipeline is located within South Bucks AQMA and in close proximity to additional AQMAs, moderate adverse effects are predicted during construction in the short-term for air quality. Minor negative effects are predicted during operation as a result of emissions from chemical deliveries and sludge removal associated with the treatment works (estimated to be approximately 1964 vehicle movements per year), and operational vehicle movements (e.g. associated with the delivery of treatment chemicals). The Deerhurst to Culham pipeline route and individual above ground site locations are predominantly within rural locations with at least 45km of the route within the Cotswolds AONB. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. The final part of the Deerhurst to Culham route near Culham is 5.5km north of the North Wessex Downs AONB and passes a number of promoted viewpoints. The construction compounds and pipeline route would be temporary prominent features in the landscape during construction due to temporary removal of distinctive landscape features. Along the pipeline route and at the majority of above ground sites, there is a network of PROW and trails. Sensitive recreational receptors would be expected to have views of construction of most of the pipeline route and above ground assets. It is therefore anticipated that there will be major negative effects during construction. In operation, pipeline and overhead powerlines would be buried. Fields	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		Moderate	N/A	Short term (< 5 years)	N/A	Short term (< 5 years)	N/A	Local	Low	N/A	-1	0	The River Thames is accessible to water craft. The construction of the scheme will involve crossing of a number of watercourses with associated temporary disruption to users. In operation, there will be limited effects on any recreation associated with the River Severn or River Thames in respect of recreation activities (e.g. walking, angling) or navigation activities.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity. The anticipated levels (minor significant impact during construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	All reasonable effort will be made to avoid temporary closure of Public Rights of Way with footpath/bridleway diversions provided instead. The SEA for Severn Thames WRMP19 states that Public Rights of Way will be reinstated following construction completion. Careful siting and use of screening where work locations are in proximity to Public Rights of Way and other affected recreational assets will be undertaken. There is the opportunity to improve footpaths and connections in and around proposed pipeline route as part of the construction work, giving rise to a permanent minor beneficial effect. Use of directional drilling of the pipeline laying is also proposed to reduce the scale of disruption at river and road crossings.	-2	0	The SEA for Severn Thames WRMP19 states that during construction, there would the potential for significant temporary disruption to recreation activities considering the scale of the scheme and the well-connected network of Public Rights of Way and trails in proximity to the above ground construction sites and along the pipeline route. This includes the potential for temporary disruption to access to areas with high tranquility value including parts of the Cotswolds and North Wessex Downs AONB. The construction of the scheme will also involve crossing of a number of roads and watercourses with associated temporary disruption to users. In operation, there will be limited effects on any recreation associated with the River Severn or River Thames in respect of recreation activities (e.g. walking, angling) or navigation activities. There will a small amount of permanent	0

		boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. Moderate adverse effects are therefore anticipated during operation. There are a large number of designated heritage assets in proximity to the construction areas associated with the scheme including listed buildings, scheduled monuments and Registered Parks and Gardens (including Buckland House Registered Park and Garden. There could be some residual temporary adverse effects during operation; with respect to access and enjoyment of these assets. Additionally, archaeological remains may also be impacted during construction and should be further investigated. Moderate and minor adverse effects are therefore anticipated during construction and operation respectively. HRA screening identified that the construction and operation of the Deerhurts to Culham transfer pipelines would not have any adverse effect on the integrity of nearby internationally designated sites. In terms of the rest of the scheme, a section of pipeline is adjacent to the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. There is the potential for changes in hydrology at the SPA/Ramsar and SSSIs. Additionally, there the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. In operation, it is not anticipated that the upstream abstraction would have any significant adverse impact on the qualifying features of the Severn Estuary. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint. Abstraction source and transfer pipeline crosses several surface water bodies the quality of which could be affected during											landtake which will involve the loss of greenfield land (for the Break Pressure Tank associated with the pipeline), however this is not anticipated to impact upon recreational access.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-2	-1	The anticipated pipeline routes follow the footprints of several roads, including the M4, and so is anticipated to cause such impacts. The construction traffic impact is anticipated to generate an estimated 9,500 HGV movements. Further HGV movements will be generated by the construction of the pipeline. Moderate adverse effects are therefore anticipated during construction. In operation, there will be requirement for chemical deliveries and sludge removal associated with the treatment works (estimated to be approximately 1964 vehicle movements per year). In addition, there will be the requirement for operational vehicle movements (e.g. associated with the delivery of treatment chemicals), primarily visiting the low lift pump station and the water treatment sites. Occasional maintenance works for all sites may require larger trucks / mobile cranes to bring / install replacement parts or plant on a minor scale. Minor adverse effects are therefore anticipated during operation.	-1
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This scheme requires the construction of 4 x 132 kW Intake booster pumps, 11.1 km of 800 mm Diameter Main, 64m3 Surge Vessel, and 88km of pipeline (including any associated infrastructure e.g. a break pressure tank and a tee off the main pipeline).	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	construction works. The installation of the pumps also has the potential to affect water quality during construction works. Further abstraction may have a negative effect on the environment if not properly monitored and licenced. Predicted climatic changes in England include hotter and drier summers. This option is likely to reduce the vulnerability to drought risks associated with climate change and thus improving resilience to the likely effects of climate change.	High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Any proposal for this option should avoid designated sites where possible. Due to the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. HRA of the Affinity Water's WRMP concluded any effects on the SPA can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. This would need to be developed further during detailed scheme design. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. From aerial mapping, the boundary of the SPA and Ramsar appear to have a section of trees and shrubs screening the gravel pits from the road, therefore noise and light disturbance may be reduced due to the natural screening. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction. However, Natural England may want more detailed design information at this stage to support this conclusion due to the proximity of the SPA and Ramsar site.	-2	-1	The potential for effects on Cothill Fen SAC; Little Wittenham SAC; Bredon Hill SAC; and Dixton Wood SAC were considered in the Severn Thames HRA screening, which concluded no Likely Significant Effect in all cases. With regard to the Severn Estuary SAC, SPA and Ramsar, the HRA concluded that the construction and operation of the Deerhurts to Culham transfer pipelines would not have any adverse effect on the integrity of the designated sites, taking account of the Hands Off Flow condition that would control abstraction at Deerhurst to protect flows to the Severn Estuary and mitigation in the form of intake screens to guard against potential mortality of fish through abstraction. The Deerhurts to Culham transfer pipelines will not require land take from within the European Marine Site boundaries, and construction activities are at a sufficient distance from the European Site (approximately 23.9km at the closest point) that no significant impacts on the qualifying features are anticipated as a result of construction. In terms of the rest of the scheme, a section of pipeline is adjacent to the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. There is also the potential for disturbance (noise, light, dust etc.) to the designated sites during construction. From aerial mapping, the boundary of the SPA and Ramsar appear to have a section of trees and shrubs screening the gravel pits from the road, therefore noise and light disturbance may be reduced due to the natural screening. The flooded gravel pits are in hydrological connectivity with the local water table. Depending on the depth and construction method of the pipeline (and thus the need for dewatering of the excavation or risk of pollution) there is thus potential for changes in hydrology and water quality within the SPA. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. Moderate adverse effects are therefore anticipated during construction. In operation, the abstraction of water from the River Severn at Deerhurst up to a maximum daily rate of 500Ml/d would not reduce flows downstream below a hands-off flow condition of 1,800Ml/d thus, only flows above this level would be affected downstream of the abstraction. Abstraction would be limited to a maximum of 275Ml/d if flows at Deerhurst are less than 2,486Ml/d. The volumes would be small in comparison to flows in the estuary (the Severn Estuary has a very large tidal range) such that it is not anticipated that the	-1

														upstream abstraction would have any significant adverse impact on the qualifying features of the site, which would be well habituated to fluctuating water levels and flows. However, as with the pipeline transfer, supported and phased canal transfers carry a minor risk of temporarily disrupting sea lamprey migration during low flow conditions by causing additional flow to pass over Upper Lode Weir on the River Severn, which may affect the ability of sea lamprey to pass the weir for short infrequent periods. Although there would be some minor modification to the flow regime as a consequence of the abstraction, these flow constraints will provide an acceptable level of protection to the downstream river environment and aquatic ecology, including migratory fish species. Significant impacts are therefore not anticipated during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. Due to the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place.	-2	-1	There are two SSSIs within 1km of the Deerhurts to Culham transfer pipelines. Cleeve Common (0.6km from the pipelines) is one of the most extensive areas of limestone grassland in the Cotswolds and is of importance both for its grassland, and for its geological and physiographical features. This site is in favourable condition. Chimney Meadows (1km from the pipelines) consists of six neutral, unimproved and semi-improved alluvial meadows which support a botanically rich sward and are of local importance for breeding birds, particularly waders. This site is in unfavourable – recovering condition. The site has suffered two damaging events in successive years in 2007 and 2008 when the whole grassland area was flooded prior to hay cut. Hay cutting and aftermath grazing was not carried out in these years, resulting in major changes in the vegetation. At these distances from the pipeline construction, the potential for likely significant adverse effects on the grassland habitats and associated features (e.g. wading birds) are assessed as negligible. In terms of the rest of the scheme, a section of pipeline is adjacent to Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the	

													River Thames at its closest, 440m from the abstraction point. This pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. Wraysbury & Hythe End Gravel Pits supports nationally important numbers of three species of wintering wildfowl together with an important assemblage of breeding birds associated with open waters and wetland habitats. In addition the site supports two nationally scarce invertebrates and a number of locally uncommon plants. Wraysbury Reservoir SSSI supports nationally important numbers of wintering cormorant Phalacrocorax carbo, great crested grebe Podiceps cristatus and shoveler Anas clypeata. Both sites are currently in a favourable condition. There is the potential for increased abstraction from the River Thames to affect the hydrology of these sites. The pipeline is also 360m from Kingcup Meadows and Oldhouse Wood SSSI, designated for its intimate mosaic of habitats adjacent to the River Alderbourne, which includes woodland, unimproved pastures and semi and unimproved meadowland. This SSSI is meeting favourable and unfavourable recovering condition status. The pipeline is also 40m from Fray's Farm Meadows LNR and SSSI, designated for being one of the last remaining examples of relatively unimproved wet alluvial grassland in Greater London and the Colne Valley. Approximately 53.3% of this SSSI is in favourable condition, with the remainder unfavourable declining. The unfavourable declining is as a result of dense litter/thatch cover (high cover of graminoids/tall herbs). The vegetation throughout is very dense and under-managed. The pipeline is 52m from Ruislip Woods NNR and SSSI, designated for its ancient semi-natural woodland, including some of the largest unbroken blocks that remain in Greater London. The SSSI is in favourable and unfavourable – recovering condition status. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs.
	5.c. Impact on non-native species?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The abstracted water will be pre-treated.	0	0	The abstracted water would be discharged into the River Thames at Culham which has been carefully selected as the discharge location to minimise any adverse effects on the river environment. The abstracted water will be pre-treated to address water quality risks and risks of the spread of INNS.

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Long term >25 years	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Mitigation measures where the pipeline route runs close to ancient woodland and wood pasture habitat areas includes tree surveys to assess risks and put in place applicable tree retention and protection measures to ensure the construction activities final pipeline route avoids any adverse effects on supporting root structures. In proximity to Ancient Woodland locations, where soil stripping is to be undertaken, the soils are to be stored and reinstated following construction in order to maintain seedbanks. In the event that site specific ecological assessments identify any permanent impacts on other protected species or habitats associated with these development works, appropriate mitigation measures including where appropriate relocation of such species or provision of compensatory habitat, will be undertaken in advance of the works being undertaken. Ecological surveys of BAP Priority habitats are required. The loss of BAP Priority habitat should be avoided where possible. Where this isn't possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction; a CEMP should be in place. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames.	-2	-2	The abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. The pipeline passes adjacent to several blocks of BAP Priority habitat deciduous woodland. The pipeline also passes 14m and 79m from two parcels of ancient woodland east of Chandlers Hill, 52m from ancient woodland at Ruislip Woods, adjacent to French Grove and Battlers Wells Wood ancient woodland and 88m from ancient woodland north of French Grove. There are a number of areas of ancient woodland within 1km of the Deerhurst to Culham transfer pipeline route. Every effort will be made to ensure the final pipeline route avoids the need for the removal of other (non-Ancient Woodland) trees, hedgerows or other important vegetation, or adverse effect on supporting root structures. Any hedgerows affected will be reinstated. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. Additionally, the pipeline passes adjacent to houses, through residential areas. These have the potential to support roosting bats or nesting birds. There is therefore the potential for disturbance to BAP Priority habitats, species, and ancient woodland during construction; a CEMP should be in place. Minor adverse effects are anticipated. In terms of effects taking place during operation, the likely residual adverse effects of the discharge to the River Thames relate to the increases in the low flow to extreme low flow arising from the discharge of 400 Ml/d, in particular risks to the flow regime of the weir pools in the reaches below the discharge point - higher flows and/or more variable changes in flow under low flow conditions may lead to a loss of shallows and increased flow velocities which can reduce habitat availability for the full range of fish, invertebrates and plants living in these reaches. Detailed studies have identified that for flows of 400 Ml/d at Culham there may be some adverse effects on aquatic ecology that this reaches. Minor adverse effects are therefore also anticipated at a flow of 500 Ml/d.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-3	-2	The Deerhurst to Culham pipeline route and individual above ground site locations are predominantly within rural locations with at least 45km of the route within the Cotswolds AONB. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. The final part of the Deerhurst to Culham route near Culham is 5.5km north of the North Wessex Downs AONB. This pipeline route passes 2km north east of a promoted viewpoint at Cleve Hill and 1600m north east of a promoted viewpoint at Stockwell Common, 2.5km to the north east of a promoted viewpoint near St Paul's Epistle off A436. The scheme is located within the following NCAs, many of which have historic, cultural and distinctive landscape features that are potentially affected by the proposals: Severn and Avon Vales NCA (106) , Cotswolds NCA (107), Upper Thames Clay Vales NCA (108) and Mid vale Ridge NCA (109). The construction compounds and pipeline route would be temporary prominent features in the landscape during construction due to temporary removal of distinctive landscape features. Along the pipeline route there is a well connected network of PRoW and trails, including the Severn Way at the Intake Site. Although not publicly accessible, the construction works would be a visible feature from the Thames Path opposite. Sensitive recreational receptors would be expected to have views of construction of most of the pipeline route and any above ground assets. Sensitive residential receptors are located in individual properties, small villages, hamlets and towns along the route and would be expected to have views of the pipeline route. It is therefore anticipated that there will be major negative effects during construction. In operation, pipeline and overhead powerlines would be buried. Fields boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. In the short to medium term, 5 years after initial operation, fields would return to their original condition. In the long term, 15 years after initial operation, planting would mature and hedgerow connections re-established, aiding integration of the new facilities into the landscape and setting of the AONB. Moderate adverse effects are therefore anticipated during operation.	-2
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-2	0	The pipeline route passes within the South Bucks AQMA. There are also two further AQMAs within 3km of construction areas (Cheltenham Whole Borough AQMA and Tewkesbury Town Centre AQMA). HGV movements will be generated by the construction of the pipelines which will result in increased traffic in localised areas due to the anticipated large number of deliveries. However, given the presence of the M25 and M4 in the vicinity of the pipeline route it is considered that construction and operational impacts may be lessened to some extent. Nonetheless, moderate negative effects on air quality in the short-term during construction are anticipated. It is considered unlikely that the operational phase would result in significant impacts on local air quality.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-2	-1	This scheme requires the construction of 4 x 132 kW Intake booster pumps, 11.1 km of 800 mm Diameter Main, 64m3 Surge Vessel, and 88km of pipeline (including any associated infrastructure e.g. a break pressure tank and a tee off the main pipeline). The construction of this new infrastructure will result in an increase of energy use. The operation of this new infrastructure will result in an increase in energy use. Construction and operational activities are therefore likely to increase Affinity Water's carbon footprint.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	3	Predicted climatic changes in England include hotter and drier summers. The flow support elements of this scheme would enable the reliable transfer of water for the benefit of flows in the River Thames and resource availability in the London WRZs during times of low flow, therefore reducing the vulnerability to drought risks associated with climate change and thus improving resilience to the likely effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation includes requiring that the first flush of water through the pipeline will be tested and if required treated at a temporary holding lagoon. Once operational, the discharge will be treated to environmental standards at the water treatment works and this will provide sufficient quality of water for discharge taking account of the mixing and dilution that will occur within the receiving waters. The discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies (which are currently assessed as being at WFD moderate status). Peaks in suspended solids will be monitored and if there is an elevated level of suspended solids, the abstraction from the River Severn will be reduced to just the pipeline "sweetening" flows and will be treated prior to the main treatment works. The outfall to the River Thames will involve an aeration cascade structure to oxygenate the discharge water to minimise any adverse impacts on dissolved oxygen concentrations in the river.	-1	0	Construction activities that could affect water quality include construction of the intake at Deerhurst, the outfall at Culham and where the pipeline crosses watercourses. The pipeline route will have a number of major crossings including the River Coln and the River Thames. Construction of the intake and outfall will be managed by best construction practices and any residual construction risk to the associated water bodies is low. Minor adverse effects are therefore anticipated during construction. In operation, the abstraction of water from the River Severn at Deerhurst (WFD water body GB109054044404) is not anticipated to result in a change in the flow regime that would be materially significant such as to alter the chemical status of the river. The abstracted water will be treated at the nearby treatment works. The first flush of water through the pipeline after a period of non-use has the potential for adverse effects to water quality. The effects of the discharge at the discharge/flow augmentation point at Culham (Thames (Evenlode to Thame) GB106039030334) and the potentially impacted waterbodies downstream (GB106039030331; GB106039023233; GB106039023232) were considered in the WFD assessment. This concludes that there is the potential for some organic pollutants to be in the discharged, such as metaldehyde, as these pollutants are more difficult to treat and remove at the water treatment works. However, with the hands-off flow conditions set at appropriate levels to safeguard the aquatic environment, there should be no material adverse effects of the abstraction on the River Severn water quality or ecology. Neutral effects anticipated.	0

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation includes requiring that the first flush of water through the pipeline will be tested and if required treated at a temporary holding lagoon. Once operational, the discharge will be treated to environmental standards at the water treatment works and this will provide sufficient quality of water for discharge taking account of the mixing and dilution that will occur within the receiving waters. The discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies (which are currently assessed as being at WFD moderate status). Peaks in suspended solids will be monitored and if there is an elevated level of suspended solids, the abstraction from the River Severn will be reduced to just the pipeline "sweetening" flows and will be treated prior to the main treatment works. The outfall to the River Thames will involve an aeration cascade structure to oxygenate the discharge water to minimise any adverse impacts on dissolved oxygen concentrations in the river.	-1	0	Construction activities that could affect water quality include construction of the intake at Deerhurst, the outfall at Culham and where the pipeline crosses watercourses. The pipeline route will have a number of major crossings including the River Coln and the River Thames. Construction of the intake and outfall will be managed by best construction practices and any residual construction risk to the associated water bodies is low. Minor adverse effects are anticipated. In operation, the abstraction of water from the River Severn at Deerhurst (WFD water body GB109054044404) is not anticipated to result in a change in the flow regime that would be materially significant such as to alter the chemical status of the river. The abstracted water will be treated at the nearby treatment works. The first flush of water through the pipeline after a period of non-use has the potential for adverse effects to water quality. The effects of the discharge at the discharge/flow augmentation point at Culham (Thames (Evenlode to Thame) GB106039030334) and the potentially impacted waterbodies downstream (GB106039030331; GB106039023233; GB106039023232) were considered in the WFD assessment. This concludes that there is the potential for some organic pollutants to be in the discharged, such as metaldehyde, as these pollutants are more difficult to treat and remove at the water treatment works. However with the hands-off flow conditions set at appropriate levels to safeguard the aquatic environment, there should be no material adverse effects of the abstraction on the River Severn water quality or ecology. Neutral effects anticipated.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Low	Appropriate licensing and HOF will be required.	0	0	The abstraction of water from the River Severn at Deerhurst (GB109054044404) is to a maximum daily rate of 500Ml/d and would not reduce flows locally below a hands-off flow condition of 1,800Ml/d, protecting the downstream flow regime and flows to the Severn Estuary, ensuring a sustainable level of abstraction. Neutral effects anticipated.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Low	Appropriate licensing and HOF will be required.	-1	0	During construction, a number of watercourses will be intersected by the pipeline route. Any temporary flow diversions will be subject to agreement with the Environment Agency to avoid any material adverse effects on the river environment and ensuring WFD compliance. A number of river crossings are also required as part of pipeline route. The use of pipejacking will be adopted to mitigate impacts. Minor adverse effects anticipated during construction. In operation, the abstraction from the River Severn at Deerhurst would modify the flow regime downstream, reducing some of the flow variability at moderately low flows but this will be ameliorated by river flow support from upstream water sources as flows reduce towards the hands-off flow condition which prevents abstraction at low flows below 1800 Ml/d. Abstraction will be limited to 275 Ml/d at river flows below 2486 Ml/d. These flow constraints on abstraction will protect the low flow regime and flows to the Severn Estuary. Downstream of the discharge to the River Thames at Culham, the greatest proportion change in the flow would be increases in the low flow to extreme low flow and velocities in the reaches immediately downstream - the greatest effects would be in the receiving waterbody (Thames (Evenlode to Thame) GB106039030334), with effect reducing with distance downstream. The River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. No effects are anticipated on groundwater levels. At times of very low flows, the release of water to the River Thames may provide a minor benefit to the hydrological conditions. Measures will be taken to protect any temporary exposure of bare soil from runoff during heavy rainfall events. Neutral effects anticipated during operation.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Low	Adequate methods of construction (mitigation) to be provided includes the dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction.	-1	0	Sections of the pipeline route will be within the flood plain where high groundwater levels and high soil permeability are expected. Adequate methods of construction will be adopted to minimise the impact of localised flooding during construction. Minor adverse effects anticipated. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete. Neutral effects anticipated.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A watching brief, surveys and investigation will be required to minimise risk of harm to unknown assets. Mitigation also includes minimising the impact on the settings of existing heritage features such as Deerhurst Priory and Wightfield Manor, through the use of screening and avoiding stockpiling in these more sensitive locations. A buffer area between the proposed conveyance route works and heritage assets will be established to minimise development activity which would adversely affect these features and their setting.	-2	-1	There are a large number of designated assets in proximity to the construction areas associated with the scheme including listed buildings, scheduled monuments and Registered Parks and Gardens (including Buckland House Registered Park and Garden). Measures would be taken to avoid permanent disturbance to the setting of these designated assets, however, long term temporary impacts are likely to result during the construction phase. The routing of the pipeline and temporary nature of these works is likely to minimise adverse effects, although there could be some residual temporary adverse effects during operation; with respect to access and enjoyment of these assets. The alignment of the pipeline will be developed further during design development and further consultation with Historic England would be proposed during this process. In addition, the location of the proposed conveyance route is in close proximity to a number of scheduled monuments (i.e. Roman small town at Wycombe). Construction works therefore has the potential to adversely affect these heritage features and their setting. Moderate adverse effects are therefore anticipated during the construction phase.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	?	?	?	?	?	?	?	Further investigation required. This is likely to include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	?	?	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. The excavation required for scheme construction is large and therefore still represents a risk in respect of buried assets. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	-1	The pipeline route crosses grade 1 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The permanent above ground components of the scheme (e.g. the Break Pressure Tank associated with the pipeline) would involve permanent landtake, some of which would be greenfield land/agricultural land. However this is not considered to be a significant amount. Therefore minor negative effects are anticipated during construction and operation.	-1

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SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Harefield Treatment Works, and then transfer by a new main for storage at Harefield Reservoir. This option also includes a supported conveyance pipeline from Deerhurst on the River Severn to Culham on the River Thames with a 500 Ml/d capacity and a total length 88km. This option will provide moderate positive effects against all objective 1 sub objectives. The pipeline route follows the footprints of several roads and construction traffic is anticipated to generate an estimated 9,500 HGV movements. Moderate adverse impacts are therefore predicted during construction. Given the new pipeline is located within Hillingdon AQMA and in close proximity to additional AQMAs, moderate adverse effects are predicted during construction in the short-term for air quality. Minor negative effects are predicted during operation as a result of emissions from chemical deliveries and sludge removal associated with the treatment works (estimated to be approximately 1964 vehicle movements per year), and operational vehicle movements (e.g. associated with the delivery of treatment chemicals). The Deerhurst to Culham pipeline route and individual above ground site locations are predominantly within rural locations with at least 45km of the route within the Cotswolds AONB. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. The final part of the Deerhurst to Culham route near Culham is 5.5km north of the North Wessex Downs AONB and passes a number of promoted viewpoints. The construction compounds and pipeline route would be temporary prominent features in the landscape during construction due to temporary removal of distinctive landscape features. Along the pipeline route and at the majority of above ground sites, there is a network of PROW and trails. Sensitive recreational receptors would be expected to have views of construction of most of the pipeline route and above ground assets. It is therefore anticipated that there will be major negative effects during construction.	N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		Moderate	N/A	Short term (< 5 years)	N/A	Short term (< 5 years)	N/A	Local	Low	N/A	-1	0	The River Thames is accessible to water craft. The construction of the scheme will involve crossing of a number of watercourses with associated temporary disruption to users. In operation, there will be limited effects on any recreation associated with the River Severn or River Thames in respect of recreation activities (e.g. walking, angling) or navigation activities.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity. The anticipated levels (minor significant impact during construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation includes that all reasonable effort will be made to avoid temporary closure of Public Rights of Way with footpath/bridleway diversions provided instead. Public Rights of Way will be reinstated following construction completion. Careful siting and use of screening where work locations are in proximity to Public Rights of Way and other affected recreational assets will be undertaken. There is the opportunity to improve footpaths and connections in and around proposed pipeline route as part of the construction work, giving rise to a permanent minor beneficial effect. Use of directional drilling of the pipeline laying is also proposed to reduce the scale of disruption at river and road crossings.	-2	0	During construction, there would the potential for significant temporary disruption to recreation activities considering the scale of the scheme and the well-connected network of Public Rights of Way and trails in proximity to the above ground construction sites and along the pipeline route. This includes the potential for temporary disruption to access to areas with high tranquility value including parts of the Cotswolds and North Wessex Downs AONB. The construction of the scheme will also involve crossing of a number of roads and watercourses with associated temporary disruption to users. In operation, there will be limited effects on any recreation associated with the River Severn or River Thames in respect of recreation activities (e.g. walking, angling) or navigation activities. There will a small amount of permanent landtake which will involve the loss of greenfield land (for the Break Pressure	0

		In operation, fields boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. Moderate adverse effects are therefore anticipated during operation. There are a large number of designated heritage assets in proximity to the construction areas associated with the scheme including listed buildings, scheduled monuments and Registered Parks and Gardens (including Buckland House Registered Park and Garden. There could be some residual temporary adverse effects during operation; with respect to access and enjoyment of these assets. Additionally, archaeological remains may also be impacted during construction and should be further investigated. Moderate and minor adverse effects are therefore anticipated during construction and operation respectively. HRA screening identified that the construction and operation of the Deerhurts to Culham transfer pipelines would not have any adverse effect on the integrity of nearby internationally designated sites. In terms of the rest of the scheme, a section of pipeline is adjacent to the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. Also part of the South West London Waterbodies Ramsar and SPA are Wraysbury & Hythe End Gravel Pits SSSI and Wraysbury Reservoir SSSI, 1.3km and 1.1km from the pipeline respectively. There is the potential for changes in hydrology at the SPA/Ramsar and SSSIs. Additionally, there the potential for increased abstraction from the River Thames to affect the hydrology of the sites. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. In operation, it is not anticipated that the upstream abstraction would have any significant adverse impact on the qualifying features of the Severn Estuary. Construction phase activities will result in an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however												Tank associated with the pipeline), however this is not anticipated to impact upon recreational access.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-2	-1	The anticipated pipeline routes follow the footprints of several roads and so is anticipated to cause impacts. The construction traffic impact is anticipated to generate an estimated 9,500 HGV movements. Further HGV movements will be generated by the construction of the pipeline. Moderate adverse effects are therefore anticipated during construction. In operation, there will be requirement for chemical deliveries and sludge removal associated with the treatment works (estimated to be approximately 1964 vehicle movements per year). In addition, there will be the requirement for operational vehicle movements (e.g. associated with the delivery of treatment chemicals), primarily visiting the low lift pump station and the water treatment sites. Occasional maintenance works for all sites may require larger trucks / mobile cranes to bring / install replacement parts or plant on a minor scale. Minor adverse effects are therefore anticipated during operation.	-1
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	This scheme requires the construction of 4 x 315 kW Intake Pumps, 4 x 110 kW Booster Pumps, 23.4 km of 800 mm Diameter Main, 2 x 65 m3 Surge Vessels, 1 x 5 m3 Surge Vessel, 1 x 800 mm Pressure Sustaining Valve, and 88km of pipeline (including any associated infrastructure e.g. a break pressure tank and a tee off the main pipeline).	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint. Abstraction source and transfer pipeline crosses several surface water bodies the quality of which could be affected during construction works. The installation of the pumps also has the potential to affect water quality during constriction works. Further abstraction may have a negative effect on the environment if not properly monitored and licenced. Predicted climatic changes in England include hotter and drier summers. This option is likely to reduce the vulnerability to drought risks associated with climate change and thus improving resilience to the likely effects of climate change.	High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	Any proposal for this option should avoid designated sites where possible. Due to the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. HRA of the Affinity Water's WRMP concluded any effects on the SPA can be avoided through careful design and construction of the pipeline, informed by geotechnical and hydrogeological investigations. These would enable the pipeline to be installed at a suitable depth and in a suitable manner (including return of any dewatering volumes immediately back to ground) that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. This would need to be developed further during detailed scheme design. In terms of noise and light disturbance, depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. From aerial mapping, the boundary of the SPA and Ramsar appear to have a section of trees and shrubs screening the gravel pits from the road, therefore noise and light disturbance may be reduced due to the natural screening. Therefore, at this level it is considered possible to conclude that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction. However, Natural England may want more detailed design information at this stage to support this conclusion due to the proximity of the SPA and Ramsar site.	-2	-1	The potential for effects from the Deerhurts to Culham transfer pipelines on Cothill Fen SAC; Little Wittenham SAC; Bredon Hill SAC; and Dixton Wood SAC were considered through Severn Thames HRA screening. This concluded that the construction and operation of the Deerhurts to Culham transfer pipelines would not have any adverse effect on the integrity of the designated sites, taking account of the Hands Off Flow condition that would control abstraction at Deerhurst to protect flows to the Severn Estuary and mitigation in the form of intake screens to guard against potential mortality of fish through abstraction. The Deerhurts to Culham transfer pipelines will not require land take from within the European Marine Site boundaries, and construction activities are at a sufficient distance from the European Site (approximately 23.9km at the closest point) that no significant impacts on the qualifying features are anticipated as a result of construction. In terms of the rest of the scheme, a section of pipeline is adjacent to the South West London Waterbodies Ramsar and SPA, which is also designated as Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the abstraction point. Also part of the South West London Waterbodies Ramsar and SPA are Wraysbury & Hythe End Gravel Pits SSSI and Wraysbury Reservoir SSSI, 1.3km and 1.1km from the pipeline respectively. Wraysbury & Hythe End Gravel Pits supports nationally important numbers of three species of wintering wildfowl together with an important assemblage of breeding birds associated with open waters and wetland habitats. In addition the site supports two nationally scarce invertebrates and a number of locally uncommon plants. Wraysbury Reservoir SSSI supports nationally important numbers of wintering cormorant Phalacrocorax carbo, great crested grebe Podiceps cristatus and shoveler Anas clypeata. Both sites are currently in a favourable condition. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SPA/Ramsar and SSSIs. There is also the potential for disturbance (noise, light, dust etc.) to the site during construction. Moderate adverse effects are therefore anticipated. In operation, the abstraction of water from the River Severn at Deerhurst up to a maximum daily rate of 500Ml/d would not reduce flows downstream below a hands-off flow condition of 1,800Ml/d thus, only flows above this level would be affected downstream of the abstraction. Abstraction would be limited to a maximum of 275Ml/d if flows at Deerhurst are less than 2,486Ml/d. The	-1

														volumes would be small in comparison to flows in the estuary (the Severn Estuary has a very large tidal range) such that it is not anticipated that the upstream abstraction would have any significant adverse impact on the qualifying features of the site, which would be well habituated to fluctuating water levels and flows. However, as with the pipeline transfer, supported and phased canal transfers carry a minor risk of temporarily disrupting sea lamprey migration during low flow conditions by causing additional flow to pass over Upper Lode Weir on the River Severn, which may affect the ability of sea lamprey to pass the weir for short infrequent periods. Although there would be some minor modification to the flow regime as a consequence of the abstraction, these flow constraints will provide an acceptable level of protection to the downstream river environment and aquatic ecology, including migratory fish species. Significant impacts are therefore not anticipated during operation.		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Mitigation to be developed during detailed scheme design. Due to the potential for disturbance (noise, light, dust etc.) to the site during construction, a CEMP should be in place. Please see detailed mitigation provided at 5.a.	-2	-1	There are two SSSIs within 1km of the Deerhurts to Culham transfer pipelines. Cleeve Common (0.6km from the pipelines) is one of the most extensive areas of limestone grassland in the Cotswolds and is of importance both for its grassland, and for its geological and physiographical features. This site is in favourable condition. Chimney Meadows (1km from the pipelines) consists of six neutral, unimproved and semi-improved alluvial meadows which support a botanically rich sward and are of local importance for breeding birds, particularly waders. This site is in unfavourable – recovering condition. The site has suffered two damaging events in successive years in 2007 and 2008 when the whole grassland area was flooded prior to hay cut. Hay cutting and aftermath grazing was not carried out in these years, resulting in major changes in the vegetation. At these distances from the pipeline construction, the potential for likely significant adverse effects on the grassland habitats and associated features (e.g. wading birds) are assessed as negligible. In terms of the rest of the scheme, a section of pipeline is adjacent to Wraysbury No.1 Gravel Pit SSSI. This SSSI is of national importance for wintering gadwall Anas Strepera. The SSSI is currently in a favourable condition. This site is also 160m from the River Thames at its closest, 440m from the abstraction point.		

													This pipeline is also 1.3km from Wraysbury & Hythe End Gravel Pits SSSI and 1.1km from Wraysbury Reservoir SSSI. Wraysbury & Hythe End Gravel Pits supports nationally important numbers of three species of wintering wildfowl together with an important assemblage of breeding birds associated with open waters and wetland habitats. In addition the site supports two nationally scarce invertebrates and a number of locally uncommon plants. Wraysbury Reservoir SSSI supports nationally important numbers of wintering cormorant Phalacrocorax carbo, great crested grebe Podiceps cristatus and shoveler Anas clypeata. Both sites are currently in a favourable condition. There is the potential for increased abstraction from the River Thames to affect the hydrology of these sites. The pipeline is also 360m from Kingcup Meadows and Oldhouse Wood SSSI, designated for its intimate mosaic of habitats adjacent to the River Alderbourne, which includes woodland, unimproved pastures and semi and unimproved meadowland. This SSSI is meeting favourable and unfavourable recovering condition status. The pipeline is also 40m from Fray's Farm Meadows LNR and SSSI, designated for being one of the last remaining examples of relatively unimproved wet alluvial grassland in Greater London and the Colne Valley. Approximately 53.3% of this SSSI is in favourable condition, with the remainder unfavourable declining. The unfavourable declining is as a result of dense litter/thatch cover (high cover of graminoids/tall herbs). The vegetation throughout is very dense and under-managed. The pipeline is 52m from Ruislip Woods NNR and SSSI. Ruislip Woods NNR and SSSI, designated for its ancient semi-natural woodland, including some of the largest unbroken blocks that remain in Greater London. The SSSI is in favourable and unfavourable – recovering condition status. Depending on the depth of the pipeline there is the potential for changes in hydrology at the SSSIs.
	5.c. Impact on non-native species?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The abstracted water will be pre-treated.	0	0	The abstracted water would be discharged into the River Thames at Culham which has been carefully selected as the discharge location to minimise any adverse effects on the river environment. The abstracted water will be pre-treated to address water quality risks and risks of the spread of INNS.

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Long term >25 years	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Mitigation measures where the pipeline route runs close to ancient woodland and wood pasture habitat areas includes tree surveys to assess risks and put in place applicable tree retention and protection measures to ensure the construction activities final pipeline route avoids any adverse effects on supporting root structures. In proximity to Ancient Woodland locations, where soil stripping is to be undertaken, the soils are to be stored and reinstated following construction in order to maintain seedbanks. In the event that site specific ecological assessments identify any permanent impacts on other protected species or habitats associated with these development works, appropriate mitigation measures including where appropriate relocation of such species or provision of compensatory habitat, will be undertaken in advance of the works being undertaken. Ecological surveys of BAP Priority habitats are required. The loss of BAP Priority habitat should be avoided where possible. Where this isn't possible, compensatory habitat may be required. There is the potential for disturbance to BAP Priority habitats and ancient woodland during construction; a CEMP should be in place. There is also the potential for changes in hydrology to coastal and floodplain grazing marsh Priority habitat due to the increased abstraction from the Thames. Please see further detailed mitigation provided at 5.a.	-1	-1	The abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland and BAP Priority habitat coastal and floodplain grazing marsh. The pipeline passes through a block of BAP Priority habitat deciduous woodland adjacent to the M4 motorway. It also passes adjacent to several blocks of BAP Priority habitat deciduous woodland. The pipeline passes 14m and 79m from two parcels of ancient woodland east of Chandlers Hill, 52m from ancient woodland at Ruislip Woods, adjacent to French Grove and Battlers Wells Wood ancient woodland and 88m from ancient woodland north of French Grove. There are a number of areas of ancient woodland within 1km of the Deerhurst to Culham transfer pipeline route. Every effort will be made to ensure the final pipeline route avoids the need for the removal of other (non-Ancient Woodland) trees, hedgerows or other important vegetation, or adverse effect on supporting root structures. Any hedgerows affected will be reinstated. There is therefore the potential for disturbance to BAP Priority habitats and ancient woodland during construction; a CEMP should be in place. Minor adverse effects are anticipated. In terms of effects taking place during operation, the likely residual adverse effects of the discharge to the River Thames relate to the increases in the low flow to extreme low flow arising from the discharge of 400 Ml/d, in particular risks to the flow regime of the weir pools in the reaches below the discharge point - higher flows and/or more variable changes in flow under low flow conditions may lead to a loss of shallows and increased flow velocities which can reduce habitat availability for the full range of fish, invertebrates and plants living in these reaches. Detailed studies have identified that for flows of 400 Ml/d at Culham there may be some adverse effects on aquatic ecology that this reaches. Minor adverse effects are therefore also anticipated at a flow of 500 Ml/d.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	National	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-3	-2	The Deerhurst to Culham pipeline route and individual above ground site locations are predominantly within rural locations with at least 45km of the route within the Cotswolds AONB. Harefield Reservoir Expansion will most likely be partially above ground as per the existing site setup. The final part of the Deerhurst to Culham route near Culham is 5.5km north of the North Wessex Downs AONB. This pipeline route passes 2km north east of a promoted viewpoint at Cleve Hill and 1600m north east of a promoted viewpoint at Stockwell Common, 2.5km to the north east of a promoted viewpoint near St Paul's Epistle off A436. The scheme is located within the following NCAs, many of which have historic, cultural and distinctive landscape features that are potentially affected by the proposals: Severn and Avon Vales NCA (106) , Cotswolds NCA (107), Upper Thames Clay Vales NCA (108) and Mid vale Ridge NCA (109). The construction compounds and pipeline route would be temporary prominent features in the landscape during construction due to temporary removal of distinctive landscape features. Along the pipeline route there is a well connected network of PRoW and trails, including the Severn Way at the Intake Site. Although not publicly accessible, the construction works would be a visible feature from the Thames Path opposite. Sensitive recreational receptors would be expected to have views of construction of most of the pipeline route and any above ground assets. Sensitive residential receptors are located in individual properties, small villages, hamlets and towns along the route and would be expected to have views of the pipeline route. It is therefore anticipated that there will be major negative effects during construction. In operation, fields boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. In the short to medium term, 5 years after initial operation, fields would return to their original condition. In the long term, 15 years after initial operation, planting would mature and hedgerow connections re-established, aiding integration of the new facilities into the landscape and setting of the AONB. Moderate adverse effects are therefore anticipated during operation.	-2
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-2	0	The pipeline route passes within the Hillingdon AQMA. There are also two further AQMAs within 3km of construction areas (Cheltenham Whole Borough AQMA and Tewkesbury Town Centre AQMA). HGV movements will be generated by the construction of the pipelines which will result in increased traffic in localised areas due to the anticipated large number of deliveries. Therefore moderate negative effects on air quality in the short-term during construction are anticipated. It is considered unlikely that the operational phase would result in significant impacts on local air quality.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	--1	-1	The option requires the construction of 4 x 315 kW Intake Pumps, 4 x 110 kW Booster Pumps, 23.4 km of 800 mm Diameter Main, 2 x 65 m3 Surge Vessels, 1 x 5 m3 Surge Vessel, 1 x 800 mm Pressure Sustaining Valve, and 88km of pipeline (including any associated infrastructure e.g. a break pressure tank and a tee off the main pipeline). The construction of this new infrastructure will result in an increase of energy use. The operation of this new infrastructure will result in an increase in energy use. Construction and operational activities are therefore likely to increase Affinity Water's carbon footprint.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. The flow support elements of this scheme would enable the reliable transfer of water for the benefit of flows in the River Thames and resource availability in the London WRZs during times of low flow, therefore reducing the vulnerability to drought risks associated with climate change and thus improving resilience to the likely effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation includes requiring that the first flush of water through the pipeline will be tested and if required treated at a temporary holding lagoon. Once operational, the discharge will be treated to environmental standards at the water treatment works and this will provide sufficient quality of water for discharge taking account of the mixing and dilution that will occur within the receiving waters. The discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies (which are currently assessed as being at WFD moderate status). Peaks in suspended solids will be monitored and if there is an elevated level of suspended solids, the abstraction from the River Severn will be reduced to just the pipeline "sweetening" flows and will be treated prior to the main treatment works. The outfall to the River Thames will involve an aeration cascade structure to oxygenate the discharge water to minimise any adverse impacts on dissolved oxygen concentrations in the river.	-1	0	Construction activities that could affect water quality include construction of the intake at Deerhurst, the outfall at Culham and where the pipeline crosses watercourses. The pipeline route will have a number of major crossings including the River Coln and the River Thames. Construction of the intake and outfall will be managed by best construction practices and any residual construction risk to the associated water bodies is low. Minor adverse effects are therefore anticipated during construction. In operation, the abstraction of water from the River Severn at Deerhurst (WFD water body GB109054044404) is not anticipated to result in a change in the flow regime that would be materially significant such as to alter the chemical status of the river. The abstracted water will be treated at the nearby treatment works. The first flush of water through the pipeline after a period of non-use has the potential for adverse effects to water quality. The effects of the discharge at the discharge/flow augmentation point at Culham (Thames (Evenlode to Thame) GB106039030334) and the potentially impacted waterbodies downstream (GB106039030331; GB106039023233; GB106039023232) were considered in the WFD assessment. This concludes that there is the potential for some organic pollutants to be in the discharged, such as metaldehyde, as these pollutants are more difficult to treat and remove at the water treatment works. However, with the hands-off flow conditions set at appropriate levels to safeguard the aquatic environment, there should be no material adverse effects of the abstraction on the River Severn water quality or ecology. Neutral effects anticipated.	0

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation includes requiring that the first flush of water through the pipeline will be tested and if required treated at a temporary holding lagoon. Once operational, the discharge will be treated to environmental standards at the water treatment works and this will provide sufficient quality of water for discharge taking account of the mixing and dilution that will occur within the receiving waters. The discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies (which are currently assessed as being at WFD moderate status). Peaks in suspended solids will be monitored and if there is an elevated level of suspended solids, the abstraction from the River Severn will be reduced to just the pipeline "sweetening" flows and will be treated prior to the main treatment works. The outfall to the River Thames will involve an aeration cascade structure to oxygenate the discharge water to minimise any adverse impacts on dissolved oxygen concentrations in the river.	-1	0	Construction activities that could affect water quality include construction of the intake at Deerhurst, the outfall at Culham and where the pipeline crosses watercourses. The pipeline route will have a number of major crossings including the River Coln and the River Thames. Construction of the intake and outfall will be managed by best construction practices and any residual construction risk to the associated water bodies is low. Minor adverse effects are anticipated. In operation, the abstraction of water from the River Severn at Deerhurst (WFD water body GB109054044404) is not anticipated to result in a change in the flow regime that would be materially significant such as to alter the chemical status of the river. The abstracted water will be treated at the nearby treatment works. The first flush of water through the pipeline after a period of non-use has the potential for adverse effects to water quality. The effects of the discharge at the discharge/flow augmentation point at Culham (Thames (Evenlode to Thame) GB106039030334) and the potentially impacted waterbodies downstream (GB106039030331; GB106039023233; GB106039023232) were considered through a WFD assessment. This concludes that there is the potential for some organic pollutants to be in the discharged, such as metaldehyde, as these pollutants are more difficult to treat and remove at the water treatment works. However with the hands-off flow conditions set at appropriate levels to safeguard the aquatic environment, there should be no material adverse effects of the abstraction on the River Severn water quality or ecology. Neutral effects anticipated.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Low	Appropriate licensing and HOF will be required.	0	0	The abstraction of water from the River Severn at Deerhurst (GB109054044404) is to a maximum daily rate of 500Ml/d and would not reduce flows locally below a hands-off flow condition of 1,800Ml/d, protecting the downstream flow regime and flows to the Severn Estuary, ensuring a sustainable level of abstraction. Neutral effects anticipated.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral.	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Low	Appropriate licensing and HOF will be required.	-1	0	During construction, a number of watercourses will be intersected by the pipeline route. Any temporary flow diversions will be subject to agreement with the Environment Agency to avoid any material adverse effects on the river environment and ensuring WFD compliance. A number of river crossings are also required as part of pipeline route. The use of pipejacking will be adopted to mitigate impacts. Minor adverse effects anticipated during construction. In operation, the abstraction from the River Severn at Deerhurst would modify the flow regime downstream, reducing some of the flow variability at moderately low flows but this will be ameliorated by river flow support from upstream water sources as flows reduce towards the hands-off flow condition which prevents abstraction at low flows below 1800 Ml/d. Abstraction will be limited to 275 Ml/d at river flows below 2486 Ml/d. These flow constraints on abstraction will protect the low flow regime and flows to the Severn Estuary. Downstream of the discharge to the River Thames at Culham, the greatest proportion change in the flow would be increases in the low flow to extreme low flow and velocities in the reaches immediately downstream - the greatest effects would be in the receiving waterbody (Thames (Evenlode to Thame) GB106039030334), with effect reducing with distance downstream. The River Thames would not be subject to undue flow variability beyond its characteristic flow regime from the elevated baseflow due to the regulated nature of the river. No effects are anticipated on groundwater levels. At times of very low flows, the release of water to the River Thames may provide a minor benefit to the hydrological conditions. Measures will be taken to protect any temporary exposure of bare soil from runoff during heavy rainfall events. Neutral effects anticipated during operation.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Low	Adequate methods of construction (mitigation) to be provided includes the dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction.	-1	0	Sections of the pipeline route will be within the flood plain where high groundwater levels and high soil permeability are expected. Adequate methods of construction will be adopted to minimise the impact of localised flooding during construction. Minor adverse effects anticipated. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete. Neutral effects anticipated.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A watching brief, surveys and investigation will be required to minimise risk of harm to unknown assets. Mitigation also includes minimising the impact on the settings of existing heritage features such as Deerhurst Priory and Wightfield Manor, through the use of screening and avoiding stockpiling in these more sensitive locations. A buffer area between the proposed conveyance route works and heritage assets will be established to minimise development activity which would adversely affect these features and their setting.	-2	-1	There are a large number of designated assets in proximity to the construction areas associated with the scheme including listed buildings, scheduled monuments and Registered Parks and Gardens (including Buckland House Registered Park and Garden). Measures would be taken to avoid permanent disturbance to the setting of these designated assets, however, long term temporary impacts are likely to result during the construction phase. The routing of the pipeline and temporary nature of these works is likely to minimise adverse effects, although there could be some residual temporary adverse effects during operation; with respect to access and enjoyment of these assets. The alignment of the pipeline will be developed further during design development and further consultation with Historic England would be proposed during this process. In addition, the location of the proposed conveyance route is in close proximity to a number of scheduled monuments (i.e. Roman small town at Wycombe). Construction works therefore has the potential to adversely affect these heritage features and their setting. Moderate adverse effects are therefore anticipated during the construction phase.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	?	?	?	?	?	?	?	Further investigation required. This is likely to include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	?	?	At the SEA scale it is not possible to determine the potential effect on any known or unknown paleo-environmental deposits. The excavation required for scheme construction is large and therefore still represents a risk in respect of buried assets. An archaeological survey should accompany any further construction / excavation work outside of current pipe lines.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	-1	The pipeline route crosses grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The permanent above ground components of the scheme (e.g. the Break Pressure Tank associated with the pipeline) would involve permanent landtake, some of which would be greenfield land/agricultural land. However this is not considered to be a significant amount. Therefore minor negative effects are anticipated during construction and operation.	-1

1.3 EFF

1.3.1.1 AFF-EFF-WRZ7-0910

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option will have minor negative construction phase effects on the strategic transport network with minor negative knock on effects on critical services and industries. It is assumed that the option will result in the loss of BAP priority deciduous woodland. Assuming appropriate mitigation and compensatory habitat measures, there will be a moderate negative construction phase effect. A proportion of the new pipeline runs adjacent to the Kent Downs AONB, and the new reservoir will have a residual operation effect on landscape. Consequently it is likely there will be minor negative effects on landscape during construction and operation. The option requires new infrastructure and will therefore result in a minor negative effect on Affinity Water's carbon footprint. With regards to the local environment's resilience to climate change, further abstraction may have a minor negative operational effect. The option may also have a minor negative operational phase effects on surface water bodies with regards to naturalisation and quality of water. There may also be a minor negative effect on heritage assets and agricultural land during construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 4Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route passes through farmland and some road footprints and so is anticipated to cause such impacts. Well used roads will be affected by the scheme: A2 0.1 (km), A258 1.6.The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	This option requires a river intake and pumping station at Marden Ash (River Roding), a new fully bunded bankside storage reservoir located at Birds Green, an onsite Water Treatment works and pumping station. Additionally, it will require 32.2km of mains pipeline to Rye Hill Service Reservoir.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline is 814m from Dover to Kingsdown Cliffs Special Area of Conservation (SAC). The HRA (2017) for the dWRMP found that given the distance from the transfer route and the lack of sensitivity that SAC interest features have to impacts arising at this distance, significant effects are considered unlikely.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No mitigation required.	0	0	The proposed pipeline is 722m from Dover to Kingsdown Cliffs Site of Special Scientific Interest (SSSI), 3.1km from Folkestone Warren SSSI, 3.7km from Alkham, Lydden and Swingfield Woods SSSI, 3.8km from Lydden and Temple Ewell Downs SSSI and 4.4km from Sandwich Bay to Hacklinge Marshes SSSI. Given the distance and sensitivity of the closest designated site, Dover to Kingsdown Cliffs SSSI, and the proposed pipeline route no adverse impacts are anticipated.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	High	Avoid loss of BAP Priority habitat if possible. If not possible, compensatory habitat may be required. CEMP should be in place during construction.	-1	0	The proposed pipeline route passes through BAP Priority habitat deciduous woodland. The proposed pipeline also intersects hedgerow habitat.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	A landscape and visual impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New/upgraded structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-1	-1	It should be noted that a proportion of the new pipeline runs adjacent to the Kent Downs AONB. There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. There is the potential for minor negative effects during construction and operation as a result of the upgraded reservoir. Mitigation could help to reduce the significance of the effect during operation but this is uncertain at this stage.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant. No significant impacts on air quality are predicted during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires significant new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on Affinity Water's carbon footprint.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.		1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Construction of increased diameter mains and increased capacity reservoir not likely to impact on groundwater levels during construction due to depth to groundwater.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Best construction practice	0	0	Potential for negative impact effect during construction of mains and works to increase reservoir capacity but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No surface watercourses identified nearby. Construction of increased diameter mains and increased capacity reservoir not likely impact on water levels during construction due to depth to groundwater.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Heritage impact assessment should be carried out to determine the effect of the pipeline and in particular the new reservoir on designated heritage assets.	-1	0	The new pipeline passes within close proximity to three Listed Buildings. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. Once mitigation has been taken into account it is considered unlikely that the upgraded reservoir will result in a significant negative effect on the historic environment during operation.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

1.4 TPO

1.4.1.1 AFF-TPO-WRZ3-0134

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline route is anticipated to follow the footprint of major roads. As such, this option will have minor negative construction phase effects on strategic transport infrastructure with knock on negative effects on critical services and industries. The pipeline also passes adjacent to BAP priority habitat, and consequently there are likely to be minor negative effects on this biodiversity feature during both construction and operation. This option requires additional pumping and treatment of water, and consequently it will have moderate negative construction phase, and minor negative operation phase effect on Affinity Water's carbon footprint. Further abstraction may also have a minor negative operational effect on the resilience of the local environment to climate change, and have minor negative operation effects on ground water and surface water bodies. The option will also have a minor negative effect on heritage assets during construction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and assessment may be required.	0	?	The anticipated minor residual impacts on the River Lee's water quality or flow may be perceptible to informal recreation users. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	WTW site assumed inaccessible to the public (no public rights of way or public facilities in site footprint). Road footpaths not assumed to be used recreationally. The upgrade to the pipeline follows the route of existing roads, and so no accessible informal recreation sites are anticipated to be affected during construction or operation.	

3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The pipeline route is anticipated to follow the footprint of major roads and so is considered likely to cause such impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. It is anticipated that works traffic will be timed to avoid congestion impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires upgrades to the Hart Lane WTW and new Booster Pumps.	0
	4.b. Result in higher levels of reuse of waste?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	There would need to be more detailed ecological studies to determine if schemes with abstractions from the River Lee Catchment could be delivered without negatively affecting the interest features of the Lee Valley Ramsar site in particular. At this point it should be noted that the volumes of water achievable from these proposals to increase peak abstraction at the expense of average may need to be adjusted to ensure the Ramsar site is protected depending on the outcome of those more detailed investigations.	0	?	The HRA (2017) for the dWRMP found that this scheme would not have a likely significant alone during construction or operation. It identified the potential for an in-combination effect during operation on the Lee Valley Spa/ Ramsar with options 1057, 0502, 0548 and 1075 as a result of abstraction from River Lee catchment. Further investigations required if these schemes are taken forward.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required	0	0	None identified	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration	?	?	The option will result in the transfer of water from Surrey University to the existing Affinity Water network, which has the potential to result in the spread of INNS. It is	

										systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.			considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	Low	Short term (< 5 years)	?	Temporary	?	Local	Low	There is the potential for disturbance (through noise, dust, light etc.) to Priority habitats and the River Lee during construction. A CEMP should be in place during construction. There is the potential for changes to water quality in the River Lee during operation. Although abstraction will be within the current licence, the EA have expressed some concern with regards to the WFD status of the River Lee. Therefore ecology surveys are required.	-1	-1	The pipeline passes adjacent to an area of good quality semi-improved grassland BAP Priority habitat. The pipeline also passes 150m from two parcels of deciduous woodland BAP Priority habitat, and 300m from two parcels of deciduous woodland BAP Priority habitat. The pipeline also passes adjacent to the River Lee at Luton. The abstraction site is 597m from the River Lee, which may be affected by increased abstraction from the boreholes during operation, leading to changes in water quality. This would still be within the existing licence; however the EA has expressed some concern with regards to the WFD status of the River Lee. Therefore this Option is assessed as having a potential negative operational effect on the River Lee, and ecology surveys are required.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include appropriate re-instatement and screening. Heritage and landscape character assessments should be carried out where significant infrastructure works will be carried out.	-1	0	There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase and the pipeline will be buried.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	WFD assessment states further information and assessment required to identify the potential impacts of this option.	0	-2	WFD assessment states potential for increased abstraction to impact on water quality in the groundwater body by drawing in poorer quality groundwater. Further information and assessment required to identify potential impacts of increased abstraction.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	WFD assessment states further information and assessment required to identify the potential impacts of this option.	0	-1	WFD assessment states potential for increased abstraction to impact on the water balance in the Chalk although increase abstraction is within licence . Further information and assessment required to identify the potential impacts of this.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake borehole integrity check, especially if using old boreholes. Make sure headworks are properly sealed to surface water run off.	0	0	Potential for negative impact effect during operation but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	WFD assessment states further information and assessment required to identify the potential impacts of this option.	0	-2	WFD assessment states potential for increased abstraction to impact on contributions to the nearby River Lee which could impact on river flows. Further information and assessment required to identify the	-2

														potential impacts of this.	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option is not located on floodplain, and measures are not likely to significantly increase the surface area of hardstanding within the option location.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	There is one Listed Building located within 20m of the proposed pipeline route. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts predicted	0

1.4.1.2 AFF TPO-WRZ4-0412

(In the Expected, High Growth, and Supply-side Challenging Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option is to purchase or lease and then transfer any potential spare capacity from 3 boreholes owned by Hillingdon Hospital. Two boreholes (B & A) are in use, while borehole C has been out of use for years owing to high iron levels (water quality). According to the Environment Agency website, the licence 28/39/28/0513 (HILLINGDON HOSPITAL NHS TRUST) is for 0.55 Ml/d at average and 1.00 Ml/d at peak. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, road infrastructure and air quality. It is however noted that details of the site are still to be identified and thus the connecting pipeline route will need to be assessed once the site has been identified. No key issues have been identified during construction, however similarly further assessment may be needed once the pipeline route has been determined. Abstraction should remain within current licence limits, limiting effects on the majority of receptors.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.55Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The rivers Fray and Colne Brook are not anticipated to be affected by the pipeline construction as they are at the western extreme of the assumed 2000m radius for potential pipeline impacts. A small watercourse (River Pinn) closer to Hillingdon Hospital is not anticipated to be suitably sized or accessible for in-stream recreation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated. The potential construction impacts on footpaths are anticipated to be insignificant as it is anticipated that the footpaths will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		?	N/A	Short term (< 5 years)	N/A	N/A	Temporary	N/A	Local	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified at the detailed design stage.	?	0	The 2km pipeline route is not yet identified but may cross a number of major footpaths. This may lead to temporary negative effects during construction. Details of the site are still to be identified and thus the connecting pipeline route will need to be assessed once the site has been identified.	

3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The pipeline route is anticipated to follow the footprint of major roads and so is considered likely to cause such impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. It is anticipated that works traffic will be timed to avoid congestion impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will require new WTW, 4 x 4 kW Borehole pumps, 2 x 5.5 kW Booster Pumps, 1 x 0.23 m3 Surge Vessel and 2,000 m of 150 mm diameter trunk main and 450 m of 100 mm diameter main.	-1
	4.b. Result in higher levels of reuse of waste?		Moderate	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No further assessment required.	0	0	The boreholes are located 3.8km from Fray's Farm Meadows Site of Special Scientific Interest (SSSI), 4.3km from Kingcup Meadows and Oldhouse Wood SSSI and 4.3km from Denham Lock Wood SSSI. Yeading Meadows Local Nature Reserve (LNR) is 3.3km from the borehole locations. There should be no net change to licenced abstraction at the Hillingdon Hospital. Also given the distance between the current borehole location and the closest designated site, Fray's Farm Meadows SSSI, no adverse impacts of the scheme on designated sites are anticipated.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. There should be no net	

														change to licenced abstraction at the Hillingdon Hospital. It is therefore considered that there is low risk of increasing the spread of INNS during operation.	

1.4.1.3 TPO-WRZ6-1083

(In the Aspirational, Expected, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This is a third party scheme to obtain a supply from the Surrey University site in Guildford. The option requires further discussions with Surrey University to lease the use of the borehole, a licence application to the Environment Agency, and pipework to take the water into the existing Affinity Water network; the site is just outside WRZ6. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, and road infrastructure. No key issues have been identified during operation. Abstraction should remain within current licence limits, limiting effects on the majority of receptors.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No rivers or surface water bodies are anticipated to be significantly affected by this scheme.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The new pipeline follows the route of existing roads and through the grounds of the University of Surrey, and so no accessible informal recreation sites are anticipated to be affected during construction or operation.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route crosses the footprint of major roads. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. Well used roads will be affected by the scheme: A3 0.1 (km), unclassified 0.5	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will require new WTW at the Park Barn reservoir site, 2 x 90 kW Borehole Pumps, 2 x 5.5 kW Boosters at Treatment Works, 1 x 0.6 m Surge Vessel, and 1.85 km of 200 mm Diameter Main.	-1
	4.b. Result in higher levels of reuse of waste?	Moderate	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline route is 2.2km from Wey Valley Meadows Site of Special Scientific Interest (SSSI), 2.8km from Whitmoor Common SSSI, 4.8km from Ash to Brookwood Heaths SSSI and 4.9km from Colyers Hanger SSSI. Given the distance of the pipeline and the closest designated sites, the Wey Valley Meadows SSSI, no adverse impacts are anticipated as a result of construction of the new borehole and of the new pipeline. There are no identified impact pathways to SSSI interest features. There should be no net change to licenced abstraction at the University of Surrey borehole.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The option will result in the transfer of water from Surrey University Borehole to Park Barn Drive Reservoir, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route and new WTW but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-2	0	The proposed pipeline route passes through BAP Priority habitat deciduous woodland. Park Barn Drive Reservoir is adjacent to BAP Priority habitat deciduous woodland. There is the potential for loss of BAP Priority habitat deciduous woodland. There is also potential for disturbance to species during the construction of the pipeline and WTW at the reservoir site. Depending on depth of pipeline, potential for changes to hydrology within BAP Priority habitat deciduous woodland. Also potential for noise, light and dust disturbance during construction.	

	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, WTW and reservoir cell. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. The new WTW should also be designed sympathetically to fit in with the surrounding landscape and screening used where appropriate. More detailed mitigation measures should be set out at the detailed design stage.	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The new WTW is likely to have a minor negative effect during construction; however, mitigation measures such as screening/planting will reduce the residual effect during operational phase.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	N/A	Short term (<5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	There is the potential for minor negative effects on local air quality during construction but these are unlikely to be significant given that the pipeline route does not pass through any AQMAs.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles. Energy efficient pumps should be adopted to reduce the carbon footprint of the operation process.	-1	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	0	WFD assessment states that assuming abstraction rates remain the same as on the University licence no additional impacts are expected. No WFD assessment required.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Low	N/A	0	0	WFD assessment states that assuming abstraction rates remain the same as on the University licence no additional impacts are expected. No WFD assessment required.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	N/A	0	0	WFD assessment states that assuming abstraction rates remain the same as on the University licence no additional impacts are expected. No WFD assessment required.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No hydraulic connection with surface water.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no designated heritage assets within close proximity and there are no other pathways for significant effects on the historic environment.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

1.5 RNC

1.5.1.1 AFF-RNC-WRZ7-0900

(In the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect.
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is the removal of network constraints by construction of a new main from Primrose Treatment Works to The Cricketer's Public House with connection into the existing network; this will allow increased abstraction from the groundwater sources and transfer to Folkestone. The scheme will provide an additional 0.97 Ml/d during average conditions and 1.32 Ml/d at Peak for use within WRZ7. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, and road infrastructure. No key issues have been identified during construction.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.97Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The anticipated levels (minor significant impact at construction) of river water quality change are not anticipated to have material impacts on the enjoyment of water-based recreational opportunities	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The site is not expected to be well used due to the limited access, and the availability of alternative footpaths and rivers in local area.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprints of roads and so is anticipated to cause such impacts. Well used roads will be affected by the scheme: Unclassified 1.2km. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires 1.19 km of 300 mm Diameter Main from Primrose Treatment Works to Cricketer's Public House and 1 x 1 m3 Surge Vessel	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline is 1.4km from Alkham, Lydden & Swingfield Woods SSSI. This SSSI comprises several woodlands situated on the steep slopes of dry chalk valleys. A number of uncommon plants occur including lady orchid *Orchispurpurea* in the woods and burnt orchid *Orchis ustulata* in the grassland. The site is in favorable and unfavourable – recovering condition. The pipeline is 2.1km from Lydden and Temple Ewell Downs SSSI, designated for its rich chalk grassland, and its outstanding assemblages of plants and invertebrates. The site is in favourable, and unfavourable-recovering condition. The pipeline is also 2.2km from Folkestone Warren SSSI. This site is designated for its biological, geological and physiographical interest. The site encompasses a range of marine and terrestrial habitats associated with the chalk cliffs, which support outstanding assemblages of plants and invertebrates, together with individual species which are nationally uncommon. This site is in favourable, and unfavourable-recovering condition. Given the distance of the scheme from the SSSIs it is considered that there will be no impacts during construction. Given the findings of the assessment against SEA Objectives 10 and 11 it is considered unlikely that there would be any impacts during operation.	?
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The pipeline passes adjacent to five parcels of BAP Priority Habitat deciduous woodland. There is potential for fragmentation/minor loss of BAP priority woodland during the construction phase. The pipeline is also within 100m of one additional parcel of deciduous woodland BAP Priority habitat and is 114m from a parcel of lowland calcareous grassland BAP Priority habitat. Depending on depth of pipeline, potential for changes to hydrology within BAP Priority habitats. Also potential for noise, light and dust disturbance during construction. There is also potential for disturbance to associated species during the construction of the pipeline. A CEMP should be in place during construction. Depending on the depth of the pipeline there is the potential for changes in hydrology. Ecological surveys are required.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	A landscape and visual impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-1	0	This proposed pipeline falls within 100m of the Kent Downs AONB. Construction of the new pipeline could have a minor negative effect on the landscape in the short-term, but this will be temporary and once it is buried there will be a residual neutral effect during operation.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Given the scale of the pipeline, no significant effects are anticipated.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change. No WFD assessment required.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore, pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	0	0	The new pipeline does not cross any surface water bodies. However, the pipeline is situated 57 m from the River Dour. There is the potential for disturbance to the river habitat and associated species during construction. It is considered that there is suitable mitigation available to ensure that there will be a residual neutral effect during construction. During operation there will not be any impacts.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that this option would have any significant effects on the historic environment. There are no heritage assets within close proximity that are likely to be affected.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

1.5.1.2 AFF-RNC-WRZ7-0626

(In the Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is designed to remove a network constraint on the Barham South East Water Import Main and a demand constraint, by transferring the existing Broome Borehole Source to Denton rather than via the Barham Import Main (WRZ7). Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, agricultural land, and road infrastructure. Key issues during operation relate to potential long-term effects on the landscape given the option falls entirely within the Kent Downs AONB.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.27Ml/d (peak output) equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The anticipated levels (minor significant impact at construction) of river water quality change are not anticipated to have material impacts on the enjoyment of water-based recreational opportunities	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Water craft activities are not expected to be sensitive to minor changes in water quality or water flow changes. If bathing activity occurs in the affected waterbodies (considered unlikely), then minor adverse impacts on water quality may lead to impacts on the level and enjoyment of bathing activity.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The site is not expected to be well used due to the limited access, and the availability of alternative footpaths and rivers in local area.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route follows the footprint of a major road and so is considered likely to cause such impacts. The A260 will be affected by the scheme. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This scheme requires a 2 x 75 kW Borehole Pumps at Broome Borehole, new UV and Marginal Chlorination treatment at Broome Borehole and 1.59 km of new 200 mm diameter transfer main from Broome Pump Station to Denton.	0

	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	0	0	The pipeline is 3.3km from Ileden and Oxenden Woods SSSI, 3.9km from Alkham, Lydden and Swingfield Woods SSSI, 4.5km from Lydden and Temple Ewell Downs SSSI and 4.6km from Parkgate Down SSSI. However, due to the distance to these SSSIs, no effects are anticipated during construction or operation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Medium	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats and any associated species where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	The pipeline is adjacent to one parcel of BAP Priority habitat deciduous woodland, and is within 100m of two additional parcels of this habitat. The pipeline also passes within 200m of five additional parcels of BAP Priority habitat deciduous woodland. There is potential for fragmentation/minor loss of BAP priority woodland during the construction phase. There is also potential for disturbance (including noise, light, dust etc.) to BAP Priority habitats and associated species during construction. A CEMP should be in place during construction. Depending on the depth of the pipeline there is the potential for changes in hydrology. Ecological surveys are required.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-2	-1	This option falls entirely within the Kent Downs AONB. Construction of the new pipeline could have a minor negative effect on the landscape in the short-term, but this will be temporary and once it is buried there will be a residual neutral effect during operation. At this stage there is some uncertainty about the scale of the new building for treatment but it is assumed that it will not be significant and be located within the existing treatment site. Once mitigation has been taken into account, including planting/screening it is predicted that the significance of residual effects can be reduced. Despite the small scale of development, it is considered that there is the potential for a minor negative effect during operation, in recognition of the AONB.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Given the scale of the pipeline, no significant effects are anticipated.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	High	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change. No WFD assessment required.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. Re-route the new pipeline to avoid damaging Listed Buildings, Scheduled Monuments and Registered Parks and Gardens, especially those within 10m / working area. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The pipeline passes within 10m of a number of Listed Buildings and runs adjacent to a Registered Park and Garden. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. It is assumed that there will be appropriate mitigation to ensure that the visible infrastructure does not have a significant negative effect on the historic environment.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	

	environmental deposits?													
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by pipeline construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

2. Groundwater options

2.1 NGW

2.1.1.1 AFF-NGW-WRZ6-0005

(In the Expected and High Growth Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst case operational effect.
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The Horsley abstraction well was last pumped in 1997. There were water quality issues (coliforms and nitrates) that the available treatment (marginal chlorination) could not solve. The option is to investigate the groundwater source to confirm yields and to upgrade treatment as necessary; although the licence is for 0.69 Ml/d (average) and 1.14 Ml/d (peak) the most likely yield is believed to be 0.38 Ml/d at average and 0.62 Ml/d peak owing to an adit related constraint. It is possible that the nitrate issue could be alleviated through blending of water in the nearby Pebble Hill reservoir, although dedicated treatment for nitrate is currently assumed for costing purposes. Small scale scheme with minimal new infrastructure. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to material consumption, carbon footprint and landscape. Key issues during operation relate to potential long-term effects on SEA objectives relating to waste.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.38Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The site is not expected to be used due to the lack of access, and availability of alternative footpaths and rivers in local area.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant residual impacts on surface water quality or flows are anticipated in the scope of this option.	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The site is not expected to be used due to the lack of access, and availability of alternative footpaths and rivers in local area.	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	0	0	The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts identified.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Small scale scheme that will not require significant new infrastructure.	0

	4.b. Result in higher levels of reuse of waste?	Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for medium to longer term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	N/A	Short term (< 5 years)	N/A	Short term (< 5 years)	N/A	Local	High		0	0	Sheepleas Local Nature Reserve (LNR) and Site of Special Scientific Interest (SSSI) is situated 530m from the new or upgraded WTW and associated borehole. However, due to the distance and lack of impact pathways it is not considered likely that there would be any impacts.	
	5.c. Impact on non-native species?	?	N/A	?	N/A	?	N/A	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	N/A	0	0	The new building for treatment will be situated on an existing Affinity Water site. There are no important habitats or species identified in close proximity to the site. It is considered that there will be no impacts on priority habitats or species as a result of this scheme.	?
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Sensitive design of any new infrastructure and use of screening/ planting where possible.	-1	0	It is anticipated that the new / upgraded WTW will be on the existing site; therefore this is unlikely to affect the current landscape post mitigation measures. There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Low	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given the scale of development. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	No WFD issues or impacts on water levels/ floes identified.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There would be no overall increase in licensed abstracted volumes and as such no WFD assessment required. No impacts are therefore likely.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There would be no overall increase in licensed abstracted volumes and as such no WFD assessment required. No impacts are therefore likely.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There would be no overall increase in licensed abstracted volumes and as such no WFD assessment required. No impacts are therefore likely.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There would be no overall increase in licensed abstracted volumes and as such no WFD assessment required. No impacts are therefore likely.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impact expected as the Guileshill Brook Surface Water Body appears to relate to a stream on the London Clay and not receiving Chalk baseflow.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts identified.	0

2.1.1.3 AFF-NGW-WRZ1-0062

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The abstraction borehole is located 800m from Chiltern Beechwoods SAC and may therefore have minor negative operational phase effect on the SAC. Further abstraction may have a minor negative effect on the local environment during operation if not properly monitored and licenced. There may be a minor positive effect on the River Chess as the replacement abstraction is further away.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.05Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires Pump and WTW upgrades to allow an additional 2ML/d to be abstracted.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	Regional	Moderate	None identified	0	?	The Batchworth site is located 1km from Croxley Common Moor Site of Special Scientific Interest (SSSI). Given the distance of the SSSI from the Batchworth site impacts to the SSSI are unlikely.	

	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires Pump and WTW upgrades to allow an additional 2ML/d to be abstracted. Given that there is pre-existing infrastructure, upgrades should not have any effect on landscape.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the sites is 95m from the Misbourne AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Long term >25 years	N/A	Temporary	Regional	High	Hydrogeological survey and monitoring of groundwater levels in the Chalk and implement trigger levels.	0	0	Scheme will alter groundwater level but should not have additional impact as it is replacing an existing abstraction which is nearby.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Long term >25 years	N/A	Temporary	Regional	High	No additional risk of pollution (existing borehole). Potential pollution from water runoff via headworks depending on borehole construction. Borehole integrity should be checked before operation.	0	0	Scheme is a change of licence to an existing structure. If the borehole has been constructed according to best construction practice there should be no pollution risk to the aquifer.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Long term >25 years	N/A	Temporary	Regional	Moderate	Replacement abstraction borehole is further away from the River Chess so there could be less impact on the River Chess. Could be impacts on River Colne.	0	1	Potential benefits on the River Chess as the replacement abstraction is further away. There could be small negative impact on River Colne.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No heritage assets are within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts identified	0

2.1.1.4 AFF-NGW-WRZ2-0120

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option may have minor negative effects on public rights of way and also on strategic transport infrastructure during construction. The location of the existing & assumed new borehole is surrounded by Ruislip Woods NNR & SSSI. As such, it may have minor negative construction phase and operational effects on biodiversity. The option will increase Affinity Water's carbon footprint and will therefore result in minor negative effects in both construction and operation in this regard. This option may also reduce the resilience of the local environment to climate change and will therefore have a minor negative effect in this regard. There may also be a moderate negative effects on water levels and quality in the Mid Chiltern Chalk aquifer during operation and the potential for minor negative operational phase effects on water bodies in the Colne catchment.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The pipeline route travels along roads within existing residential areas. Furthermore, the borehole is located between Ruislip Woods National Nature Reserve and Ruislip Common and is adjacent to Ruislip Lido which are likely to be used extensively for recreation. Construction of the pipeline could result in a short-term temporary minor negative effect. Once the pipeline is buried there should be no residual effect.	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The pipeline follows several A roads including the A4180 and A4125. There are likely to be minor temporary negative effects during construction.	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV	0	0	The roads affected by this option are not likely to result in knock on effects from congestion on critical services and infrastructure.	

										routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.				
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires the refurbishment of an existing borehole, a new borehole and a new mains pipeline.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	High	?	Short term (< 5 years)	?	Temporary	Permanent	National	?	Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction. Detailed surveys required.	-1	-1	The location of the existing & assumed new borehole is surrounded by Ruislip Woods NNR & SSSI. The new pipeline route passes adjacent to this designated site (with the site on either side of a road) at several locations. Ruislip Woods NNR & SSSI comprises the largest block of ancient semi-natural woodland in Greater London, and also includes acid and neutral grasslands, ponds, streams and marshland. The site supports nationally rare and nationally scarce species of moths and a diverse range of breeding birds. Potential for changes in hydrology depending on depth of pipeline and location of borehole. Potential for noise, light and dust disturbance during construction.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Lee Valley Ramsar & SPA, and Amwell Quarry SSSI (which covers the same area) is approximately 5.4km downstream of the site. This site contains two waterbodies and wetland, grassland and woodland habitats. The site supports breeding birds and invertebrates. Potential for an effect on this site due to changes in water quality due to the borehole's proximity to the River Lee.	?	?	Lee Valley Ramsar & SPA, and Amwell Quarry SSSI (which covers the same area) is approximately 5.4km downstream of the site. This site contains two waterbodies and wetland, grassland and woodland habitats. The site supports breeding birds and invertebrates. Potential for an effect on this site due to changes in water quality due to the borehole's proximity to the River Lee.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	?	Short term (< 5 years)	?	Temporary	Permanent	Local	Low	Avoid loss of BAP priority habitat where possible. If not possible, compensatory habitat may be required. Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction. Detailed surveys required	-1	0	The location of the existing & assumed new borehole is within an area of BAP Priority habitat deciduous woodland. Pipeline passes adjacent and through (following a road) BAP priority habitat deciduous woodland. Potential for changes in hydrology depending on depth of pipeline and location of borehole. Potential for noise, light and dust disturbance during construction. Potential for loss of BAP priority habitat	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Mitigation measures should include appropriate re-instatement and screening.	-1	0	The pipeline route runs around the perimeter of the Ruislip Woods National Nature Reserve. Additionally, Ruislip Lido, and Ruislip Common are anticipated to be well used recreation sites. Construction may have a negative effect on the landscape setting and character. However, once re-instated the likely residual effect will be neutral	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	?
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licensing of water abstraction.	0	1	This option will lead to an increase in water supply which will have a positive impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Hydrogeological survey and monitoring of groundwater levels in the Chalk in the Colne catchment downstream of abstraction to confirm groundwater flow and impacts.	0	-2	Abstraction during operations would be carefully monitored to understand impact on the nearby Mid Chiltern Chalk aquifer (the water body is not present at abstraction point).	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	No additional risk of pollution (existing boreholes). Potential pollution from water runoff via headworks depending on borehole construction. Borehole integrity should be checked before operation.	0	0	Scheme includes 3 boreholes recommissioning. If the boreholes have been constructed according to best construction practice there should be no pollution risk to the aquifer.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	0	-1	Potential impact on base flow for surface water bodies in the Colne catchment depending on groundwater flow direction.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	There are a number of Listed Buildings located within 30m of the pipeline route. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should make sure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline does not cross grade 1 or 2 agricultural land.	0

2.1.1.5 AFF-NGW-WRZ5-0342

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option may have minor negative effects on public rights of way and also on strategic transport infrastructure with a knock on effect on critical services and industries during construction. There may be minor negative effects during both construction and operation on the Epping Forest SSSI and BAP priority deciduous woodland. There may also be minor negative effects on landscape during construction phase. The option will increase Affinity Water's carbon footprint and will therefore result in minor negative effects in both construction and operation in this regard. This option may also reduce the resilience of the local environment to climate change and will therefore have a minor negative effect in this regard. There may also be a moderate negative effects on water levels and quality in the Mid Chiltern Chalk aquifer during operation. There is a scheduled monument located approximately 250m from the Rye Hill reservoir as such there will also be minor negative effect during construction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	WFD assessment states further information and assessment required.	0	?	The WFD assessment found that the abstraction may influence the water balance in the GW Body and this could also reduce contributions to surface water bodies. The anticipated residual impacts on water quality/ flow may be perceptible to informal recreation users. Further information and assessment required to assess the impact of this.	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	No pipeline is route is specified. The pipeline may have to cross the M11 at several locations, dependent on drilling sites. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working	-1	0	There may be short term effects associated with construction traffic impacts.	

												hours. The phased delivery of infrastructure will also help to minimise impacts.				
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires the development of a cluster of deep chalk boreholes	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found the following: Epping Forest SAC is 3.6km from the assumed borehole locations. However the exact location of the boreholes is not known and the route of the pipeline has not been identified as part of this Option. This Option can be screened out on the basis that although there are areas of wet heathland within the SAC they are related to water levels in the superficial deposits rather than the deep aquifer, it is unlikely that they would be affected by abstraction 3.6km distant and at these distances it can be assumed that any pipeline (route not specified as part of this Option) could be routed to avoid European sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	?	Local	Low	Depending on depth of pipelines, potential for changes to hydrology within designated sites. Also potential for noise, light and dust disturbance during construction. Potential for changes to hydrology due to draw down from borehole abstraction. Ecological survey required. CEMP should be implemented during construction.	-1	-1	Epping Forest SSSI is 300m from the assumed new borehole locations. Potential for noise, light and dust disturbance during construction. Potential for changes to hydrology due to draw down from borehole abstraction. However the exact location of the borehole is not known and the route of the pipeline has not been identified. Ecological survey required.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	?	Local	Low	Undertake investigations on potential changes in hydrology. Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction. Once locations of pipeline route and borehole location are known detailed ecological survey required.	-1	-1	Potential for changes to hydrology within BAP Priority habitat deciduous woodland at Wintry Wood CWS which is 830m from the assumed new borehole locations. Also potential for noise, light and dust disturbance during construction. Potential for protected species to be affected. However the exact location of the borehole is not known and the route of the pipeline has not been identified. Ecological survey required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1

	8.b. Maximise the company's resilience to a changing climate?		N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licensing of water abstraction.	0	1	This option will lead to an increase in water supply which will have a positive impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Best practice construction.	0	-1	WFD assessment states potential for abstraction to draw in poor quality groundwater in confined aquifer although any change in the mobilisation of poorer quality water is unlikely to impact on the unconfined Chalk. Creation of new preferential pathways into the aquifer due to new drilling. No likely impacts to water quality in surface water given prevalence of London Clay. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	-2
	10.c. Alter water table levels and amount of water within aquifers?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	WFD assessment requires further information and assessment to assess the impact of the option.	0	-2	WFD assessment states new groundwater source has potential to impact on the water balance in the GW body. Further information and assessment required to assess the impact of this.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Moderate	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best construction practice.	0	-1	WFD assessment states creation of new preferential pathways into the aquifer due to new drilling. No likely impacts to water quality in GWDTE (e.g. Epping Forest SSSI which may contain groundwater dependent species) given prevalence of London Clay. No likely impacts to water quality in surface water or in GWDTW given prevalence of	

														London Clay. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	WFD assessment requires further information and assessment to assess the impact of the option.	0	-2	Lowering of groundwater levels may occur during drilling and construction phase although likely to be minor and local. The WFD assessment found that the abstraction may influence the water balance in the GW Body and this could also reduce contributions to surface water bodies. Further information and assessment required to assess the impact of this.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	There is a scheduled monument located approximately 250m from the Rye Hill reservoir. There is therefore potential for negative effects during the construction phase. However, mitigation including screening/planting should reduce the significance of the residual effect during operation.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	0	0	The boreholes are located on grade 2 agricultural land. Therefore, there will be short term negative effects. Appropriate reinstatement should ensure that these effects are not experienced during construction phase.	0

2.1.1.6 AFF-NGW-WRZ5-0496

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option may have a minor negative effect on nearby BAP priority deciduous woodland during operation and may also have a minor negative effect on the resilience of the local environment to climate change during operation. There may be a moderate negative effect on the Cam Ely Ouse Chalk aquifer and minor negative effect on the flow in River Cam and Slade during operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	WFD assessment states further information and assessment required.	0	?	The WFD assessment found that the increase in peak licence quantity may impact on the water balance in the groundwater body. This could also reduce contributions to surface water bodies. The anticipated residual impacts on water quality/ flow may be perceptible to informal recreation users. WFD assessment states further information and assessment required to assess the impact of this.	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No road closures or works are anticipated.	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires the development of a cluster of boreholes	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	No impact pathways to European sites identified.	-1

and other important habitats and species?	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	The Debden Road Source is 2.8km from Debden Water Site of Special Scientific Interest (SSSI) and 4.5km from Hales and Shadwey Woods SSSI. Given the distance between Debden Road Source and the closest designated site no impacts are anticipated.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	High	A CEMP should be in place during construction and ecological surveys are required. Investigations are required to determine potential impacts on base flow in the River Cam and Slade	0	-1	The closest area of BAP Priority habitat of deciduous woodland is 290m from Debden Road Source. There is potential for changes in hydrology to BAP Priority habitat deciduous woodland during operation. There is the potential for disturbance (through noise, light, dust, etc.) during construction however given the distance between the source and deciduous woodland adverse impacts are unlikely. Changes in the pattern of abstraction (i.e. increasing peak at expense of average) could possibly impact on the ecology of the River Cam and River Slade if it changed flows or water levels during sensitive periods.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No, the treatment work upgrades will be carried out within existing buildings.	
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	?
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Medium	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1

	8.b. Maximise the company's resilience to a changing climate?		N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a positive impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	WFD assessment requires further information and assessments needed to assess potential impact on water levels/balance.	-1	-2	WFD assessment states creation of new preferential pathways into the aquifer due to drilling and below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted. Increase in abstraction at peak period may impact on contributions to the River Cam and River Slade which could have some influence in water quality in surface watercourses. Impacts unlikely to be significant although further information and assessment needed to assess potential impact on water levels. WFD assessment highlights that an increase in peak licence quantity may impact on the water balance in the groundwater body although annual licence not to be increased. Further information and assessment required to consider the impact of this	-2
	10.c. Alter water table levels and amount of water within aquifers?		Low	Medium	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	WFD assessment states further information and assessment needed to assess potential impact on water levels.	0	-2	WFD assessment states increase in peak licence quantity may impact on the water balance in the groundwater body although annual licence not to be increased. Further information and assessment required to consider the impact of this.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best construction practice.	0	0	Potential for negative impact effect during construction and operation but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	WFD assessment states further information and assessment needed to assess potential impact on water levels.	0	-2	WFD assessment states lowering of groundwater levels may occur during drilling and construction phase although likely to be minor and local. Increase in abstraction at peak period may impact on contributions to the River Cam and River Slade which could have some influence in water quality in surface watercourses. Impacts unlikely to be significant although further information and assessment needed to assess potential impact on water levels.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is no designated heritage within close proximity to the option and no other pathways for significant residual effects.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

2.1.1.7 AFF-NGW-WRZ3-0548

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option may have minor negative operation phase effect on the Lee Valley Ramsar & SPA, and Amwell Quarry SSSI, as well as BAP priority habitat deciduous woodland. The option will also have a minor negative operation phase effect with regards to Affinity Water's carbon footprint. There may be a moderate negative effect on the Chalk aquifer and minor negative effect on the surface water flows during operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.31Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This option requires construction of a new borehole at the Hartham WTW site, which will require borehole pumps and a 100m pipeline to connect the borehole to the existing WTW.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	There would need to be more detailed ecological studies to determine if schemes with abstractions from the River Lee Catchment could be delivered without negatively affecting the interest features of the Lee Valley Ramsar site in	0	?	The HRA (2017) for the dWRMP found that this scheme would not have a likely significant alone during construction or operation. It identified the potential for an in-combination effect during operation on the Lee Valley Spa/ Ramsar with options 1057, 0502, 0134 and 1075 as a result of abstraction from River Lee catchment.	-1

										particular. At this point it should be noted that the volumes of water achievable from these proposals to increase peak abstraction at the expense of average may need to be adjusted to ensure the Ramsar site is protected depending on the outcome of those more detailed investigations.			Further investigations required if these schemes are taken forward.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	?	N/A	?	N/A	Permanent	Regional	High	Undertake investigations and avoid effect on SSSI where possible.	0	-1	Amwell Quarry is approximately 5.4km downstream of the site. This site contains two waterbodies and wetland, grassland and woodland habitats. The site supports breeding birds and invertebrates. Potential for an effect on this site due to changes in water quality due to the borehole's proximity to the River Lee.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	?	Short term (< 5 years)	?	Temporary	Permanent	Local	Low	Undertake investigations on potential changes in hydrology. Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction.	0	-1	BAP priority habitat deciduous woodland is located approximately 160m downstream of the site. Potential for changes in water quality or hydrology due to borehole's proximity to the River Lee. Potential for acoustic, light and dust disturbance during construction.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option requires construction of a new borehole at the Hartham WTW site, which will require borehole pumps and a 100m pipeline to connect the borehole to the existing WTW. There is the potential for some new infrastructure to be visible; however, given that it is an existing WTW site and in the context of the urban setting , this will not	0

														result in significant effects to the landscape.	
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given the scale of the proposed option. There is unlikely to be any significant impacts on local air quality.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	National	Moderate	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a positive impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Hydrogeological survey and monitoring of groundwater levels in the Chalk to assess impacts. Use of trigger levels.	0	-2	Potential for negative impact effect during construction (although very short term during construction and reversible) and operation. Abstraction during operations would be carefully monitored to understand impact on the unconfined Chalk aquifer.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best construction practice.	0	0	Potential for negative impact effect during construction and operation but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	0	-1	Potential effect on surface water where Chalk contributes to surface water base flow.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline does not cross grade 1 or 2 agricultural land.	0

2.1.1.8 AFF-NGW-WRZ2-0610

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	There may be minor negative construction phase effects on strategic transport infrastructure with knock on minor negative effects on critical services and industries during construction. The location of the existing & assumed new borehole is surrounded by Ruislip Woods NNR & SSSI and within an area of BAP Priority habitat deciduous woodland. Therefore there will be minor negative effects during construction and operation. There may be a moderate negative effect on the Chalk aquifer and minor negative effect on the surface water flows during operation. There are also two Listed Buildings located within 30m of the pipeline route. There is therefore potential for negative effects during the construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 4Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Well used roads will be affected by the scheme: A4180 2.6 (km), A404 0.1, A4125 1, Unclassified 3.8. A roads assessed due to greater length affected and greater likelihood of significant congestion impacts. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There may be short term effects on services associated with traffic impacts	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires the refurbishment of an existing borehole, a new borehole and a new mains pipeline.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	High	?	Short term (< 5 years)	?	Temporary	Permanent	National	?	Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction. Detailed surveys required.	-1	-1	The location of the existing & assumed new borehole is surrounded by Ruislip Woods NNR & SSSI. The new pipeline route passes adjacent to this designated site (with the site on either side of a road) at several locations. Ruislip Woods NNR & SSSI comprises the largest block of ancient semi-natural woodland in Greater London, and also includes acid and neutral grasslands, ponds, streams and marshland. The site supports nationally rare and nationally scarce species of moths and a diverse range of breeding birds. Potential for changes in hydrology depending on depth of pipeline and location of borehole. Potential for noise, light and dust disturbance during construction.	?
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	?	Short term (< 5 years)	?	Temporary	Permanent	Local	Low	Avoid loss of BAP priority habitat where possible. If not possible, compensatory habitat may be required. Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction. Detailed surveys required	-1	?	The location of the existing & assumed new borehole is within an area of BAP Priority habitat deciduous woodland. Pipeline passes adjacent and through (following a road) BAP priority habitat deciduous woodland. Potential for changes in hydrology depending on depth of pipeline and location of borehole. Potential for noise, light and dust disturbance during construction. Potential for loss of BAP priority habitat. Potential for changes in	

														hydrology to River Colne due to borehole abstraction.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Mitigation measures should include appropriate re-instatement and screening.	-1	0	The pipeline route runs around the perimeter of the Ruislip Woods National Nature Reserve. Additionally, Ruislip Lido, and Ruislip Common are anticipated to be well used recreation sites. Construction may have a negative effect on the landscape setting and character. However, once re-instated the likely residual effect will be neutral	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Construction and operation activities should follow sustainable design principles.	0	1	This option will lead to an increase in water supply (4 Ml/d) which will have a marginal impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Hydrogeological survey and monitoring of groundwater levels in the Chalk in the Colne catchment downstream of abstraction to confirm groundwater flow and impacts.	0	-2	Abstraction during operations would be carefully monitored to understand impact on the nearby Mid Chiltern Chalk aquifer (the abstraction is not located in the water body).	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	No additional risk of pollution (existing borehole). Potential pollution from water runoff via headworks depending on borehole construction. Borehole integrity should be checked before operation.	0	0	Scheme is a borehole recommissioning. If the borehole has been constructed according to best construction practice there should be no pollution risk to the aquifer.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	0	-1	Potential impact on base flow for surface water bodies in the Colne catchment depending on groundwater flow direction.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	There are two Listed Buildings located within 30m of the pipeline route. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should make sure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline does not cross grade 1 or 2 agricultural land.	0

2.1.1.9 AFF-NGW-WRZ4-0624

(In the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is a combination of the WRMP14 options 624 and 442. It proposes obtaining supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area. The Lower Greensand water is to be pumped via a new pipeline along the Grand Union Canal towpath for treatment at a new Iver 2 WTW location (the existing Iver WTW is at full capacity). A new pipeline will then take the water to existing Iver for onward transfer to an upgraded Harrow Service Reservoir for use in WRZ4 (or WRZ2). Key issues during construction phase relate to minor impacts due to infrastructure delivery against SA objectives relating to recreation, road infrastructure, material consumption, landscape air quality and the historic environment. Key issues during operation primarily relate to the findings of the WFD assessment and that the reduction in discharge to the Salthill Stream as a result of this option could result in the deterioration in water quality and flows. Potential indirect effects on ecology of Salthill Stream/Brook.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 4Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	There is the potential for a Hands Off Flow condition when there is low flow in the River Roding. The WFD assessment suggests that further investigation is needed and that a scheme to provide compensation flows may be required by the EA for licensing.	0	?	The WFD assessment found that there is the potential for a reduction of flow in the Salthill Stream impacts on water-based recreation. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way/ the towpath. Further more specific mitigation can be identified at the detailed design stage.	-1	0	The new pipeline will affect the canal towpath during construction, but these impacts will be local and temporary.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will	-1	0	There are likely to be minor temporary negative effects during construction as a result of local and temporary disturbance to roads.	0

											also help to minimise impacts.					
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	Given the urban location and proximity to strategic transport routes the delivery of a new pipeline and expanded reservoir could potentially have local and temporary minor negative effects during construction.		
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a new pipeline along the Grand Union Canal towpath for treatment at a new Iver 2 WTW location (the existing Iver WTW is at full capacity). A new pipeline will then take the water to existing Iver for onward transfer to an upgraded Harrow Service Reservoir	0	
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No pathways identified for impacts on SSSIs.		
	5.c. Impact on non-native species?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	The WRMP19 Supply side Constrained Options Report (2018) states that there is a potential risk of invasive non-native species (INNS) where a scheme is abstracting from a neighbouring catchment and transferring to a storage reservoir in another catchment. This Canal and Rivers Trust scheme has been identified within the Constrained Options Report as potentially needing evaluation for the INNS risk if a detailed design stage had a preference for the delivery of abstracted water to the Affinity Water network via the canals rather than a pipeline.		

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Any specific mitigation should be explored at the detailed design stage where necessary.	0	-1	The new pipeline follows existing infrastructure and while there are priority habitats in close proximity, standard construction practice should ensure that there are no significant impacts as a result of disturbance. The WFD assessment found that the reduction in discharge to the Salthill Stream as a result of this option could result in the deterioration in water quality and flows and this could affect the ecology and fisheries Salthill Stream/Brook.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include the retention of hedgerows, trees and walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. Where possible any opportunities to merge the upgraded reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.	-1	0	The new pipeline will and upgraded reservoir has could have minor negative effects on the landscape/townscape in the short-term during construction. During operation the pipeline will be buried so it will not affect the current landscape in the long-term. Mitigation measures such as screening/ planting should reduce the significance of any residual negative effects during operation as a result of the expanded reservoir so that they are neutral.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Moderate	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within an AQMA. There are likely to be minor, local and temporary negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a marginal impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Further hydrological investigations required to determine the extent and specifics of mitigation.	0	-1	The WFD assessment found that there is the potential for this scheme to affect water flows in the Salthill Stream surface water body. This could reduce the resilience of the environment to climate change.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. It is considered that there is suitable mitigation available to ensure that there will be a residual neutral or minor negative effect during construction. During operation there will not be any impacts. The GSK abstraction is / was discharged to the stream following its use as non-evaporative cooling. The option may involve diverting this discharge to Affinity Water for consumptive use. As a result the WFD assessment found that there is a potential for a reduction in water returned to the water body that may lead to deterioration of status and flows.	-2

											determine if could impact the status of the Salthill Stream surface water body.					
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required.	0	2	While this option does not propose a new WTW it does treat the groundwater at the new Iver 2 WTW before being transferred to the upgraded Harrow Reservoir. Potential for a minor positive effect during operation. The WFD assessment found that the reduction in discharge to the Salthill Stream may lead to deterioration in water quality for that surface water body. Uncertainty at this stage until further hydrological studies are carried out.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required.	0	-1	While the WFD assessment does not identify any issues in relation to groundwater bodies/ aquifers it does highlight that there is the potential to affect water flows in the Salthill Stream surface water body. The WFD assessment states that the discharge volume needs to be quantified and further WFD assessment undertaken to determine if it could impact the status of the whole water body.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify that there is the risk of saline or other intrusions as a result of this scheme.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status of the Salthill Stream surface water body.	0	-2	The GSK abstraction is / was discharged to the stream following its use as non-evaporative cooling. The option may involve diverting this discharge to Affinity Water for consumptive use. As a result the WFD assessment found that there is a potential for a reduction in water returned to the Salthill Stream water body that may lead to deterioration of status and flows.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	There are two Listed Buildings located within 30m of the pipeline route. The upgraded harrow Reservoir is also in close proximity to a Registered Park and Garden. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should make sure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any Grade 1 or 2 agricultural land.	0

2.1.1.10 AFF-NGW-WRZ5-0877

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The Rye Hill Reservoir site is adjacent to Epping Long Green East CWS, and 132m from Harlow Woods SSSI and Parndon Woods & Common LNR .The Rye Hill Reservoir site is 132m from an area of BAP Priority habitat deciduous woodland. Therefore, there may be minor negative effects during construction phase on these features. The Rye Hill WTW site has existing infrastructure in place. Therefore landscape is unlikely to be significantly affected by new infrastructure once mitigation is taken into account. However, there may be minor negative effects during operation. The option may have minor negative effects on the resilience of the local environment to climate change. There are also two Listed Buildings located within 30m of the pipeline route. There is therefore potential for negative effects during the construction phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a new WTW, borehole pumps for 5 boreholes through to Rye Hill service reservoir (4x duty and 1x standby), new treatment building and pipework.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The Option is located 3.0km from Epping Forest SAC. The HRA (2017) for the dWRMP found that given the distance and nature of the Option involved and the fact that the wet heathland at the SAC is related to water levels in the superficial deposits rather than the deep aquifer, adverse impacts are considered unlikely no likely significant effect will arise.	?

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	?	Regional	High	A CEMP should be in place.	-1	?	The Rye Hill Reservoir site is 132m from Harlow Woods SSSI. There is the potential for any construction works to cause disturbance (noise, light, dust etc.) to these sites.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	?	Local	Low	A CEMP should be in place during construction. Ecological surveys are required	-1	?	The Rye Hill Reservoir site is 132m from an area of BAP Priority habitat deciduous woodland. There is the potential for any construction works to cause disturbance (noise, light, dust etc.) There is the potential for protected and/or notable species.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The Rye Hill WTW site has existing infrastructure in place. Therefore landscape is unlikely to be significantly affected by new infrastructure once mitigation is taken into account. There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase. Borehole locations are yet to be confirmed but it is considered that the kiosks will not be of sufficient size to significantly affect the landscape.	?
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term	Permanent	Permanent	National	Moderate	N/A	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a	-1

				(>25 years)								negative impact on the carbon footprint of the Company.		
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Construction and operation activities should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a marginal impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	0	0	WFD assessment does not identify that the abstraction alone is likely to have any significant impacts on water flows/ levels or quality and is this scheme is therefore not likely to affect the resilience of the local environment.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify any interaction with or impacts on surface water bodies.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A – This options is the development of artificial storage and recovery source.	
	10.c. Alter water table levels and amount of water within aquifers?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Further information and investigation may be required once abstraction and recharge rates are known.	0	?	WFD assessment states that lowering of groundwater levels may occur during drilling and construction phase in the confined Chalk – although likely to be minor and local and unlikely to impact surface water given the presence of London Clay. In terms of operation, the WFD assessment states that new Groundwater abstraction and recharge may impact on water balance in the Chalk although given the confined conditions at the Rye Hill Reservoir, any change in the water balance is unlikely to impact on the unconfined Chalk located 7 km to the northwest. Further information and investigation may be required once abstraction and recharge rates are known.	?
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Mitigation may also include undertaking a borehole integrity check. Further information and investigation may be required once abstraction and recharge rates are known.	0	?	WFD assessment found that there is potential for the creation of new preferential pathways into the aquifer due to new drilling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted. No impacts to	

														surface water likely given presence of London Clay. The WFD assessment found that recharge of treated water could mobilise poorer quality water in the deeper chalk due to greater head. Any change in the mobilisation of poorer quality water is unlikely to impact on the unconfined Chalk.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify any interaction with or impacts on surface water bodies.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include a heritage impact assessment, and full re-instatement of any land affected by construction.	-1	0	There are two Listed Buildings located within 30m of the pipeline route. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should make sure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline does not cross grade 1 or 2 agricultural land.	0

2.1.1.11 AFF-NGW-WRZ1-1050

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	There may be minor negative construction phase effects on strategic transport infrastructure with knock on minor negative effects on critical services and industries during construction. The option may have minor negative construction phase effects on areas of BAP priority deciduous woodland and also on the Ashridge Commons & Woods SSSI. There are also likely to be moderate negative effects on landscape during construction phase of the new pipeline, as small proportion of the pipeline passes through the Chilterns AONB. The option will have a minor negative effects during operation and construction with regards to Affinity Waters carbon footprint. The pipeline passes within 15m of three listed buildings in Berkhamsted. This will result in minor negative effects on these heritage assets during construction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. Well used roads will be affected by the scheme: A 4251 0.1 (km), A416 0.9, A41 0.1, Unclassified 3.6. A roads assessed due to significant length affected and greater likelihood of significant congestion impacts., urban other roads selected for cost as most road length affected is unclassified road.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There may be short term effects on services associated with traffic impacts	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option requires an upgrade to the Berkhamsted WTW, 4x 30kW booster pumps from Berkhamsted WTWs to Chesham High Level Reservoir and 8.41km pipeline from Berkhamsted WTWs to Chesham.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	N/A	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found the following: This option involves the Canal and Rivers Trust (CRT). The CRT currently has two licensed abstractions upstream of Berkhamsted to top up the Grand Union Canal. The actual abstraction has been between 55% and 90% (between 4.0 and 6.5 Ml/d on average) of the combined annual licence (around 7.1 Ml/d on average) in recent years. The option involves purchasing part of the licence / some of the water from the CRT to allow additional abstraction at the downstream existing Berkhamsted source. Removal of this demand constraint will help mitigate the sustainability reductions at the Amersham source. This option assumes constraint removal at the Berkhampstead source with a transfer of licensed volumes from the CRT to support increased abstraction. The option involves the construction of a new pipeline from Berkhamsted WTWs to Chesham. CRT Cow Roast abstraction borehole is located 800m from Chiltern Beechwoods SAC. The pipeline itself is 2.3km from the SAC at its closest. Based on the more refined analysis of impact pathways in the HRA Report (2017) for the dWRMP, it is possible to screen this out.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Moderate	Ecological survey required. CEMP should be implemented during construction.	-1	0	CRT cow roast abstraction borehole is located 800m from Asheridge Commons & Woods Site of Special Scientific Interest (SSSI). The borehole is 2.6km from Aldbury Towers SSSI and 3km from Oddy Hill & Tring Park SSSI. Depending on depth of pipeline, potential for changes to hydrology.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	The WRMP19 Supply side Constrained Options Report (2018) states that there is a potential risk of invasive non-native species (INNS) where a scheme is abstracting from a neighbouring catchment and transferring to a storage reservoir in another catchment.	

													This Canal and Rivers Trust scheme has been identified within the Constrained Options Report as potentially needing evaluation for the INNS risk if a detailed design stage had a preference for the delivery of abstracted water to the Affinity Water network via the canals rather than a pipeline.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Ecological survey required. CEMP should be implemented during construction.	-1	0	The new pipeline route runs adjacent to Woodland by Harriotsend Farm Pond County Wildlife Site (CWS) and Brickhill Green CWS which are also BAP Priority habitat deciduous woodland. The pipeline route is 45m from Harriotsend Spring CWS, 60m from The Rookery CWS and Hockeridge Bottom CWS which is also an area of ancient woodland. The pipeline is 250m from Dean's Wood ancient woodland. Depending on depth of pipeline, potential for changes to hydrology to CWS and ancient woodland. Also potential for noise, light and dust disturbance during construction. Potential for protected species to be affected.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-2	0	There are likely to be short-term temporary negative effects on landscape during construction phase of the new pipeline, as small proportion of the pipeline passes through the Chilterns AONB. Assuming appropriate mitigation and re-instatement the residual effect during operation should be neutral.	?

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	There is likely to be increased carbon footprint through construction (and minimal increase for operation)	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Construction and operation activities should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a marginal impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is to buy water currently abstracted by Thames so there should be no additional impact.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is to buy water currently abstracted by Thames so there should be no additional impact.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is to buy water currently abstracted by Thames so there should be no additional impact.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is to buy water currently abstracted by Thames so there should be no additional impact.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-1	0	The pipeline passes within 15m of three listed buildings in Berkhamsted. This will result in short term temporary negative effects on these heritage assets during construction through loss of setting and character. Assuming appropriate re-instatement, the residual effect during operation should be neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	

											potential unknown archaeological assets.				
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

2.1.1.12 AFF-NGW-WRZ3-1053

(In the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is for a Lower Greensand borehole to be drilled on the existing site at Kings Walden for an output of 3Ml/d. The existing site already has a Chalk groundwater source. This water could then be used for blending with the chalk source on site that suffers from high nitrates. Key issues during construction phase relate to minor impacts due to infrastructure delivery against SA objectives relating to material consumption and landscape. Key issues during operation primarily relate to the abstraction of groundwater and its influence on the water balance in Woburn Sands groundwater body. The groundwater abstracted through this scheme could also be used for blending with the existing chalk source on site that suffers from high nitrates, which could have positive impacts on the SEA objective relating to the WFD.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Further information and assessment may be required	0	?	Groundwater abstraction may influence groundwater body interaction with River Ivel surface water body. This could affect water levels in the River Ivel but this is uncertain at this stage and it is not likely that this would significantly affect water-based recreational activity.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is proposed on an existing site and given its scale is unlikely to have any impacts.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is proposed on an existing site and given its scale is unlikely to have any impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is proposed on an existing site and given its scale is unlikely to have any impacts.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Small scale scheme that will not require significant new infrastructure.	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for medium to longer term negative effects as a result of the waste produced by the new WTW.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.				
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	As per SEA objective 10 and 11, the WFD assessment recommends that further assessments are carried out to determine the influence of this scheme on the water levels in the River Ivel.	0	?	Given the nature and scale of this option it is unlikely to have any significant impacts on SSSIs. However, the WFD assessment notes that groundwater abstraction may influence groundwater body interaction with River Ivel surface water body. This could affect water levels in the River Ivel and therefore the River Great Ouse of which it is a tributary. There are a number of SSSIs downstream in close proximity to the River Great Ouse. While there is uncertainty around the impact of this scheme on the water levels of the River Ivel, it is not considered likely to result in any significant changes to the water levels or quality in the River Great Ouse and therefore no impacts are predicted on any downstream SSSIs. There are no other impacts pathways identified.				
	5.c. Impact on non-native species?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	?			
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	As per SEA objective 10 and 11, the WFD assessment recommends that further assessments are carried out to determine the influence of this scheme on the water levels in the River Ivel.	0	?	Given the nature and scale of this option it is unlikely to have any significant impacts on priority habitats. However, the WFD assessment notes that groundwater abstraction may influence groundwater body interaction with River Ivel surface water body. This could affect water levels in the River Ivel and therefore the priority habitats on and that are reliant on water from the river. While there is uncertainty around the impact of this scheme on the water levels of the River Ivel, it is considered that there is low risk of significant effects on priority habitats, although there is an element of uncertainty. There are no other impacts pathways identified.				

	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	Low	Short term (< 5 years)	N/A	Temporary	Permanent	Local	Low	Sensitive design of any new or replacement infrastructure.	-1	0	Potential for a minor negative effect during construction but sensitive design should ensure that any residual effects during operation are neutral.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is not in close proximity to an AQMA, it is proposed on an existing site and given its scale is unlikely to have any impacts.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	The water produced from this option can be used for blending with the chalk source on site that suffers from high nitrates. This will ensure a larger volume of water resources are available, and will therefore maximise the company's resilience to climate change induced water shortages.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	As per SEA objective 10 and 11, the WFD assessment recommends that further assessments are carried out to determine the influence of this scheme on the River Ivel.	0	?	The WFD assessment notes that groundwater abstraction may influence groundwater body interaction with River Ivel surface water body, which could reduce the resilience of the environment to climate change. Local and temporary impacts with an element of uncertainty.	?
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is a groundwater abstraction.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	N/A	0	-2	WFD assessment states potential influence to the River Ivel if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water to confirmed during hydrogeological survey. WFD assessment concludes combined	

														impacts have the potential to have an adverse effect at the local scale.		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required. However, it should be noted that the LGS aquifer becomes unconfined more than 13 km north of the abstraction point, therefore any impact would be naturally mitigated due to the distance.	0	-2	The WFD assessment found that the groundwater abstraction may influence local water balance in Woburn Sands groundwater body depending on extent of confined Lower Greensand abstraction influence.		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	0	0	The WFD assessment found that this scheme will not increase the risk of saline or other intrusions on the Upper Bedford Ouse Woburn Sands groundwater body.		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required. However, it should be noted that the LGS aquifer becomes unconfined more than 13 km north of the abstraction point, therefore any impact would be naturally mitigated due to the distance.	0	-2	The WFD assessment found that this abstraction could potentially influence water balance in Woburn Sands groundwater body depending on extent of confined Lower Greensand abstraction influence, which needs to be confirmed through further hydrogeological survey work. There is also the potential to affect groundwater body input to influence the River Ivel water levels/flow.	-2	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. The scheme would not	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off. There is the potential for the option to reduce the likelihood of groundwater and fluvial flooding given the findings of the WFD assessment but this is uncertain at this stage.	0	

										affect flood storage once operational and the necessary flood plain compensation complete.				
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Appropriate screening/planting.	0	0	There is a listed building located approximately 500m from the option site. However, views are limited from the site to the Listed Building and appropriate mitigation including screening/planting will ensure that residual effects are neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drilling will occur at a pre-existing site, therefore there will be no effect on agricultural land.	0

2.1.1.13 AFF-NGW-WRZ3-1068

(In the Aspirational, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The scheme is to license a new AMP6 borehole in the Lower Greensand aquifer within the existing Runley Wood site boundary to allow an increased abstraction at this site. It is dependent upon the outcome of AMP6 LGS borehole testing. The scheme includes upgrades to existing non-infrastructure. Key issues during construction phase relate to minor impacts due to infrastructure delivery against SA objectives relating to material consumption and landscape. Key issues during operation primarily relate to the abstraction of groundwater and its influence on the water balance in Woburn Sands groundwater body and subsequent impacts on the River Flint. There are also potential issues around the new pipeline and impacts on priority habitats and the M1.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Further information and assessment may be required.	0	?	Groundwater abstraction may influence groundwater body interaction with River Flit surface water body. This could affect water levels in the River Flit but this is uncertain at this stage and it is not likely that this would significantly affect water-based recreational activity.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified at the detailed design stage.	-1	0	This scheme requires a short 580m new pipeline to connect the borehole/ LGS WTW to the Chaul End Reservoir. This could cause disturbance to the public footpaths in close vicinity to the boreholes. These impacts will be local and temporary.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. Pipe jacking could be used to avoid any disturbance to the M1. This should be	?	0	This scheme requires a short 580m new pipeline to connect the borehole/ LGS WTW to the Chaul End Reservoir. The new pipeline route passes over the M1. Pipe jacking could be used to avoid any disturbance to the motorway but the feasibility of this is uncertain at this stage. No impacts are anticipated during the operation phase.	0

										explored further at the detailed design stage. The phased delivery of infrastructure will also help to minimise impacts.					
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	0	0	Scheme is proposed on an existing site and given its scale is unlikely to have any impacts.		
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Small scale scheme that will not require significant new infrastructure.	-1	
	4.b. Result in higher levels of reuse of waste?	Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for medium to longer term negative effects as a result of the waste produced by the new WTW.		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	As per SEA objective 10 and 11, the WFD assessment recommends that further assessments are carried out to determine the influence of this scheme on the Woburn Sands groundwater body and therefore water levels in the River Flit.	0	?	Given the nature and scale of this option it is unlikely to have any significant impacts on SSSIs. However, the WFD assessment notes that groundwater abstraction may influence groundwater body interaction with River Flit surface water body. This could affect water levels in the River Flit and the SSSIs downstream, which includes Fancott Woods and Meadows SSSI. This is designated for its neutral grassland (Cynosurus cristatus - Centaurea nigra grassland) and currently has a 100% favourable condition status. While there is uncertainty around the impact of this scheme on the water levels of the River Flit, it is not considered likely to result in any significant changes to the water levels or quality in the Flit and therefore no significant impacts are predicted on any downstream SSSIs. There are no other impacts pathways identified.	?	
	5.c. Impact on non-native species?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Invasive species on site should be identified and removed in advance	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard		

										of any construction as per standard construction practice.			construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	As per SEA objective 10 and 11, the WFD assessment recommends that further assessments are carried out to determine the influence of this scheme on the water levels in the River Flit. Pipe jacking could be used to avoid any loss of the priority habitat. This should be explored further at the detailed design stage.	?	?	Given the nature and scale of this option it is unlikely to have any significant impacts on priority habitats. However, there are two issues that need to be considered. The first is during construction as there is a short 580m pipeline required to connect the borehole/ LGS WTW to the Chaul End Reservoir and this crosses over some priority habitat (deciduous woodland). Given the location of the scheme it is unlikely that the route of the pipeline could be altered to avoid the habitat, given that the borehole and reservoir are separated by the M1 and the priority habitats that run along either side of the motorway. Pipe jacking could be used to avoid any loss of the habitat but the feasibility of this is uncertain at this stage and should be explored further at the detailed design stage. The second issue is that the WFD assessment notes that groundwater abstraction may influence groundwater body interaction with River Flit surface water body. This could affect water levels in the River Flit and therefore the priority habitats on and that are reliant on water from the river. While there is uncertainty around the impact of this scheme on the water levels of the River Flit, it is considered that there is low risk of significant effects on priority habitats, although there is an element of uncertainty. There are no other impacts pathways identified.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	Low	Short term (< 5 years)	N/A	Temporary	Permanent	Local	Low	Sensitive design of any new or replacement infrastructure.	-1	0	Potential for a minor negative effect during construction but sensitive design should ensure that any residual effects during operation are neutral.	?
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme is not in close proximity to an AQMA, it is proposed on an existing site and given its scale is unlikely to have any impacts.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Design and construction methods should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	The water produced from this option can be used for blending with the chalk source on site that suffers from high nitrates. This will ensure a larger volume of water resources are available, and will therefore maximise the company's resilience to climate change induced water shortages.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	As per SEA objective 10 and 11, the WFD assessment recommends that further assessments are carried out to determine the influence of this scheme on the River Ivel.	0	?	The WFD assessment notes that groundwater abstraction may influence groundwater body interaction with River Ivel surface water body, which could reduce the resilience of the environment to climate change. Local and temporary impacts with an element of uncertainty.	?
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This scheme is a groundwater abstraction.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	-1	WFD assessment states that abstraction may influence groundwater body interaction with River Flit surface water body, and therefore may impact the quality if a link between the Woburn Sands and confined Lower Greensand is confirmed during hydrogeological survey. WFD concludes minor localised effects.	

	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required.	0	-2	The WFD assessment found that the groundwater abstraction may influence local water balance in Woburn Sands groundwater body depending on extent of confined Lower Greensand abstraction influence.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	0	0	The WFD assessment found that this scheme will not increase the risk of saline or other intrusions on the Upper Bedford Ouse Woburn Sands groundwater body.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required.	0	-2	The WFD assessment found that this abstraction could potentially influence water balance in Woburn Sands groundwater body depending on extent of confined Lower Greensand abstraction influence, which needs to be confirmed through further hydrogeological survey work. There is also the potential to affect groundwater body input to influence the River Ivel water levels/flow.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Appropriate screening/planting.	0	0	There is a listed building located approximately 500m from the option site. However, views are limited from the site to the Listed Building and appropriate mitigation including screening/planting will ensure that residual effects are neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drilling will occur at a pre-existing site, therefore there will be no effect on agricultural land.	0

2.1.1.14 AFF-NGW-WRZ3-1075

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option has potential for cumulative impacts to the River Lee Navigation which the Lee Valley SPA and Ramsar is dependent on and may therefore result in minor negative operational phase effects. The option will have a minor negative effects during operation and construction with regards to Affinity Waters carbon footprint and will also have a minor negative effect on the local environments resilience to climate change. There may also be a moderate negative effect on the unconfined Chalk aquifer and potentially surface waters during operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and assessment may be required.	0	?	The anticipated residual impacts on water quality/ flow may be perceptible to informal recreation users. There is an element of uncertainty until further investigations are carried out.	?
	3.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a new borehole with pumps and a surge vessel.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	There would need to be more detailed ecological studies to determine if schemes with abstractions from the River Lee Catchment could be delivered without negatively affecting the interest features	0	?	The HRA (2017) for the dWRMP found that this scheme would not have a likely significant alone during construction or operation. It identified the potential for an in-combination effect during operation on the Lee Valley Spa/ Ramsar with options 1057, 0502, 0134 and 0548	?

											of the Lee Valley Ramsar site in particular. At this point it should be noted that the volumes of water achievable from these proposals to increase peak abstraction at the expense of average may need to be adjusted to ensure the Ramsar site is protected depending on the outcome of those more detailed investigations.			as a result of abstraction from River Lee catchment. Further investigations required if these schemes are taken forward.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	None identified	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low		-1	0	BAP Priority habitats, lowland heath and deciduous woodland are located 20m from the abstraction point and may be subject to disturbance during construction. Potential for changes to hydrology of the habitats.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires a new borehole, which may require the use of drilling machinery. However, there is existing sub station infrastructure on the site so there will be no measurable impact from infrastructure as a result of this option.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given the scale of the proposed option. There is unlikely to be any significant impacts on local air quality.	0

8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licensing of water abstraction.	0	1	The water produced from this option can be used for blending with the chalk source on site that suffers from high nitrates. This will ensure a larger volume of water resources are available, and will therefore maximise the company's resilience to climate change induced water shortages.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licensing of water abstraction.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	WFD states further information and assessment required to identify the potential impacts of this.	0	-2	WFD assessment states there is potential for increased abstraction to impact on the water balance. Further information and assessment required to identify the potential impacts of this.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	WFD states further information and assessment required to identify potential impacts of increased abstraction.	0	-2	WFD assessment states potential for increased abstraction to impact on water quality in the groundwater body. Further information and assessment required to identify potential impacts of increased abstraction.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Further information and assessment required to identify the potential impacts of this.	0	-2	WFD assessment identifies potential for increased abstraction to impact on contributions to the nearby River Lea which could impact on River Flows although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this.	-2

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pipeline does not cross grade 1 or 2 agricultural land.	0

2.2 EGW

2.2.1.1 AFF-EGW-WRZ2-0087

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option may have a minor negative effect during operation on the resilience of the environment to climate change if further abstraction is not properly monitored and licensed. However, there may be minor positive operational effects in terms of improving flows in the River Lee.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 1.6Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	N/A	
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	N/A	
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Access is not anticipated to change as a result of this scheme.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no significant congestion impacts anticipated from this scheme.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no significant congestion impacts anticipated from this scheme. No other infrastructure impacts identified.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires upgrading pumps and upgrading treatment at the existing Shakespeare Road.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found the following: This option involves increased average and peak abstraction from the chalk aquifer. The Shakespeare Road abstraction site is	?

														approximately 40km upstream from the Lee Valley SPA and Ramsar site. However, Shakespeare Road water is used locally in Harpenden and returns to the Lee through the Harpenden STW. The site is located in the interfluve so any increase in abstraction is unlikely to affect the SPA due to a combination of this positioning and sheer distance meaning that there is no connecting impact pathway (similar setting to Nomansland for higher outputs).	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	None identified	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	BAP Priority habitat deciduous woodland is present 580m away. Due to this distance, no effect is anticipated.	0	0	BAP Priority habitat deciduous woodland is present 580m away. Due to this distance, no effect is anticipated.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires upgrading pumps and upgrading treatment at the existing Shakespeare Road. It is assumed that this will take place within the existing site boundaries and will therefore have no significant effects.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option involves upgrades to existing treatment and borehole infrastructure. It is assumed that any treatment upgrades will be within existing buildings.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	N/A	Short term (< 5 years)	N/A	Permanent	N/A	National	Moderate	Construction and operation activities should follow sustainable design principles	-1	0	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in minimal increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	0
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		Moderate	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	High	Undertake assessment of potential effect of increased abstraction on groundwater and surface water. Implement groundwater level monitoring and trigger levels.	0	1	A WFD assessment may be required to demonstrate a net positive impact of this scheme; improvement of flows in the Lee, without significantly impacting the Upper Colne.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	High	Best construction practice.	0	0	Potential for negative impact effect during construction of borehole and operation but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	0	1	A WFD assessment may be required to demonstrate a net positive impact of this scheme; improvement of flows in the Lee, without significantly impacting the Upper Colne.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is assumed that any upgrades will be within existing buildings; therefore, no heritage assets are within the influence of this option.	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires upgrading pumps and upgrading treatment at the existing Shakespeare Road. It is assumed that this will take place within the existing site boundaries and will therefore have no significant effects.	0

2.2.1.2 AFF-EGW-WRZ2-0090

(In the Expected, High Growth, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The existing Stonecross chalk groundwater source comprises two boreholes of approximately 75 m depth, and currently has a peak deployable output of 3.0 Ml/d and a licensed peak rate of 3.41 Ml/d. The option involves upgrading the borehole pumps, treatment works, and a network modification to close the 0.41 Ml/d gap between DO and licence. Unlikely to be any significant impacts during construction given the lack of new infrastructure. Key issues during operation relate to potential long-term effects on water levels, WFD status and biodiversity.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.41Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	As above.	
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	As above.	
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	N/A	0	0	The option seeks to close the 0.41Ml/d gap between DO and licence. It is not likely to affect any water-based recreation assets.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No changes to access are anticipated as a result of this scheme.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	N/A	0	0	The scheme is in a built-up area, but no significant effects are anticipated given the scale and nature of the option.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Low	N/A	0	0	The option involves upgrading three borehole pumps and the site treatment works. Boreholes and filtration equipment construction will require energy and raw materials - this is not expected to be a significant increase due to the scale of the option.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP found that there are no identified impact pathways to European designated sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no identified impact pathways to any SSSIs or their interest features.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. Increased DO will be within the existing licence. It is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level.	0	-1	Given the location, nature and scale of the option at an existing site, there is not likely to be any impacts on priority habitats in the short-term during construction. During operation, abstraction should remain within current licence limits and should therefore not have adverse effects on protected species or habitats as environmental considerations should have already been assessed for the upper limits of the licence. However, it is recognised that the situation may have changed and that increased abstraction at peak times could have an impact on water levels in the aquifer and impact base flow in the linked surface water body (Ver River). However, these impacts would be local and temporary.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements are uncertain at this stage given the nature and scale of the scheme. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are given further consideration at the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Sensitive design of any new or replacement infrastructure.	0	0	The option involves upgrading and replacing existing infrastructure, including the borehole pumps and treatment works on existing sites. As a result and given the sites location within the urban area it is unlikely that there will be any significant impacts on the landscape/townscape.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	HGVs and other vehicles relating to the construction and operation could be routed to avoid any AQMAs.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that there will not be any impacts on AQMAs. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	N/A	Short term (< 5 years)	N/A	Permanent	N/A	National	Moderate	Design and construction methods should follow sustainable design principles.	-1	0	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in minimal increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	0
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level.	0	-1	During operation, abstraction should remain within current licence limits and should therefore not have adverse effects on the environment as this should have already been assessed for the upper limits of the licence. However, it is recognised that the situation may have changed and that increased abstraction at peak times could have an impact on water levels in the aquifer and impact base flow in the linked surface water body (Ver River). However, these impacts would be local and temporary.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage.	0	-1	Increase of abstraction at peak time may have some potential impact on water level in the aquifer and impact base flow in the linked surface water body (Very River). There is potential for this to have a minor negative effect but this will be local and temporary	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	0	0	The WFD assessment concluded that this option would have no impacts in relation to saline or other intrusions.	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage.	0	-1	Increase of abstraction at peak time may have some potential impact on water level in the aquifer and impact base flow in the linked surface water body (Very River). There is potential for this to have a minor negative effect but this will be local and temporary	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Given the nature and scale of this option and its location on an existing site it is not likely that there will be any impacts on the historic environment.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No grade 1 or 2 agricultural land will be affected by this option.	0

3.1.1.1 AFF-EGW-WRZ6-0173

(In the Expected, High Growth, and Supply-side Challenging Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option consists of optimising the Clandon Source. The source is currently operated at a high abstraction rate (>2Ml/d) for a few hours each day owing to the inability to vary pump speed. The source is high storage (audit system) and low permeability, such that this high rate cannot be sustained for long. Changing the software to allow water level based control of the pump speed should allow an increase in DO. The 2012 DO assessment indicates an average and peak DO of 0.2Ml/d based on actual outputs for 2012. For the purposes of costing the scheme the average benefit is assumed to be 0.1 Ml/d at average (total DO of 0.3Ml/d), and a peak benefit of 0.3 Ml/d (total DO of 0.5Ml/d) in line with information in a previous test report (Clandon Well Pump Test, Memo Report, July 2011). No key issues have been identified for construction or operation. This is considering all that is required is a change in the control philosophy to allow pump speed to be varied.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.3 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is an area of BAP Priority habitat deciduous woodland is present 65m from the existing borehole. However, scheme is a software upgrade. No linking impact pathways.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered	

													that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified.	0	0	Coylers Hanger SSSI is situated 2.3km from the existing borehole location. Scheme is a software upgrade, no linking impact pathways identified.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in minimal increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	0
	8.b. Maximise the company's resilience to a changing climate?	Low	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	N/A	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	WFD assessment states that assuming abstraction is within current licence no additional impacts are expected. No WFD assessment required.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake assessment of potential effect of increased abstraction on groundwater and surface water. To confirm sustainability of abstraction, progress with pumping tests and further modelling work and if the tests prove no impact, have a time limited licence while collecting monitoring data for review.	0	0	Although the increased abstraction may have some impact on groundwater level in the Guildford Chalk groundwater body (and also on base flow of the Upper part of the East Clandon Stream surface water body), the environmental impact should have already been assessed for the full licence. No further impacts are expected. No WFD required.	

										Mitigation could include a Hands-off Flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage.					
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	0	0	Potential for negative impact effect during operation (already existing) but appropriate mitigation should ensure residual effects are neutral.		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Hydrogeological survey and monitoring of groundwater levels in the Chalk. Mitigation could include a Hands-off Flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage. This should be given further consideration at the detailed design stage.	0	0	Although the increased abstraction may have some impact on groundwater level in the Guildford Chalk groundwater body (and also on base flow of the Upper part of the East Clandon Stream surface water body), the environmental impact should have already been assessed for the full licence. No further impacts are expected. No WFD required.	0	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.		
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. It is assumed that all that is required is a change in the control philosophy to allow pump speed to be varied.	0	

3.1.1.2 AFF-EGW-WRZ7-0306

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option may have a minor negative effect during operation on the resilience of the environment to climate change if further abstraction is not properly monitored and licensed. The option also involves drilling of new abstraction well which may have a minor negative effect on groundwater quality during construction. Furthermore, the option is located nearby to BAP priority deciduous woodland and may have a minor negative effect on this feature during construction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.52 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated. Therefore no recreational impacts anticipated.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated. Therefore no recreational impacts anticipated.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated. Therefore no recreational impacts anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no significant congestion impacts anticipated from this scheme.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no significant congestion impacts anticipated from this scheme. No other infrastructure impacts identified.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	Option requires 2 x 30Kw borehole pumps and 5m of 300mm pipework.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found the following: The scheme is to upgrade the existing Cow Lane source to deploy its full licensed quantity. Cow Lane source is 2.8 km from Dover to Kingsdown Cliffs Special Area of Conservation (SAC), 3.8 km from Lydden & Temple Ewell Downs and 7.6 km from Folkestone to Etchinghill Escarpment SAC. Increased abstraction for this option is within existing licensed quantities. Given the distances involved and the lack of sensitivity that SAC interest features have to impacts arising at this distance it is considered no likely significant effect will arise. Given the distance of the nearest SAC, 2.8 km from Dover to Kingsdown Cliffs no adverse impacts are anticipated as a result of construction of the new borehole.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	This option is within current licence limits . As a consequence no further assessment is required.	0	0	Cow Lane source is 1.2km from Folkestone Warren Site of Special Scientific Interest (SSSI), 2.7km from Alkham, Lydden and Swingfield Woods SSSI, 2.8km from Dover to Kingsdown Cliffs SSSI and 3.8km from Lydden and Temple Ewell Downs SSSI. Increased abstraction for this option is within existing licensed quantities. Given the distance of the nearest SAC, 2.8km from Cow Lane to Dover to Kingsdown Cliffs, no adverse impacts are anticipated as a result of construction of the new borehole.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A CEMP should be in place during construction, and ecological surveys are required	-1	0	Potential disturbance on nearby BAP priority habitat deciduous woodland during construction. Abstraction should remain within current licence limits and should have no additional effect on protected species or habitats. Potential for disturbance to protected species within woodland	

														habitats during construction of borehole	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant new visible infrastructure. No significant effects on the landscape are predicted.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option does not pass through any AQMAs.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	N/A	N/A	Short term (< 5 years)	N/A	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles	-1	0	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in minimal increased energy use. This is likely to have a negative impact on the carbon footprint of the Company	0
	8.b. Maximise the company's resilience to a changing climate?	Low	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	N/A	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Best construction practice during drilling.	0	0	No change in abstraction. The option involves drilling of new abstraction well which is unlikely have impacts to water levels.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	High	Best construction practice during drilling. Undertake regular borehole integrity check. Make sure headworks are properly sealed to surface water run off.	-1	0	No change in abstraction. The option involves drilling of new abstraction well which may have minor impacts to groundwater quality during construction. Undertake regular borehole integrity check. Make sure headworks are properly sealed to surface water run off.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No change in abstraction for this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within close proximity and no significant effects predicted on the historic environment. No known important archaeology.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts anticipated	0

3.1.1.3 AFF-EGW-WRZ7-0322

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option may have minor negative construction phase effects on the strategic transport network with knock on minor negative effects on critical services and industries The site for the proposed new Water Treatment Works is surrounded by BAP priority habitat deciduous woodland and the existing pipeline passes through Lydden & Temple Ewell Downs SAC and SSSI. Consequently, there will be minor negative construction phase, and operational phase effects on biodiversity. The new pipeline and new WTW will result in minor negative effects on landscape during construction. Operation activities will also result in increased energy use. This is likely to have a negative impact on the carbon footprint of the company. The option will also have minor negative construction and operation effects on the resilience of the local environment to climate change. Furthermore, the option may have minor negative operational phase effects on groundwater and surface water bodies, and minor negative construction phase effects on agricultural land.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	N/A	
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	N/A	
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Further information and assessment may be required.	0	?	The anticipated levels (minor significant impact at operation) of surface water quality change has the potential to impacts on the enjoyment of in-stream recreation. There is an element of uncertainty until further investigations are carried out.	?
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The construction impacts are anticipated to be insignificant as it is anticipated that the North Downs Way footpath will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts	-1	0	Some roads will be affected by the scheme: Unclassified crossing x5 , A2 crossing.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction,	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works	

											agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts			associated with the new pipeline.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	High	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires 10 new boreholes and new WTW which will be constructed on an existing site.	0
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	?	?	?	?	?	?	National	High	Pipeline should be re-routes to avoid the SAC or option should not be taken forward.	-3	-2	The HRA (2017) for the dWRMP found the following: The scheme involves developing a new chalk groundwater source near an area of historic coal mine water drainage and discharge. It utilises an existing (currently disused) pipeline to the existing Affinity Water Stonehall site, with the intention of then supplying the Chalksole zone. The existing pipeline passes through Lydden & Temple Ewell Downs SAC for approximately 220m. If no physical work is required to the c. 220m of pipeline that traverses the SAC then LSE are unlikely to occur provided that a dust management plan is produced to ensure that no dust generating activities take place within 200m of the SAC. If works are required to the section of pipeline which traverses the SAC then a detailed plan for the careful translocation and replacement of the grassland would need to be devised. Given the high risk that the grassland could not be restored to its pre-works condition, any need for works to the section of pipeline within the SAC could make this scheme undeliverable with its current route alignment. To make the option deliverable, a new pipeline would then be required, which avoided the SAC. Therefore, unless it can be confirmed at this stage that no works to the existing pipeline traversing the SAC would be required, or that a new pipeline can be routed outside the SAC, it is not	-2

																possible to conclude that adverse effects on integrity could be avoided since potential mitigation solutions (such as grassland translocation and replacement) have inadequate certainty as to their success rate.		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	Low	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	National	High	None identified based on assumptions. However, if works are required to the existing pipeline to make it suitable for operation, ecological investigation will be required	-1	-1	Existing pipeline passes through Lydden & Temple Ewell Downs SAC and SSSI. Potential for loss of or disturbance to this site.		
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.		
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	?	Local	Moderate	Location of the WTW, boreholes and new pipeline between these should avoid loss of BAP priority habitat deciduous woodland. CEMP should be in place during construction.	-1	?	The site for the proposed new Water Treatment Works is surrounded by BAP priority habitat deciduous woodland. Depending on the location of the WTW there is the potential for this scheme to result in the loss of this habitat. There is also the potential for disturbance (noise, light, dust etc.) during construction. There is also the potential for changes in hydrology to affect this habitat. At the time of assessment the exact location of boreholes was unknown. Once this has been identified, further ecological investigations required.		
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures.	-1	0	There will be short-term temporary negative effects during construction of the 500m pipeline as well as the new WTW. The new pipeline will be buried and the WTW will be developed on an existing treatment site. It is therefore considered that once mitigation is taken into account there will be a	0	

														residual neutral effect during operation.	
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option does not pass through any AQMAs.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This options requires significant new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	-1	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	WFD assessment states further information and assessments required.	0	-2	WFD assessment states new abstraction may reduce contributions to surface water bodies. Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	WFD assessment states further information and assessments required.	0	-2	WFD assessment states potential for groundwater abstraction to mobilise poor quality water from nearby mine workings. Creation of new preferential pathways into the aquifer due to new drilling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best	

													practice for design, construction and operations reduce risks to water quality. Further assessment required to identify potential for groundwater abstraction to mobilise poor quality water from nearby mine workings.	
	10.c. Alter water table levels and amount of water within aquifers?		Moderate	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	High	WFD assessment states further information and assessments required.	-1	-2	WFD assessment states lowering of groundwater levels may occur during drilling and construction phase although likely to be minor and local. Potential for groundwater abstraction to mobilise poor quality water from nearby mine workings. Further assessment required to identify potential mobilisation of poor quality groundwater. WFD assessment also states new abstraction may influence the water balance in the GW Body. Further information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Monitor water quality regular and set pollutant concentration trigger levels.	0	-1	Coal measures aquifer is artesian and causing pollution in the Chalk aquifer. Increased abstraction could potentially increase pollution.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	WFD assessment states further information and assessments required.	0	-2	WFD assessment states new abstraction may reduce contributions to surface water bodies Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The pump station and treatment works are not located close to any designated heritage assets. The pipeline route travels through a registered park and garden. However, as it is an existing pipeline which is to be utilised, no construction or operational effects on this asset are anticipated. No known important archaeology.	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		Moderate	N/A	Short term (< 5 years)	N/A	N/A	Temporary	N/A	N/A	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	Some ALC Grade 2 land is crossed by the indicated pipeline route.	0

3.1.1.4 AFF-EGW-WRZ3-0502

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option will have minor negative effects on recreation assets during both construction and operation. Regarding biodiversity, it may have result in minor negative operational phase effects on the Lee Valley, SPA, Ramsar, and SSSI. The construction and operation of this option will have a minor negative effect with regards to Affinity Water's carbon footprint, and will have a minor negative effect with regard to the local environment's resilience to climate change. As the option involves an increase in abstraction it is likely to have a minor negative effect during operation on ground water and surface water bodies.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	N/A	
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	N/A	
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-1
	2.b. Alter water levels that affect water-based recreation assets?		Low	Moderate	Short term (> 5 years)	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	N/A	0	-1	The river is used for informal recreation. Therefore there is potential for water quality and levels to be adversely affected. The operational impact assessment of informal recreation differs from in-stream recreation. Although the impact on water quality and level is considered to be the same; the receptor group is considered to be larger for informal recreation owing to the popularity of the site for informal recreation. Potential fishing sites on the Lee Navigation and at nearby lakes were identified through the Angling Trust's site (fishinginfo.co.uk). Changes to base flow of the Lee Navigation has the potential to impact on aquatic habitats and species, and it is therefore anticipated that angling at sites on the Lee Navigation might experience temporary adverse impact however these are not expected to be significant.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No changes to access are anticipated as a result of this scheme	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no significant congestion impacts anticipated from this scheme.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Moderate	N/A	-1	0	The option involves expansions of an existing water treatment works including new pumps.	-1
	4.b. Result in higher levels of reuse of waste?	Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the expanded WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	There would need to be more detailed ecological studies to determine if schemes with abstractions from the River Lee Catchment could be delivered without negatively affecting the interest features of the Lee Valley Ramsar site in particular. At this point it should be noted that the volumes of water achievable from these proposals to increase peak abstraction at the expense of average may need to be adjusted to ensure the Ramsar site is protected depending on the outcome of those more detailed investigations.	0	?	The HRA (2017) for the dWRMP found that this scheme would not have a likely significant alone during construction or operation. It identified the potential for an in-combination effect during operation on the Lee Valley Spa/ Ramsar with options 1057, 1075, 0134 and 0548 as a result of abstraction from River Lee catchment. Further investigations required if these schemes are taken forward.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assessment of potential for changes in flow at SSSI required.	0	0	Potential for changes to the base flow of the Lee Valley Navigation due to increased abstraction. The Lee Valley SPA (Ramsar) and SSSI is around 1.5 km southeast of the Musley Lane source and is dependent on River Lee flow. This site is also a SSSI. Potential for impacts to aquatic habitats and species.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	?	?	?	?	Temporary	Permanent	National	High	None identified	?	?	No priority habitats within the vicinity of the Musley Lane source.	

	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The new treatment works will be within an existing site and unlikely to be of a scale that would significantly affect landscape.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	-2	WFD assessment states potential for increased abstraction to impact on contributions to the River Lea which could impact on water quality although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this. Potential for increased abstraction to draw in poorer quality water in the groundwater body although this may be alleviated quality although this may be alleviated by upstream sustainability reductions.	

													Further information and assessment required to identify the potential impacts of this.		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	WFD assessment states further information and assessment required to identify potential impacts.	0	-2	WFD assessment states potential for increased abstraction to impact on the water balance in the Chalk although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this.		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run off.	0	0	WFD assessment states no impacts identified as result of scheme.		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	WFD assessment states further information and assessment required to identify potential impacts.	0	-2	WFD assessment states potential for increased abstraction to impact on River Lea which could impact on River Flows although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this.	-2	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.		
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No grade 1 or 2 agricultural land will be affected by this option.	0	

3.1.1.5 AFF-EGW-WRZ1-0613

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Regarding biodiversity, the option may result in minor negative operational phase effects on the Old Rectory Meadows SSSI and, assuming appropriate mitigation and compensation, it will have minor negative construction phase effects on BAP priority habitat. The construction of this option will have a minor negative effect with regards to Affinity Water's carbon footprint, and will have a minor negative effect with regard to the local environment's resilience to climate change during operation. As the option involves an increase in abstraction it is likely to have a minor negative effect during construction on ground water and surface water bodies.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Further information and assessment may be required.	0	?	The anticipated minor residual impacts on water quality or flow may be perceptible to informal bankside recreation users. The anticipated levels of river water quality change may have material impacts on the enjoyment of in-stream recreation. Element of uncertainty until further investigations carried out.	?
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Construction work is not anticipated to occur outside the anticipated site boundaries (which contains no roads).	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Medium term (5 -25 years) to long term (>25 years)	N/A	Permanent	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	New raw materials would be required to construct the borehole and booster pumps.	0
	4.b. Result in higher levels of reuse of waste?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	Low	N/A	Medium term (5 -25 years) to long term (>25 years)	N/A	Temporary	Regional	Moderate	There is the possible potential for changes in hydrology during operation. Ecological survey is required. And investigations into hydrological interactions are required.	?	-1	Old Rectory Meadows SSSI is located 1.8km downstream of the borehole location. There is the potential for changes in hydrology at this site during operation. Although there is uncertainty of this.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	?	Short term (< 5 years)	?	Temporary	?	Local	Low	A CEMP should be in place during construction and ecological surveys are required. Investigations are required to determine potential impacts on base flow in the River Misbourne	-1	?	The pumping station and borehole location is 11m and 40m from parcels of BAP Priority habitat deciduous woodland. There is the potential for disturbance (through noise, light, dust etc.) during construction, and changes in hydrology during construction and operation. Changes in the pattern of abstraction (i.e. increasing peak at expense of average) could possibly impact on the ecology of the River Misbourne if it changed flows or water levels during sensitive periods, given the river is located 10 m from the pumping station and borehole location. However it is unknown whether these BAP Priority habitat parcels interact with the aquifer and river. A CEMP should be in place and ecological surveys are required.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new visible infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is not likely to be any significant effects on air quality.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	N/A	Medium term (5 -25 years) to long term >25 years	N/A	Permanent	N/A	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	0	This option requires new infrastructure which will use energy and raw materials in construction. This is likely to have a negative impact on the carbon footprint of the Company. No operational emissions anticipated (there will be no net change in the average annual output therefore it is assumed electricity and chemical dosing requirements will be similar to present).	0
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to long term >25 years	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to long term >25 years	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles. WFD assessment states further information and assessment required to identify the potential impacts of this.	0	-1	Further abstraction (at peak) may have a negative effect on the environment if not properly monitored and licensed. E.g. WFD assessment identifies potential for negative effects on Old Rectory Meadows SSSI is located 1.8 km downstream which contain grassland types which may be groundwater dependent) although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	Moderate	N/A	N/A	N/A	N/A	N/A	N/A	WFD assessment states further information and assessment required to identify potential impacts of increased abstraction.	0	-1	WFD assessment states potential for increased abstraction to impact on water quality in the groundwater body although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify potential impacts of increased abstraction.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to long term >25 years	N/A	Temporary	Regional	Moderate	Undertake assessment of potential effect of increased abstraction on groundwater and surface water. Implement groundwater level monitoring and trigger levels.	0	-2	WFD assessment identifies potential for increased abstraction to impact on the water balance although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to long term >25 years	N/A	Temporary	Regional	High	Undertake regular borehole integrity check. Make sure headworks are properly sealed to surface water run off.	0	0	WFD assessment states no impacts identified as a result of this option.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		High	N/A	Medium term (5 -25 years) to long term >25 years	N/A	Temporary	N/A	Local	High	WFD assessment states further information and assessment required to identify the potential impacts of this.	-1	-2	WFD assessment states potential for increased abstraction to impact on contributions to the nearby River Misbourne which could impact on River Flows although this may be alleviated by upstream sustainability reductions. Further information and assessment required to identify the potential impacts of this.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is no designated heritage within close proximity to the option and no other pathways for significant residual effects.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No known important archaeology.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts anticipated	0

3.1.1.6 AFF-EGW-WRZ2-0622

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Regarding biodiversity, the option may result in minor negative construction and operational phase effects on BAP priority habitat. There are also likely to be minor negative effects on landscape during construction phase. The construction of this option will have a minor negative effect with regards to Affinity Water's carbon footprint, and will have a minor negative effect with regard to the local environment's resilience to climate change during operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 28 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No pipelines or construction outside existing site are anticipated.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a new surface water related pre-treatment WTW at Hilfield Park Reservoir and upgrading of existing Clay Lane WTW and also 300m of 600mm mains pipeline at Hilfield Park Reservoir	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	N/A	Local	High	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for medium to longer term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None identified	

	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	Avoid loss of BAP habitat if possible. If not possible, compensatory habitat may be required. CEMP should be in place during construction. Assessment of effect of water quality/level changes on Hilfield Park Reservoir required.	-1	-1	Areas of BAP priority habitat deciduous woodland are present adjacent to Hilfield Park Reservoir. Potential for these to be lost or disturbed. Hilfield Park Reservoir and surrounding habitat is designated as a Local Nature Reserve (LNR) and a County Wildlife Site (CWS). Hilfield Park Reservoir comprises a reservoir with marshy areas, and supports bird and invertebrate species. The site will be disturbed and land lost during the construction of the new treatment works and pipeline. Hilfield Reservoir may be affected by water quality changes when storing water, and changes in hydrology depending on the depth of the pipeline. Location of new WTW and pipeline within the site is currently unknown.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include appropriate re-instatement and screening.	-1	0	There are likely to be minor negative effects on landscape during construction phase. However, as there is significant existing infrastructure at the location in the form of pumping stations and also the M1 located nearby, mitigation measures such as screening/planting should reduce the residual effect during operation to neutral.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor impacts on air quality during construction of the replacement WTW; however, this will not be of significance.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No change in abstraction in this scheme.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake regular borehole integrity check. Make sure headworks are properly sealed to surface water run off.	0	0	Existing potential for negative impact effect during operation but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No change in abstraction in this scheme.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No known important archaeology.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No agricultural land will be affected by this option.	0

3.1.1.7 AFF-EGW-WRZ7-0629

(In the Aspirational, Expected, High Growth, Supply-side Challenging, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves a negotiation to increase the abstraction license at Lye Oak. The increase in abstraction would be by 0.14Ml/d consistent with the volume of the "returned" water (around 4% of the abstraction). This option would not involve any variation in the treatment process (WRZ7). Key issues during construction phase relate to the potential impacts on SEA objectives relating to biodiversity, however further investigation required. Key issues during operation relate to potential long-term effects ground water and surface water levels, and on biodiversity; however again this requires further investigation. This option is a license change so therefore no impacts associated with new infrastructure.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.14 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	High	Undertake assessment of potential effect of increased groundwater abstraction.	0	?	Alkham - Lydden and Swingfield Woods - SSSI is around 60 m from the site. This SSSI comprises several woodlands situated on the steep slopes of dry chalk valleys. A number of uncommon plants occur including lady orchid *Orchis purpurea* in the woods and burnt orchid *Orchis ustulata* in the grassland. The site is in favourable and unfavourable – recovering condition. Potential for increase in abstraction to impact the SSSI, where groundwater dependent species may be present, however WFD assessment concludes any impacts likely to be local and minor given small increase in abstraction. Nonetheless it is considered that this may need to be investigated further.	

	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	If required, INNS risk assessment and ecological surveys will inform the detailed design stage. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	WFD assessment concludes measure insensitive to impact. INNS risk assessment and ecological surveys will likely be required if any ground works.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Undertake assessment of potential effect of increased groundwater abstraction.	0	?	There is an area of BAP priority habitat deciduous woodland located 60m from the site (associated with Alkham - Lydden and Swingfield Woods – SSSI). See 5.d for interest features and condition. Potential for increase in abstraction to impact the priority habitat, where groundwater dependent species may be present, however WFD assessment concludes any impacts likely to be local and minor given small increase in abstraction. Nonetheless it is considered that this may need to be investigated further.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None identified - scheme is applying for a licence for increased abstraction, no works required	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure.	0
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles. Ensure monitoring and licensing of water abstraction.	0	-1	Further abstraction (at peak) may have a negative effect on the environment if not properly monitored and licensed. However WFD assessment concludes any impacts likely to be local minor and local given small increase in abstraction.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake assessment of potential effect of increased abstraction on groundwater and surface water. To confirm sustainability of abstraction, progress with pumping tests and further modelling work and if the tests prove no impact, have a time limited licence while collecting monitoring data for review. Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. Appropriate licensing and HOF will be required.	0	-1	The option involves a negotiation to increase the abstraction licence (based on water discharged to ground not currently being accounted for in the water balance). This will therefore result in a slightly higher level of abstraction. WFD assessment states that this is unlikely to impact on water balance given that increased abstraction is compensated by returned water to the aquifer which is not currently included in the EA water balance.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	0	0	Potential for negative impact effect during operation but appropriate mitigation should ensure residual effects are neutral. WFD assessment concludes no significant impacts.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	0	-1	Potential for increase in abstraction to cause minor impact to water levels in nearby Upper Dour surface water catchment which could influence the quality in surface water. However, WFD concludes this is unlikely given size of abstraction (4%).	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. This option is a license change with the use of existing infrastructure	0

3.1.1.8 AFF-EGW-WRZ5-0882

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Construction activities may create minor negative effects on strategic transport infrastructure and have knock on effects on critical services and industries. This option may also result in a minor negative effect on recreation assets during operation. Regarding biodiversity features, the pipeline route crosses through four parcels of BAP priority habitat deciduous woodland, assuming appropriate mitigation and compensation, this will result in a minor negative effect during construction. There will also likely to be a minor negative effect on landscape during construction. The construction and operation of this option will have a minor negative effect with regards to Affinity Water's carbon footprint, and will have a minor negative effect with regard to the local environment's resilience to climate change. As the option involves an increase in abstraction it is likely to have a minor negative effect during operation on ground water and surface water bodies. There will also be minor negative effects on heritage assets and agricultural land.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and assessment may be required.	0	?	The River Cam - Audley End site might be affected by the reduction in River Cam base flow. Potential for negative effects on this brown trout fishery. This is due to the anticipated water flow/quality impact and the anticipated level of use given its proximity to Saffron Walden. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts	-1	0	Well used roads will be affected by the scheme: B1039 0.7 (km), B1383 0.1, M11 0.1, Unclassified 0.2.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	Upgrading of the Wendon Source Works will require raw materials.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	None identified	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation. .	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	?	Short term (< 5 years)	?	Permanent	?	Local	Low	Changes in the pipeline route could avoid the effects on BAP Priority habitats. The loss of BAP Priority habitat should be avoided where possible. If this is not possible, compensatory habitat will be required. There is the potential for disturbance to BAP Priority habitats during construction (light, noise, dust etc.), a CEMP should be in place and ecological surveys are required.	-1	?	The pipeline passes through four parcels of BAP Priority habitat deciduous woodland near to Uttlesford Pumping Station, including one parcel that is traversed by 160m. The pipeline route also passes adjacent to three additional parcels of deciduous woodland Priority habitat. The pipeline also passes 19m and 57m from two parcels of BAP Priority habitat traditional orchard. There is the potential for disturbance to BAP Priority habitats during construction (light, noise, dust etc.) Pipeline runs alongside and crosses Wendon Brook in two locations. The potential new borehole may be less than 20m from the watercourse. Although existing investigations state there would be minimal impacts on Wendon Brook, there is the potential for changes to water quality and disturbance of the watercourse during construction, as well as the operation of any new boreholes. This has the potential to affect river habitats and associated species.	

	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There are likely to be short-term temporary minor negative effects on landscape during construction phase of the new pipeline. The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. The new building for the WTW upgrade may have also have a minor negative effect during construction; however, once mitigation is taking into account it is predicted that the residual effect during operation will be neutral.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A.	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given the scale of the proposed option. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the DO this option should result in positive effects on the resilience of the company to the effects of climate change	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Low	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	WFD assessment states further information and assessment needed to assess potential impact on water levels.	-1	-2	WFD assessment identifies that the abstraction source and transfer pipeline crosses several surface water bodies the quality of which could be affected during construction. Temporary and localised dewatering may be required along the route of new mains. Abstracted water returned to groundwater or adjacent surface waters. Creation of new preferential pathways into aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. WFD assessment concludes no significant residual impacts predicted. WFD assessment states an increase in DO may impact on contributions to Wendon Brook and the Cam which could have some influence in water quality in surface watercourses. Impacts unlikely to be significant although further information and assessment needed to assess potential impact on water levels.
	10.c. Alter water table levels and amount of water within aquifers?		Low	High	Short term (> 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	High	WFD assessment concludes further information and assessments required to consider impacts.	0	-2	During construction, minor reduction of groundwater levels may be required during construction of the new mains and infrastructure. Abstracted water returned to groundwater or adjacent surface waters where possible. WFD assessment concludes any dewatering likely to be minor and local and unlikely to impact on contributions to the water balance in the GW body. During operation, WFD assessment states that an increase in DO although within the current licence may impact on the water balance in the groundwater body. Increase in DO may also impact on groundwater contributions to surface water in Wenden

													Brook or the Cam. Further information and assessments required to consider these impacts.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run off.	0	0	Potential for negative impact effect during operation but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	0	-2	Potential effect on surface water where the Chalk contributes to surface water base flow in the Cam and Wendon Brook surface water bodies.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Moderate	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Heritage impact assessment should be carried out to determine the effect of the upgrades on designated heritage assets.	-1	0	There is one Listed Building located 40m from the Uttlesford Pumping station which requires upgrading. There is therefore potential for negative effects during the construction phase. However, suitable mitigation such as screening/planting should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. No known important archaeology.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	Some ALC Grade 2 land is crossed by the indicated pipeline route.	0

3.1.1.9 AFF-EGW-WRZ7-0908

(In the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves the re-commission of the currently disused borehole at Tappington Source to provide resilience for the licence group. Test pumping is required to confirm the yield that can be achieved and water quality (WRZ7). Key issues during construction phase relate to the potential impacts on SEA objectives relating to landscape. No key issues are anticipated during operation. Abstraction should remain within current licence limits, limiting effects on the majority of receptors.	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.7 Ml/d equates to a minor positive effect (resilience increased despite no net abstraction increase).	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated. Site assumed inaccessible to the public (no public rights of way or public facilities in site footprint).	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A. Construction work is anticipated to occur within existing site boundaries.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Design and construction methods should follow sustainable design principles.	-1	0	The option requires 2 x 11 kW Borehole Pump. Construction of new pumps will require use of raw materials. This is unlikely to be significant volumes.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	This option is within existing license group quantities. As a consequence no further assessment is required.	0	0	Tappington South groundwater source is 3.4km from Alkham, Lydden and Swingfield Woods Site of Special Scientific Interest (SSSI) and 4.9km from Lynsore Bottom. Abstraction should remain within current licence limits and should have no additional effect on designated sites.	

	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	This option is within existing license group quantities. As a consequence no further assessment is required.	0	0	Tappington South groundwater source is 122m from BAP Priority habitat lowland calcareous grassland and 166m from BAP Priority habitat deciduous woodland. Abstraction should remain within current licence limits and should have no additional effect on protected species or habitats.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pumps. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-1	0	This option will be contained within a previously developed site and utilise existing infrastructure, however it is located entirely within the Kent Downs AONB therefore there may be minor negative effect on landscape during construction. Mitigation measures such as screening/planting will reduce the residual effect during operational phase.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None of the scheme falls within in AQMA and is not likely to significantly increase traffic within an AQMA during construction or operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Moderate	N/A	Short term (< 5 years)	N/A	Permanent	N/A	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	0	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in minimal increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	0

	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the supply resilience this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	N/A	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No overall increase in abstracted volumes and as such no WFD assessment required.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No significant changes to surface water flow or quality are anticipated.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No overall increase in abstracted volumes and as such no WFD assessment required.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Regional	High	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run-off.	0	0	Existing potential for negative impact effect during operation but appropriate mitigation should ensure residual effects are neutral.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No overall increase in abstracted volumes and as such no WFD assessment required.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option. No known important archaeology.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts anticipated. No pipework and existing borehole will be used.	0

3.1.1.10 AFF-EGW-WRZ5-1057

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option may have a minor negative effect on a range of SSSIs, CWSs and SPAs during both construction and operation. There may also be minor negative effects on nearby BAP priority habitat deciduous woodland during construction. As the option involves further abstraction there may be minor negative operation phase effects on the resilience of the local environment to climate change and also ground water bodies.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2 Ml/d equates to a minor positive effect (resilience increased despite no net abstraction increase).	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The anticipated minor residual impacts on water quality or flow are not anticipated to be perceptible to the majority of informal bankside recreation users. Site assumed inaccessible to the public (no public rights of way or public facilities in site footprint)	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	There would need to be more detailed ecological studies to determine if schemes with abstractions from the River Lee Catchment could be delivered without negatively affecting the interest features of the Lee Valley Ramsar site in particular. At this point it should be noted that the volumes of water achievable from these proposals to increase peak abstraction at the expense of average may need to be adjusted to ensure the Ramsar site is protected depending on the outcome of those more detailed investigations.	0	?	The HRA (2017) for the dWRMP found that this scheme would not have a likely significant alone during construction or operation. It identified the potential for an in-combination effect during operation on the Lee Valley Spa/ Ramsar with options 0502, 1075, 0134 and 0548 as a result of abstraction from River Lee catchment. Further investigations required if these schemes are taken forward.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	?	Medium term (5 -25 years)	?	Temporary	?	Regional	Moderate	Ecological survey will be required and a CEMP should be in place during upgrade works.	-1	-1	Hunsdon Mead SSSI and CWS is approximately 400 m up gradient of the Roydon source and is a water dependent ecosystem; however Affinity Water's conceptual model for this area suggests that the Chalk (from which the abstraction takes place) and the gravels (which support the SSSI) are hydraulically separated, implying minimal impact of abstraction. The Lee Valley SPA and SSSI is approximately 2 km downgradient of the source. County Wildlife Sites are present; the Roydon source is 275m from Plantation by Rye Lock CWS, 285m from Plantation by Roydon Lock CWS, 480m from an unnamed CWS, 850m from Grassland S. of Stanstead Bury Farm CWS, 1.1km from Rye Meads Gravel Pit CWS and 1.4km from Roydon Lake CWS. Potential for these sites to be disturbed during the upgrade of the WTW, and potential for hydrological changes at these sites due to increased abstraction. A CEMP should be in place during construction and ecological surveys are required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is	

														therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Low	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	?	Local	Low	A CEMP should be in place during construction, and ecological surveys are required.	-1	?	BAP Priority habitat deciduous woodland is present 264m, 286m and 467m from the Roydon source. BAP Priority habitat coastal and floodplain grazing marsh is present 250m from the Roydon source. BAP Priority habitat lowland meadows is present at Hunsdon Mead SSSI, 400m from the Roydon source. The River Stort is located 270m from the Roydon source, and the Roydon source is also adjacent to two ponds and a water-filled ditch or drain. Potential for changes in hydrology at these habitats, and potential for disturbance during the upgrade of the WTW.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-1	-1	This option requires upgrades to existing infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading supply resilience this option should result in positive effects on the resilience of the company to the effects of climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced. The WFD assessment found that this option could have a negative effect during operation on groundwater dependent species associated with Rye Meads SSI and Hunsdon Mead SSSI. This could reduce the resilience of the local environment to climate change.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	WFD assessment requires further information and assessment to identify the potential impacts of this option.	0	-2	WFD assessment states potential for increased abstraction to impact on water quality by drawing in poorer quality groundwater. Further information and assessment required to identify the potential impacts of this.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake assessment of potential effect of increased abstraction on groundwater. Implement groundwater level monitoring and trigger levels. WFD assessment concludes further information and assessment required to identify potential impact on water balance in the chalk.	0	-2	WFD assessment states potential for increased abstraction to impact on groundwater levels which could affect Hunsdon Mead SSSI (400m upgradient) and Rye Meads SSSI (1.1km downgradient) which may support groundwater dependent species. Impacts are unlikely to be significant given that the chalk is separated from the gravels (which support Hunsdon Mead SSSI) and Rye Meads is located downgradient from the source on the River Lee and not the River Stort. Potential for increased abstraction to impact on the water balance in the Chalk. WFD assessment concludes further information and assessment required to identify the potential impacts of this.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake borehole integrity check. Make sure headworks are properly sealed to surface water run off.	0	0	Potential for negative impact effect during operation but appropriate mitigation should ensure residual effects are neutral	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Best practice construction.	0	-1	WFD assessment states that there is the potential for increased abstraction to impact on contributions to the nearby River Stort and River Lea which could impact on River Flows although	-1

														impact is likely to be small given presence of London Clay in vicinity of site which means the gravels underlying the River Stort are disconnected from the Chalk and the location of the River Lee downgradient from the Source. No significant deterioration of WFD status.	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A - This option is a licence amendment and WTW upgrade. It is anticipated that upgrades to WTW will be carried out within existing buildings / site footprint.	0

3.2 ASR

3.2.1.1 AFF-ASR-WRZ6-0174

(In the Expected and High Growth Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect.
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This is a speculative scheme to inject winter excess water into the confined chalk or Lower Greensand (LGS) for use in the summer peak demand period. The source of water is likely to be treated surface water (e.g. from the existing Egham or Chertsey sources). Exploration boreholes (LGS and Chalk) and testing will be required, at which point the option is likely to evolve based on the new data (groundwater levels and water quality); for example, it is possible that based on the new information a conventional groundwater abstraction (average and peak benefit) may be possible, albeit with a suitable level of treatment. The peak scheme yield is assumed to be 5 Ml/d, but this would require recharging with 2 Ml/d into the deep aquifer during wetter 6 months of the year (based on a more well-developed scheme for ASR in the Essex Confined aquifer). The water is likely to need to be treated to near potable quality before injection, and it is thus assumed the water would only need chlorination when re-abstracted. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to recreation, material consumption, carbon footprint public rights of way, biodiversity, landscape and the historic environment. Key issues during operation relate to potential long-term effects on SEA objectives relating to waste, WFD status and indirect effects on biodiversity.	N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. The peak scheme yield is assumed to be 5 Ml/d, but this would require recharging with 2 Ml/d into the deep aquifer during wetter 6 months of the year (based on a more well-developed scheme for ASR in the Essex Confined aquifer). This equates to a minor positive effect	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not increase any opportunities for water-based recreation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not affect aby water-based recreational activities.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Diversion of public PRoW or other foot/cycle paths.	-1	0	The anticipated pipeline route passes through Runnymede Park. The (Runnymede Park) site is expected to be well used due to location in populated area. Users may experience a short term, temporary minor negative effect during construction of the pipeline.	

3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. Pipejacking could be used to avoid any disturbance to the motorway.	-1	0	The anticipated pipeline route follows the footprint of major roads and so is considered likely to cause such impacts. Well used roads will be affected by the scheme: A30, A308, A328, it also crosses the M25. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. It is anticipated that works traffic will be timed to avoid congestion impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. Pipejacking could be used to avoid any disturbance to the motorway.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires new treatment works, expansion of a service reservoir and associated infrastructure.	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Good practice construction methods should ensure that there are no impacts.	0	0	The HRA (2017) for the dWRMP found that the proposed pipeline is 520m from the closest designated site Windsor Forest & Great Park SAC. This site is not particularly hydrologically sensitive and since the 500m cut off distance that is used in this HRA for lighting and disturbance impacts is already precautionary, it is considered that no likely significant effects will arise.	?

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Proximity of the SSSI should be taken into account during detailed design and construction. Construction could be timed to avoid the winter (October to March) and therefore disturbance to interest features. Provided the trench and pipeline installation avoided polluting the water it is considered that no adverse effect on the interest features of the SSSI is expected to arise. Standard construction controls would prevent pollution.	-1	0	The key issue in terms of impacts on SSSIs is that new pipeline for this option runs along a section of the A30 which passes within 100m of the Langham Pond SSSI, which is designated for assemblages of breeding birds, invertebrate assemblage, Cynosurus cristatus - Caltha palustris grassland, nationally rare and scarce dragonfly species and standing waters. The SSSI is currently 100% favourable or favourable - recovering condition status. Any impacts will be temporary and local and are likely to arise as a result of disturbance (noise and light) to the assemblages of breeding birds during if construction is carried out during winter as well as potential impacts on water quality. It is considered that there is suitable mitigation to avoid any significant impacts during construction and no impacts are predicted during operation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route but this is uncertain at this stage. Proximity of priority habitats should be taken into account	-1	0	The propose pipeline route passes adjacent to a number of Priority Habitats, including deciduous woodland and reedbeds. The new borehole field vicinity has the potential to be within BAP Priority habitat deciduous woodland. While it is assumed that the loss of Priority Habitat will be avoided where possible there is the potential for disturbance to habitats and species during construction.	

											during detailed design and construction. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.				
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, pumps, and expanded reservoir. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	There are likely to be minor negative effects on landscape during construction phase. Pipeline will be buried so will not have any negative effects during operation. The upgraded WTW is assumed to have the same footprint and a similar height to the existing buildings and so not negative effects are expected in the longer term. The construction of the expanded reservoir has the potential for a negative effect during construction and operation. Mitigation measures such as screening/planting should help to reduce the residual negative effects during the operational phase. Given that there is an existing reservoir and WTW it is considered that this option will have a residual neutral effect during operation.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		Moderate	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within an AQMA for the M25. There are likely to be minor, local and temporary negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	-1	-1	New/ expanded infrastructure will require raw materials and there is likely to be increased energy use during operation.	0
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	0	WFD assessment does not identify that the abstraction alone is likely to have any significant impacts on water flows/ levels or quality and is this scheme is therefore not likely to affect the resilience of the local environment.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify any interaction with or impacts on surface water bodies.	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option treats ground water and then stores it in a service reservoir. It is therefore not likely to have a positive effect on this option as will not return it to a surface water body.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Further information and investigation may be required once abstraction and recharge rates are known.	0	?	The WFD assessment found that the new Groundwater abstraction and recharge may impact on water balance in the Chalk although given the confined conditions at the Rye Hill Reservoir, any change in the water balance is unlikely to impact on the unconfined Chalk located 6km to the northwest.	?
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Mitigation may also include undertaking a borehole integrity check. Make sure headworks are properly sealed to surface water run-off. Further information and investigation may be required once abstraction and recharge rates are known.	0	?	Potential for negative impact effect during construction where surface water and groundwater are hydraulically connected but appropriate mitigation should ensure residual effects are neutral. The WFD assessment found that recharge of treated water could mobilise poorer quality water in the deeper chalk due to greater head. Any change in the mobilisation of poorer quality water is unlikely to impact on the unconfined Chalk.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify any interaction with or impacts on surface water bodies.	0

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option is partially located within a flood zone area; however it will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-1	0	The new pipeline passes within 50m of a Listed Building. There is therefore potential for minor short-term negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

4. Surfacewater options

4.1 ESW

4.1.1.1 AFF-ESW-WRZ6-0801

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme involves an upgrade to Chertsey Treatment Works (construction of a new slow sand filter) to allow increased production from surface water sources within the existing joint surface and groundwater licence to provide an additional 10 Ml/d to AWC water resource zone 6. This will increase the overall treated output from 80 Ml/d to 90 Ml/d. Option includes extension to St Anns Hill service reservoir to incorporate 10 Ml/d. Key issues during construction phase relate to the delivery of new or expanded infrastructure and potential impacts on SEA objectives relating to the historic environment in particular given the proximity of a Scheduled Monument. Key issues during operation relate to potential long-term effects in terms of increased energy use.	N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 10Ml/d (peak output) equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The upgrade to the treatment works and the reservoir will not have any impacts on PRoW.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires upgrading/expansion of existing WTW and an extension to St Anns Hill service reservoir to incorporate 10 Ml/d.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction. There is an existing WTW so unlikely to be any significant increase in waste during operation.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	National	High	Proximity of the SPA should be taken into account during detailed design and construction. Construction could be timed to avoid the winter (October to March) and therefore disturbance to interest features.	-1	0	Ann's Lake, part of the South West London Waterbodies SPA/Ramsar is 300m from St. Ann's Hill Reservoir. The Ramsar site and SPA is designated for European important numbers of over-wintering gadwall and shoveler. Works may cause disturbance to this site depending on their timing (the most sensitive period for this SPA being between October and March). Depending on the noise levels generated during construction (which are unknown at this point) works may need to be timed to avoid the winter (October to March). This would usually be the preference for construction crews but is a matter to consider further during detailed design. It is important to note that St Anns Hill reservoir is separated from the SPA by the M25, which is a significant source of noise. Taking this into account it is unlikely that construction would have a significant effect on the SPA. An underground reservoir that is fully bunded could in the long term result in groundwater levels rising in the vicinity if the lake is up hydraulic gradient of the Reservoir. However, the reservoir is approximately 40m above the SPA at this point, so there would be no construction related impacts on St Ann's Lake, which is in continuity with the water table in this area. The HRA (2017) for the dWRMP concluded that adverse effects on integrity could be avoided for this option, provided the proximity of the SPA is taken into account in detailed design and construction. No impacts anticipated during operation.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	National	High	Proximity of the SSSI should be taken into account during detailed design and construction. Construction could be timed to avoid the winter (October to March) and therefore disturbance to interest features.	-1	0	St. Ann's Lake, part of the South West London Waterbodies SPA/Ramsar is 0.3km from St. Ann's Hill Reservoir. This site is also designated as Thorpe Park No.1 SSSI, which is designated for its aggregations of non-breeding birds - Gadwall, Anas strepera. However, given the findings above it is considered that there is suitable mitigation to avoid significant effects during construction and that there will be no impacts during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Low	Detailed ecological surveys required. The loss of BAP Priority habitat should be avoided where possible at the detailed design stage. Where this isn't possible, the loss of habitats mitigated for through licensing and compensation. A CEMP should be in place.	-1	0	St. Anns Hill Reservoir (to be expanded) is surrounded by BAP priority habitat deciduous woodland. While the extent of land take is not known there is likely to be the loss of some of this priority habitat.	

	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the pipeline and reservoir. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Screening/ planting should be used if necessary for the expansion of the WTW.	0	0	The upgrade/ extension of the WTW could have some impacts on the landscape during construction, but these are predicted to be minimal given that it is an existing WTW site. It is predicted that there will be a residual neutral effect during construction and operation once mitigation is taken into account.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option does not propose a significant scale of new infrastructure. It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. It should also be noted that the site is in close proximity to the M3.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	0	WFD assessment states that assuming abstraction rates remain the same as on the hospital licence no additional impacts are expected. No WFD assessment required.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	0	0	The WFD assessment found no impacts on hydromorphological status that there would be no deterioration of status for surface or ground water bodies.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Best practice construction.	0	0	The WFD assessment found that there would be no deterioration of status for surface or ground water bodies.	
	10.c. Alter water table levels and amount of water within aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Best practice construction.	0	0	The WFD assessment found that there would be no deterioration of status for surface or ground water bodies. Potential impacts during construction but best practice should ensure that impacts are local, temporary and not significant.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Best practice construction.	0	0	The WFD assessment found that there would be no deterioration of status for surface or ground water bodies. Potential impacts during construction but best practice should ensure that impacts are local, temporary and not significant.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Best practice construction.	0	0	The WFD assessment found that there would be no impacts on surface water levels or flows. Potential impacts during construction but best practice should ensure that impacts are local, temporary and not significant.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off. The small extension to the reservoir will not increase risk of groundwater flooding.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	The detailed design stage should ensure that there is no loss of the Scheduled Monument.	-3	-2	The St Anns Hill Reservoir is surrounded by the St Ann's Hill and the Dingle Scheduled Monument. There appears to be very limited room for expansion without the loss of some of the Scheduled Monument. However if it can be demonstrated that there would be no loss of the Scheduled Monument then the significant of the residual effect could be reduced.	-2

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No grade 1 or 2 agricultural land will be affected by this option.	0

4.2 RES

4.2.1.1 AFF-RES-WRZ5-0809

(In the Expected, High Growth, and Supply-side Challenging Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The scheme includes a river intake and pumping station at Marden Ash (River Roding), a new fully bunded bankside storage reservoir located at Birds Green, an onsite Water Treatment Works (WTW) and pumping station, and a treated water pipeline to Rye Hill service reservoir. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, material consumption, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on the landscape and historic environment and in particular the impacts on water quality and levels of the Lower Roding/ River Roding and indirect effects on biodiversity and WFD status as a result of the abstraction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 6Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	The new Birds Green reservoir is anticipated to be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	There is the potential for a Hands Off Flow condition when there is low flow in the River Roding. The WFD assessment suggests that further investigation is needed and that a scheme to provide compensation flows may be required by the EA for licensing.	0	?	The WFD assessment found that there is the potential for a reduction of flow in the Lower Roding as well as an impact on fish communities due to the abstraction at low flows and this could have impacts on water-based recreation. There is an element of uncertainty until further investigations are carried out.	

	2c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?	High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires 32.2km of new pipeline, which is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?	High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The new pipeline follows the route and crosses numerous roads, including the A414 and M11. The delivery of the new WTW and reservoir will also have impacts on the surrounding road network due to an increase in HGVs. There will be some traffic disruption during the construction phase; however, this is likely to be local and temporary. No significant operation impacts are anticipated.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new pipeline, WTW and reservoir.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Permanent	N/A	Regional	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	This option requires a river intake and pumping station at Marden Ash (River Roding), a new fully bunded bankside storage reservoir located at Birds Green, an onsite Water Treatment works and pumping station. Additionally, it will require 32.2km of mains pipeline to Rye Hill Service Reservoir.	-1
	4.b. Result in higher levels of reuse of waste?	Low	High	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	Low	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	A CEMP should be in place during construction. This should make sure that any discharge of water or liquid waste is controlled and disposed of correctly.	-1	-1	The majority of the new infrastructure is distant from SSSIs and/ or there are no impact pathways. Key impacts arising from this scheme during the construction phase relate to the expansion of the existing Rye Hill Service Reservoir, which is approximately 300m from Harlow Woods SSSI.	

											Monitor water levels in the Lower Roding/ River Roding to inform the use of hands-off flow conditions/ restrict abstraction of water to maintain suitable water levels to maintain the interest features of the two SSSIs downstream. Standard construction practice should ensure that there is no significant disturbance to the SSSIs. Mitigation measures should be explored to reduce potential air quality impacts on Epping Forest SSSI during construction. This may include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.			Harlow Woods SSSI is broadly designated for its broadleaved mixed and yew woodland (in particular it is notified for: Quercus robur - Pteridium aquilinum - Rubus fruticosus woodland and Fraxinus excelsior - Acer campestre - Mercurialis perennis woodland). The SSSI is currently in a favourable and unfavourable recovering condition. The citation for the SSSI suggests that site level management, such as coppicing, is one of the most important factors in maintaining a favourable condition status. It is assumed that the expansion of the reservoir can be carried out within the existing Affinity Water site. As a result of this and given the interest features and condition status of the SSSI, it is considered that there will be no significant impacts during construction of the expanded Rye Hill Reservoir. A section of the pipeline route is approximately 320m from Epping Forest SSSI. While it is recognised that Epping Forest SAC has been discussed and screened out in the HRA for the WRMP19 this area of the SSSI (to the north east of Epping) is not within the SAC boundary. Additionally, some SSSI interest features are not interest features of the SAC and so would not have been included in the HRA. These features are: Amphibian assemblage Assemblages of breeding birds – Woodland Combinations of species – Bryophytes Invertebrate assemblage Outstanding dragonfly assemblage Population of RDB moss – Zygodon forsteri, Knothole Moss U1 b,c,d,f - Festuca ovina - Agrostis capillaris - Rumex acetosella grassland W10 - Quercus robur - Pteridium aquilinum - Rubus fruticosus woodland W14 - Fagus sylvatica - Rubus fruticosus woodland W15 - Fagus sylvatica - Deschampsia flexuosa woodland W16 - Quercus spp.-Betula spp.-Deschampsia flexuosa woodland. The SSSI is currently 35.48% favourable condition, 48.17%	

														unfavourable – recovering condition, 14.53% unfavourable – no change condition, and 1.83% unfavourable declining condition. The reasons for the unfavourable – declining and unfavourable – no change condition of SSSI units are primarily air pollution, in addition to public access/disturbance. Given the site interest features and condition status there is the potential for the construction of the pipeline to adversely impact the SSSI through pollution and disturbance. Notably as a result of the increased level of HGV vehicles anticipated during the construction period. While these effects are likely to be temporary, it is noted that the NE Condition Unit Report for the SSSI states that in the absence of air pollution, the SSSI habitats would probably be in a better condition to be able to cope with the recreational pressures. Mitigation should therefore be explored where possible (as discussed under SEA Objective 3a). Standard construction practice should ensure that there is no significant disturbance to the SSSIs. This should include appropriate measures to ensure that there are no impacts on water quality and levels during construction. The WFD assessment identified that there is the potential for impacts on the flows and quality of the River Roding. There are two SSSIs located downstream of the abstraction, which are Curtismill Green and Roding Valle. Curtismill Green SSSI is broadly designated for neutral grassland and broadleaved, mixed and yew woodland. Interest features include Agrostis stolonifera - Alopecurus geniculatus grassland and Cynosurus cristatus - Centaurea nigra grassland. Approximately 83% of the SSSI is meeting favourable or unfavourable recovering status, with the remainder unfavourable declining. The unfavourable declining is as a result of agricultural practices and public access/ disturbance. Roding Valley Meadows SSSI is broadly designated for neutral grassland (lowland) and in particular Alopecurus pratensis - Sanguisorba	

													officinalis grassland and Cynosurus cristatus - Centaurea nigra grassland. Approximately 47% of the SSSI is meeting favourable or unfavourable recovering status, with the remainder unfavourable no change. The unfavourable status is as a result of freshwater pollution- water pollution - agriculture/ run off in relation to two units. Reduced water levels and quality in the River Roding could affect the interest features of the SSSIs but this is uncertain at this stage and further hydrological investigations required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further to Rye Hill Reservoir. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	The scheme proposes abstracting water from the River Roding and transferring it to a new fully bunded bankside storage reservoir located at Birds Green where it will then be treated. There is the potential to introduce INNS during construction as well as exacerbate their spread through an abstraction and transfer of raw water to Birds Green Reservoir. Element of uncertainty at this stage until further studies have been carried out.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route, new WTW and new reservoir cell but this	-1	-1	The construction of the new pipeline may result in the loss of Priority Habitats. It should be noted that the new pipeline follows exiting infrastructure where possible. The expansion of the Rye Hill Reservoir and the new Birds Green Reservoir will not result in the loss of any priority habitats. Potential for disturbance to species during the construction of the pipeline, new WTW and expanded/new reservoirs. Potential for a minor negative effect during construction.	

												is uncertain at this stage. Please refer to assessment question 5.d where other mitigation measures are discussed/ identified. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.			During operation there is the potential for the scheme to have impacts on water quality and levels of the River Roding that could affect important water dependant habitats and the species they support. Please refer to assessment question 5.d where this issue is discussed in more detail.	
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, WTW and reservoirs but this is uncertain. Once constructed and filled, the Birds Green Reservoir will provide new habitat for waders and waterfowl. Potential for a net gain in biodiversity in the long-term.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. The new WTW should also be designed sympathetically to fit in with the surrounding landscape and screening used where appropriate. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.	-2	-1	Infrastructure delivered as part of this scheme is not likely to have impacts on any designated landscapes. Potential for minor negative effects on the landscape/ townscape in the short term as a result of the new pipeline. The construction of the new WTW and new Birds Green Reservoir as well as expanded Rye Hill Reservoir are likely to have negative impacts on landscape/ townscape in the short term. During operation there is not likely to be any significant impacts as a result of the pipeline or the expanded Rye Hill Reservoir as they will be buried. The WTW is most likely to have a negative effect on the landscape during the operational phase as a result of the new buildings and will require appropriate screening/ planting. The residual effect of the new reservoir is likely to be less significant and once planting has matured it will is likely to become a valued part of the landscape. Once mitigation is taken into account it is considered that there is the potential for a long-term minor negative effect on the landscape/ townscape. It is likely that more specific mitigation identified at the detailed design stage will be	-1

													able to reduce the significance of the residual negative effect in the short and longer terms.	
	6.b. Provide opportunities for landscape enhancement?	?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	1	The delivery of the new reservoir has the potential for a long-term minor positive effect on the landscape. It provides an opportunity to deliver a new valued landscape that is used by people for recreation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	None of the scheme falls within in AQMA and is not likely to significantly increase traffic within an AQMA during construction or operation. Impacts on local air quality are most likely to arise during construction as a result of the increased number of HGVs on the road network and disruption to traffic during construction of the pipeline. However, this is unlikely to be of significance given the rural location of this scheme. During operation it is considered unlikely that there would be any significant negative impacts on local air quality as a result of increased traffic or operations.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	N/A	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Further hydrological investigations required to determine the extent and specifics of mitigation.	0	-1	The extraction of raw water from the River Roding could reduce the resilience of the river and its environment to climate change. The significance of the residual effect is uncertain at this stage and dependent on further hydrological and WFD studies.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that during operation the scheme has the potential to reduce river flow in the Lower Roding unless a scheme to provide compensatory flows is instigated.	-2

												necessary. Watercourse diversions could be designed using a 'naturalised' form. In terms of the operational phase the WFD assessment states that further investigation of hands off flow or compensatory scheme is required.				
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The water will be treated following abstraction and then stored at an expanded Rye Hill Reservoir.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impact on groundwater water body.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impact on groundwater water body.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Further discussions with the EA required to explore the need and potential for compensatory flows. Monitoring of water levels in the Lower Roding/ River Roding and the use of hands-off flow conditions where necessary.	0	-2	The WFD assessment found that a reduction of river flow in the Lower Roding is expected unless a scheme to provide compensatory flows is instigated.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during	0	0	The majority of new infrastructure falls within areas of low flood risk. Sections of the new pipeline fall within areas of high flood risk; however there is suitable mitigation available to ensure that there is a residual neutral effect. The abstraction of water from the River Roding could help to reduce the risk of fluvial flooding downstream; however, this is uncertain at this stage.	0

										construction. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete.						
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-1	-1	The construction of new infrastructure, including the pipeline, new WTW and new and expanded reservoirs, which is visible from a number of listed buildings, will have temporary negative effects on the historic environment in the short to medium term. There is also the potential for archaeological activity/remains at the site, which may be impacted by the construction of the expanded reservoir and associated infrastructure. Archaeological investigations should be carried out prior to any construction work. There is unlikely to be any significant negative effects during operation once mitigation has been taken into account; however, this is uncertain at this stage and dependent on the detailed design and implementation of mitigation measures.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	High	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary/ Permanent	Permanent	Regional	High	Mitigation measures should include full re-instatement of any land or soil affected by pipeline construction.	-2	-1	The pipeline route crosses a large area of Grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary. The new Birds Green reservoir is also located on Grade 2 agricultural land, the construction of which will result in the permanent loss of this land.	-1

4.2.1.2 AFF-RES-WRZ3-0814

(In the High Growth Future)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This is an augmentation scheme proposed to help offset the Runley Wood and Periwinkle Lane 10 Ml/d sustainability reductions (AMP7). The scheme involves abstracting water from the River Ouzel, storing it at a new fully bunded raw water reservoir at Honeywick Rye, and discharging flow to the Upper Lee River. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to recreation, material consumption, biodiversity, landscape, historic environment, road infrastructure and air quality. Key issues during operation relate to potential long-term impacts on water levels, flow and quality of the Ouzel (US Clipstone Brook) surface water body. Conversely, there is the potential for positive impacts on the Lee (from Luton to Luton Hoo Lakes) surface water body and the Upper Bedford Ouse Chalk Groundwater body as a result of increased treated discharge into the Upper Lee catchment. This will help to improve water levels and flow rates.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	The new reservoir is anticipated to be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities.	
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status surface water body.	0	?	The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume and hydromorphology of the Ouzel (US Clipstone Brook) surface water body unless a scheme to provide compensatory flows is instigated. Conversely, the WFD assessment found that there is also the potential for this option to have benefits for the Lee (from Luton to Luton Hoo Lakes) surface water body as a result of increased treated discharge into the Upper Lee catchment. This will help to improve water levels and flow rates.	?
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires 6.7km of new pipeline, which is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	

3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipeline route partly follows the footprint of major roads and so is likely to cause such impacts. Well used roads will be affected by the scheme: A5120, A5, A4146, A4012. There will be some traffic disruption during the construction phase; however, this is likely to be local and temporary. No significant operation impacts are anticipated.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new pipeline, WTW and reservoir.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Permanent	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires a surface water intake and pumping station at Leighton Buzzard, a fully bunded dam embankment and raw water reservoir (capacity 5000 Ml) at Honeywick Rye, and 13.3km of mains pipeline.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA found that there are no identified impact pathways to European designated sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Regional	High	Further hydrological studies should be carried out to inform the detailed design stage, in particular the depth of the pipeline to ensure that there are no impacts on the standing open water and canals habitat designated as part of the Houghton Regis Marl Lakes SSSI.	?	-1	Pipeline passes 200m from Totternhoe Chalk Quarry SSSI, which is currently in a favourable condition status and is broadly designated for its calcareous grassland (Festuca ovina - Avenula pratensis lowland calcareous grassland & Bromus erectus lowland calcareous grassland & Brachypodium pinnatum lowland calcareous grassland & Vascular plant assemblage). Given the distance from this site, interest features and condition status it is not considered likely that there will be any impacts.	

														The pipeline also passes approx. 150m from Houghton Regis Marl Lakes SSSI, which is currently 73.89% favourable condition and 26.11% unfavourable declining condition status and is broadly designated for its calcareous grassland and standing open water and canals (Festuca ovina - Hieracium pilosella - Thymus preaecox grassland & Great crested newt & Outstanding dragonfly assemblage & Standing waters). The SSSI comprises wetland habitats (standing open water and canals) that are rare in Britain, confined to chalk or limestone areas. Depending on the depth of the pipeline this site may be affected by changes in hydrology. It should also be noted that the unit identified as unfavourable declining the main habitat is the standing open waters and canals and this status is based on the lack of water persisting the area. The WFD assessment found that there is the potential for both negative and positive effects on surface and groundwater bodies. At this stage it is uncertain if there is the potential for impacts on the SSSIs and in particular Houghton Regis Marl Lakes SSSI during operation.
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	-1	This scheme has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as an option at risk of transporting INNS. This option involves abstracting from River Ouzel at Leighton Buzzard, and discharging to the Upper Lee River Catchment and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase.

										Monitoring downstream of the discharge into the Upper Lee to act as an early warning and give sufficient time for appropriate treatment prior to any further spread.				
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower around the route but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	Abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland, which stretches both up- and downstream from the abstraction point. Pipeline then passes through this habitat at this location. Honeywick Rye Reservoir location includes a block of BAP priority habitat deciduous woodland. Location also covers a series of ditches in agricultural land. Pipeline route is through several blocks of deciduous woodland and crosses several ditches.	
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, WTW and reservoirs but this is uncertain. Once constructed and filled, the new raw water reservoir will provide new habitat for waders and waterfowl. Potential for a net gain in biodiversity in the long-term.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.	-2	-1	Infrastructure delivered as part of this scheme is not likely to have impacts on any designated landscapes. There are likely to be negative effects on landscape as a result of the new buildings and fully bunded dam embankment during the construction and operation phases. Mitigation measures such as screening/planting will reduce the residual effect during operational phase. However, the reservoir and dam embankment will result in a residual long-term negative effect during operation as they will remain prominent in the landscape post mitigation. The residual effect of the new reservoir is likely to be less significant and once planting has matured it is likely to become a valued part of the landscape. The new raw water pipeline will also have negative effects during construction; however, following the reinstatement of the land it is predicted that there will be a residual neutral effect during operation. Once mitigation is taken into account it is considered that there is the potential for a long-term minor negative effect on the landscape/ townscape. It is likely that more specific mitigation identified at the detailed design stage will be able to reduce the significance of the residual negative effect in the short and longer terms. The phasing of infrastructure delivery will also help to reduce the significance of effects in the short-term.	-1
	6.b. Provide opportunities for landscape enhancement?		?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	1	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, but this is uncertain. The delivery of the new reservoir has the potential for a long-term minor positive effect on the landscape. It provides an opportunity to deliver a new valued landscape that is used by people for recreation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		Moderate	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction,	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. There are likely to be minor, local and temporary negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0

										agreement of HGV routes and working hours.					
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a marginal impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Long term >25 years	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. In terms of the operational phase the WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required.	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume and hydromorphology of the Ouzel (US Clipstone Brook) surface water body unless a scheme to provide compensatory flows is instigated. The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required. Conversely, the WFD assessment found that there is also the potential for this option to have benefits for the Lee (from Luton to Luton Hoo Lakes) surface water body and the Upper Bedford Ouse Chalk Groundwater body in terms of hydromorphology as a result of increased treated discharge into the Upper Lee catchment. This will help to improve water levels and flow rates. On balance, taking into account the potential for positive and negative effects it is considered that there is the potential for a minor negative effect during operation.	-2

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required.	0	-2	The WFD assessment found that there is the potential for a reduction in water quality with lower water levels and flows. Has potential to cause deterioration in the status the Ouzel (US Clipstone Brook) surface water body if not managed. A reduction of river flow due to abstraction is expected unless a scheme to provide compensatory flows is instigated Conversely, the WFD assessment found that there is also the potential for this option to have benefits for the Lee (from Luton to Luton Hoo Lakes) surface water body and the Upper Bedford Ouse Chalk Groundwater body as a result of increased treated discharge into the Upper Lee catchment. This will help to improve water levels and flow rates. Secondary benefits will be an improvement in water quality and aquatic diversity, particularly given the bad status of fish and invertebrates in relation to the Lee (from Luton to Luton Hoo Lakes) surface water body.	

	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required.	0	-2	While the WFD assessment does not identify any issues in relation to groundwater bodies/ aquifers it does highlight that there is the potential to affect water flows in the Ouzel (US Clipstone Brook) surface water body. Also there is possible loss of river depth due to abstraction at low flows. A scheme to provide compensatory flows may need instigating. Conversely, the WFD assessment found that there is also the potential for this option to have benefits for the Upper Bedford Ouse Chalk Groundwater body as a result of increased treated discharge into the Upper Lee catchment. This will help to improve water levels and flow rates.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify that there is the risk of saline or other intrusions as a result of this scheme.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status surface water body.	0	-2	The WFD assessment found that the CAMS for the area indicates that there is no water available at low flows. As such an abstraction at low flow would not be available unless a compensatory scheme is enacted. Conversely, the WFD assessment found that there is also the potential for this option to have benefits for the Lee (from Luton to Luton Hoo Lakes) surface water body and the Upper Bedford Ouse Chalk Groundwater body as a result of increased treated discharge into the Upper Lee catchment. This will help to improve water levels and flow rates. On balance, taking into account the potential for positive and negative effects it is considered that there is the potential for a moderate negative effect during operation.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include appropriate re-instatement	0	0	The pipeline route is partially located within some areas of floodplain. However, this area is not significant, and once reinstatement has occurred there should be no loss of floodplain.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-1	-1	The construction of the new raw water pipeline is likely to be visible from a number of Listed Buildings. However, appropriate reinstatement of any land affected following construction is anticipated to result in negative effects being short-term and temporary. There is the potential for archaeological activity/remains at the site, which would likely be impacted by the construction of the reservoir and associated infrastructure. Archaeological investigations should be carried out prior to any construction work. The site of the new reservoir is within 900m of a number of Listed Buildings and the Tatternhoe Castle Scheduled Monument. The reservoir is likely to be visible in part to these designated heritage assets given their elevation and the Scheduled Monument looks down the Ouzel Valley. There is therefore the potential for negative effects during construction and operation of the new reservoir. There is a significant level of uncertainty at this stage as the precise location of the reservoir and height of the bunded dam embankment are not known.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The new pipeline does not pass through any BMV agricultural land.	0

4.2.1.3 AFF-RES-WRZ3-0815

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme consists of a new fully bunded raw water storage reservoir at Edelsborough, supplied from the River Ouzel at Leighton Buzzard, with a new WTW on site delivering an average yield of 5.5 Ml/d and a peak yield of 7.15 Ml/d to an expanded Chaul End service reservoir in AWC WRZ 3. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to recreation, material consumption, biodiversity, landscape, historic environment, road infrastructure and air quality. Key issues during operation relate to potential long-term impacts of abstraction on water levels, flow and quality of the Ouzel (US Clipstone Brook) surface water body. It should also be noted that this scheme is within the setting of the Chilterns AONB.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5.5Ml/d (average) equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	It is assumed that the new raw water reservoir will be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status surface water body.	0	?	The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume and hydromorphology of the Ouzel (US Clipstone Brook) surface water.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires a new pipeline, which is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	

3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?	High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	Several A and B roads are anticipated to experience congestion during construction of this scheme. The construction traffic impact is anticipated to local and temporary. No significant operation impacts are anticipated. Well used roads will be affected by the scheme: A4012, A4146, B489, and A505. Pipe near M1 appears to be off-carriageway.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Permanent	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires 22.6km of new mains pipeline, a new fully bunded reservoir, a new surface water intake and pumping station, water treatment works and the expansion of Chaul End Service Reservoir.	-1
	4.b. Result in higher levels of reuse of waste?	Low	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Detailed design and construction should take account of the proximity of SSSIs. Best practice construction should ensure that there are no impacts.	0	0	There are a number of SSSIs within 1km of the new pipeline and reservoir. In particular the pipeline passes within 100m of Dunstable and Whipsnade Downs SSSI, which is designated broadly for calcareous grassland (Festuca ovina - Avenula pratensis - Bromus erectus - Festuca ovina - Hieracium pilosella - Thymus preaecox). It is noted that this SSSI is separated from the new pipeline, which is following existing infrastructure, by existing housing.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed	?	?	The scheme proposes abstracting water from the River Ouzel and transferring it to an expanded Chaul End service reservoir. There is	

											design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS. Monitoring downstream of the discharge into the River Ouzel to act as an early warning and give sufficient time for appropriate treatment prior to any further spread.			the potential to introduce INNS during construction. While there is the potential to spread INNS as a result of the raw water transfer to the new reservoir, they are unlikely to spread any further given the new WTW after Edelsborough Reservoir.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Temporary	Regional	Moderate	Any proposal for this option should avoid designated sites where possible. Potential for water level/ quality changes in River Ouzel and subsequent loss of suitable habitat. Mitigation could include monitoring water levels to inform the use of Hands-off flow conditions/ restrict release of water to maintain suitable water levels for the river habitats and associated species they support. Detailed ecological surveys required. The loss of BAP Priority habitat and species should be avoided where possible. Where this isn't possible, the loss of habitats and species would need to be mitigated for through licensing and compensation. A CEMP should be in place.	-1	-1	Abstraction point is adjacent to an area of BAP Priority habitat deciduous woodland, which stretches both up- and downstream from the abstraction point. Pipeline then passes through this habitat at this location. Pipeline passes adjacent to BAP priority habitat traditional orchard at Northall. Footprint of new reservoir with WTW at Edelsborough covers an area of BAP priority habitat traditional orchard, and is adjacent to areas of deciduous woodland. Site is also at the location of one of the branches of the River Ouzel. Clean water pipeline to Chaul End service reservoir is adjacent to broadleaved deciduous woodland and lowland calcareous grassland Depending on direction of Chaul End expansion there is potential for loss of broadleaved deciduous woodland. Potential for noise, light and dust disturbance during this expansion. The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume and hydromorphology of the Ouzel (US Clipstone Brook) surface water.	

	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, WTW and reservoirs but this is uncertain. Once constructed and filled, the new raw water reservoir will provide new habitat for waders and waterfowl. Potential for a net gain in biodiversity in the long-term.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.	-2	-2	There are likely to be negative effects on landscape as a result of the new and expanded infrastructure during the construction and operation phases. Mitigation measures such as screening/planting will reduce the residual effect during operational phase. However, the dam embankment will result in a residual long-term negative effect during operation as they it is likely to remain visible. There is the potential for a moderate significant long-term negative effect as the new reservoir is within 100m of the Chilterns AONB. The new raw water pipeline will also have negative effects during construction; however, following the reinstatement of the land it is predicted that there will be a residual neutral effect during operation. Part of the new route runs along the boundary of the Chilterns AONB.	-2
	6.b. Provide opportunities for landscape enhancement?		?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	1	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, but this is uncertain. The delivery of the new raw water reservoir has the potential for a long-term minor positive effect on the landscape. It provides an opportunity to deliver a new	

													valued landscape that is used by people for recreation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Moderate	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The pipeline route is partially located within the South Bedfordshire AQMA. There is the potential for minor negative effects during construction of the new pipeline, buildings and reservoir. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	-2	-2	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. In terms of the operational phase the WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that during operation the scheme has the potential to impact flow velocity and volume and hydromorphology of the Ouzel (US Clipstone Brook) surface water. The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required.	-2

										hands off flow or compensatory scheme is required.				
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Low	High	Short term (<5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required.	-1	-2	The WFD assessment found that there is potential for a minor temporary impact during construction due to the loss of habitat during installation of the pump and chamber. Unlikely to be significant at waterbody scale WFD assessment also found that there is the potential for a reduction in water quality with lower water levels and flows. Has potential to cause deterioration in the status the Ouzel (US Clipstone Brook) surface water body if not managed. This could have a negative effect on water quality during operation.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or compensatory scheme is required.	0	-2	While the WFD assessment does not identify any issues in relation to groundwater bodies/ aquifers it does highlight that there is the potential to affect water flows in the Ouzel (US Clipstone Brook) surface water body. Potential impact on reduction in water quality with lower water levels and flows. Has potential to cause deterioration in status if not managed.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify that there is the risk of saline or other intrusions as a result of this scheme.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status surface water body. Confirm timing of abstraction and investigation if hands off flow or compensatory scheme is required.	0	-2	The WFD assessment found that during operation the scheme has the potential to result in reduced river flow in relation to the Ouzel (US Clipstone Brook) surface water body unless a scheme to provide compensatory flows is instigated. The CAMS for the area indicates that there is no water available at low flows. As such an abstraction at low flow would not be available unless a compensatory scheme is enacted. The WFD assessment recommends that the timing of the abstraction needs to be confirmed and that further investigation of hands off flow or	-2

														compensatory scheme is required.	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-2	-1	There are two Scheduled Monuments (at Butler Manor and Ivinghoe Aston) which are located approximately 200m from the new Reservoir location at Edelsborough. These may experience significant short-term temporary negative effects in terms of setting and character of the surrounding area during construction phase. There is also the potential for archaeological activity/remains at the site, which would likely be impacted by the construction of the reservoir and associated infrastructure. Archaeological investigations should be carried out prior to any construction work. The long-term effect which the reservoir may have on these assets during operation is uncertain at this time and should be explored through further assessment. The raw water pipeline from Leighton Buzzard runs within 10m of a number of Listed Buildings. These heritage assets may experience short term temporary negative effect during excavation for the pipeline but re-instatement and mitigation measures should ensure the residual effect is neutral during operation.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses a small area of grade 2 agricultural land and a larger area of grade 3 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

4.2.1.4 AFF-RES-WRZ6-0829

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is a transfer of 20 Ml/d of treated water by a new main from Boxted Pump Station to Shakespeare Road Reservoir via Friars Wash Pump Station and a new Shakespeare Road Reservoir. The scheme will require 2 x 45 kW Booster Pumps to be installed at Boxted Pump Station, 2 x 37 kW Booster Pumps at a New Shakespeare Road Reservoir, a new 17.05 km 500 mm diameter main from Boxted Pump Station to Shakespeare Road Reservoir and a new 20 Ml capacity reservoir near the existing Shakespeare Road Reservoir. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, material consumption, road infrastructure and air quality. In particular, there are a number of international and nationally designated sites for biodiversity in close proximity to the new infrastructure. Key issues during operation relate to potential long-term effects on the landscape and historic environment and in particular the impacts on water quality and levels of the Wey (Tilford to Shalford) surface water body and indirect effects on biodiversity and WFD status as a result of the abstraction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	The new raw water West End reservoir is anticipated to be accessible to the public and will therefore result in a positive effect as there is the potential for new water-based recreational opportunities.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status surface water body.	0	?	The WFD assessment found that during operation the scheme has the potential to result in reduced river flow in relation to the Wey (Tilford to Shalford) surface water body. It is not clear if this will have impacts on recreational activity. Element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires 32.2km of new pipeline, which is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	

3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The anticipated pipeline route follows the footprint of major roads and so is likely to cause such impacts. Well used roads will be affected by the scheme: M30, A331 2, A323, A322, A319 and A30. The construction impact will be local and temporary. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new pipeline, WTW and reservoir.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Regional	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	This option requires a surface water intake and pumping station, a new fully bunded embankment reservoir, expansion of an existing reservoir, onsite Water Treatment works and 28.9km of new pipeline.	0
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	The HRA made proposed the following mitigation: a) Disturbing works within 500m of the SPA are undertaken outside the breeding season (i.e. outside the period March to August) b) Pipeline installation is informed by hydrogeological and geotechnical studies where it lies within 500m of the SPA to ensure that no effect on SPA hydrology arises. The SPA is not dependent on sensitive hydrology in these particular locations being plantation woodland (the bogs and wet heathland are further from the road). Therefore this is considered achievable	-1	0	The HRA for the dWRMP found that Thursley, Hankley & Frensham Commons SAC is 1.6km downstream of the WTW. The pipeline lies in the carriageway of the A322 and passes 25m from Moor Park SSSI, 100m from Ash to Brookwood Heaths SSSI and is adjacent to Colony Bog & Bagshot Heath SSSI, all of which are components of the Thames Basin Heaths SPA. It also lies within 200m of Whitmoor Common SAC but is separated from the SPA by a nearly 200m depth of residential development. The reservoir itself would be 800m from the Thames Basin Heaths SPA at its closest. The abstraction point at Tilford is c.600m from Thursley, Hankley & Frensham Commons SPA at its closest. The international interest features of the SPA are not dependent on the river. There are areas of wet heathland and bog within the Thames Basin Heaths SPA.	-1

																		There is potential for the Thames Basin Heaths SPA to be affected by water quality changes, changes in hydrology and disturbance during construction. There is also potential for disturbance to nightjar, woodlark and Dartford warbler, which are the species for which the SPA is designated, if the works took place during the nesting season (March to August inclusive). The HRA concluded that no adverse effect on integrity should arise provided some standard construction methods are included: a) Disturbing works within 500m of the SPA are undertaken outside the breeding season (i.e. outside the period March to August) b) Pipeline installation is informed by hydrogeological and geotechnical studies where it lies within 500m of the SPA to ensure that no effect on SPA hydrology arises. The SPA is not dependent on sensitive hydrology in these particular locations being plantation woodland (the bogs and wet heathland are further from the road). Therefore this is considered achievable		
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	?	Medium term (5 -25 years)	?	Temporary	?	Regional	High	Disturbing works within 500m of the SSSIs that are designated for breeding birds are undertaken outside the breeding season (i.e. outside the period March to August) Pipeline installation is informed by hydrogeological and geotechnical studies where it lies within 500m of the SSSIs to ensure that no effect on SSSI hydrology arises. The SSSIs are not dependent on sensitive hydrology in these particular locations being plantation woodland (the bogs and wet heathland are further from the road). Therefore this is considered achievable	-1	0	Based on the findings of the assessment above, it is considered that there is suitable mitigation during the construction phase to ensure no significant effects. Residual neutral effect predicted during operation as the SSSI downstream and their interest features are not dependent on the river.		
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and	?	?	There is the potential to introduce INNS during		

												ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.			construction. The spread of INNS during transfer is unlikely as the scheme proposes the transfer of treated water. Element of uncertainty at this stage until further studies have been carried out.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route, new WTW and new reservoir cell but this is uncertain at this stage. identified. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage. Further WFD assessment and hydrological investigations to be carried out and inform the detailed design stage.	-1	-1	The construction of the new pipeline may result in the loss of Priority Habitats. It should be noted that the new pipeline follows exiting infrastructure where possible. The new raw water reservoir location includes a block of BAP priority habitat deciduous woodland. Location also covers a series of ditches in agricultural land. Potential for disturbance to species during the construction of the pipeline, new WTW and expanded/new reservoirs. Potential for a minor negative effect during construction. During operation there is the potential for the scheme to have impacts on water quality and levels of the Wey (Tilford to Shalford) surface water body that could affect important water dependant habitats and the species they support. However, this is uncertain at this stage and dependant on further hydrological investigations.	
	5.e. Provide opportunities for biodiversity enhancement?		?	High	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	2	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, WTW and reservoirs but this is uncertain. Once constructed and filled, the new raw water reservoir	

															will provide new habitat for waders and waterfowl. Potential for a net gain in biodiversity in the long-term.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. The new WTW should also be designed sympathetically to fit in with the surrounding landscape and screening used where appropriate. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.	-2	-1	Potential for negative effects on the landscape/ townscape in the short term as a result of the delivery of the new infrastructure. Given the scale of infrastructure to be delivered it is predicted that there is the potential for a moderate negative effect although it is recognised that the significance of this can probably be reduced through the phasing of development and delivery of specific mitigation measures at the detailed design stage. The extraction, pumping station and small proportion of the new pipeline fall within the Surrey Hill AONB. Any new visible infrastructure should be designed sensitively to take into account the local character of the area. During operation there is not likely to be any significant impacts as a result of the pipeline or the expanded Rye Hill Reservoir as they will be buried. There are likely to be negative effects on landscape as a result of the NTW and raw water reservoir. Mitigation measures such as screening/planting will reduce the residual effect during operational phase. The residual effect of the new reservoir is likely to be less significant and once planting has matured it is likely to become a valued part of the landscape. Once mitigation is taken into account it is considered that there is the potential for a long-term minor negative effect on the landscape/ townscape. It is likely that more specific mitigation identified at the detailed design stage will be able to reduce the significance of the residual negative effect in the short and longer terms.	-1

	6.b. Provide opportunities for landscape enhancement?	?	Moderate	?	Medium term (5 -25 years) to Long term (>25 years)	?	Permanent	Local	Moderate	N/A	?	1	The delivery of the new raw water reservoir has the potential for a long-term minor positive effect on the landscape. It provides an opportunity to deliver a new valued landscape that is used by people for recreation.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Moderate	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The scheme does into fall within an AQMA. It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. There are likely to be minor, local and temporary negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	This option will lead to an increase in water supply which will have a marginal impact on helping address Affinity Water's resilience to projected reductions in precipitation and water supply.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Further hydrological investigations required to determine the extent and specifics of mitigation.	0	-1	The extraction of raw water from the River Wey could reduce the resilience of the river and its environment to climate change. The significance of the residual effect is uncertain at this stage and dependent on further hydrological and WFD studies.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. In terms of the operational phase the WFD assessment	-1	-2	Potential for impacts during construction as the new pipeline crosses a number of watercourses. The WFD assessment found that the abstraction could cause deterioration in hydromorphological status of the Wey (Tilford to Shalford) surface water body. The WFD assessment recommends that further investigation of hands off flow or compensatory scheme is required.	-2

										recommends that further investigation of hands off flow or compensatory scheme is required.				
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Low	High	Short term (<5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	The WFD assessment recommends that that further investigation of hands off flow or compensatory scheme is required.	-1	-2	The WFD assessment found that during construction there is potential for a minor temporary impact due to the loss of habitat during installation of the pump and chamber. Unlikely to be significant at waterbody scale. The WFD assessment found that during operation there is the potential for a reduction in water quality with lower water levels and flows. Has potential to cause deterioration in the status of the Wey (Tilford to Shalford) surface water body.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further investigation of hands off flow or compensatory scheme is required.	0	-2	While the WFD assessment does not identify any issues in relation to groundwater bodies/ aquifers it does highlight that there is the potential to affect water flows in the Wey (Tilford to Shalford) surface water body.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment does not identify that there is the risk of saline or other intrusions as a result of this scheme.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	The WFD assessment recommends that further information and assessment required. The discharge volume needs to be quantified and further WFD assessment undertaken to determine if could impact the status surface water body.	0	-2	The WFD assessment found that during operation the scheme has the potential to result in reduced river flow in relation to the Wey (Tilford to Shalford) surface water body. The WFD assessment recommends that further investigation of hands off flow or compensatory scheme is required.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river.	0	0	The majority of new infrastructure falls within areas of low flood risk. Sections of the new pipeline fall within areas of high flood risk; however there is suitable mitigation available to ensure that there is a residual neutral effect. The abstraction of water from the River Wey could help to reduce the risk of fluvial flooding downstream; however, this is uncertain at this stage.	0

										Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete.				
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-2	-1	The construction of the new raw water pipeline is likely to be visible from a number of Listed Buildings, a Scheduled Monument and a Registered Park and Garden. However, appropriate reinstatement of any land affected following construction is anticipated to result in negative effects being short-term, temporary and it is therefore predicted that the operational phase for the new raw water pipeline will have a residual neutral effect. There are a number of Listed Buildings which are located within 150m of the new raw water reservoir site. Construction activities may have a short-term temporary negative effect on these heritage assets. There is unlikely to be any significant negative effects during operation once mitigation has been taken into account; however, this is uncertain at this stage and dependent on the detailed design and implementation of mitigation measures. There is also the potential for archaeological activity/remains at the site, which would likely be impacted by the construction of the reservoir and associated infrastructure. Archaeological investigations should be carried out prior to any construction work.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	

											archaeological assets.				
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land, therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

4.2.1.5 AFF-RES-WRZ4-0832

(In the Aspirational, Expected, High Growth, Supply-side Challenging, and Optimistic Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The scheme proposes the import of water from the Canals & Rivers Trust reservoir at Brent. The water would be transmitted via the River Brent and the Grand Union Canal to the existing Iver Water Treatment Works for abstraction and subsequent treatment at a new Iver 2 WTW. The option includes upgraded storage at Harrow service reservoir within WRZ4. Key issues during construction phase relate to the delivery of significant new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, historic environment, and road infrastructure and air quality. Key issues during operation relate to potential long-term effects on the landscape and historic environment and in particular the impacts on water quality and levels at the Brent Reservoir as a result of the release of water.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option 7.5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The GUC and Brent Reservoir are regularly used for recreation. The release of 7.5 Ml/d and 9.5Ml/d peak from the Brent Reservoir during operation will increase flows for periods in the River Brent and GUC; however, it is considered unlikely that this will significantly increase opportunities for water-based opportunities	
	2.b. Alter water levels that affect water-based recreation assets?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Monitor water levels in the Brent Reservoir and issue Hands off Flow condition/ restrict release to the River Brent using the existing sluices to ensure suitable water levels to support recreational activities.	0	?	The GUC and Brent Reservoir are regularly used for recreation. The construction phase is unlikely to significantly affect any water-based recreational activity. The release of 7.5 Ml/d and 9.5Ml/d peak from the Brent Reservoir during operation could increase levels in the River Brent and GUC; however, this is unlikely to result in any additional opportunities for recreation. There is uncertainty with regard to the extent and frequency of drawdown in the reservoir as a result of the release of water, which is controlled by automatic sluices. There are ongoing discussions with Affinity Water and the Rivers and Canals Trust on this scheme. The WFD assessment found that there would be no significant impacts on the water levels of the Lower Brent surface water body.	?

	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires a new 10.5km 350mm diameter main which is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The new pipeline follows the route and crosses numerous roads. The delivery of the new WTW and reservoir will also have impacts on the surrounding road network due to an increase in HGVs. There will be some traffic disruption during the construction phase; however, this is likely to be local and temporary. No significant operation impacts are anticipated.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Given the urban location and proximity to strategic transport routes, such as the M25 and M4, delivery of a new pipeline, new WTW and new reservoir could potentially have local and temporary minor negative effects during construction.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Regional	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option requires a new cell at Harrow Reservoir, new Iver 2 WTW, 10.5km of 350mm main and a number of booster pumps.	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-2
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	NE strongly recommends that options to mitigate against any biodiversity impacts associated with this scheme be explored. Opportunities for biodiversity net gain should also be sought after. Any opportunity for bankside habitat improvements should be explored, to try and offset the changes in water levels.	0	-2	During the construction phase there are likely to be no impacts on any SSSIs given the distance of new infrastructure (including new pipeline, cell at Harrow Reservoir and WTW) and lack of impact pathways. During operation the key impact is in relation to the release of water from the Brent Reservoir which is a SSSI. The Brent Reservoir SSSI is designated for breeding wetland birds, in particular for significant numbers of nesting great crested grebe, as well as wetland plant communities. The SSSI is	

											Mitigation may also include monitoring water levels in the Brent Reservoir to inform the use of Hands off Flow conditions/ restrict release of water to maintain suitable water levels for the wetland habitats and the breeding bird assemblages they support. The release of water could also be restricted the during breeding/ nesting seasons (broadly March to July).			currently in a favourable condition. There is uncertainty at this stage with regard to the extent and frequency of drawdown in the reservoir as a result of the of 7.5 Ml/d and 9.5Ml/d peak, which is controlled by automatic sluices. There are ongoing discussions with Affinity Water and the Rivers and Canals Trust on this scheme. The Great Crested Grebe nest in in reed beds and the Passerines (bullfinch, greenfinch, jay, willow warbler and wren) nest in willow woodland broadly between March and July so higher/ lower water levels in these periods could affect them. The wintering birds (Pochard, Gadwall, Snipe, Jack snipe and Smew) could also be affected as again, changing water levels could affect the amount of terrestrial habitat surrounding the waterbody that could be available for them to rest on when out of the water. The wetland plant species are sensitive to changes in water levels. It will be important to prevent the water levels from fluctuating significantly and frequently as this could displace plants as they move up/ or down in the inundation zone. More detailed hydrological investigations need to be carried out in order to determine the extent and frequency of drawdown as a result of this scheme and how the hydrological conditions affect the wetland habitats and birds they support. As a result the residual effect of this scheme on the SSSI due to impacts on water quality and levels is uncertain at this stage. However, taking a precautionary approach it is considered that there is the potential for a moderate negative effect during operation. Ongoing discussions with the Rivers and Canals Trust as well as NE will be necessary to determine the impacts on the interest features once the further hydrological data is available. Specific mitigation can then be explored at the detailed design stage to ensure that there are no negative effects on the interest features of the SSSI.		
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5 -25 years) to Long	?	Temporary	Regional	Moderate	INNS risk assessment and ecological surveys will be required to inform the detailed design stage.	?	?	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option

						term (>25 years)				Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.			involves transfer from the River Brent to the Grand Union Canal for treatment at Iver WTWs and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further for INNS risk during the feasibility study phase. There is the potential to introduce INNS during construction. There is also potential for spread of INNS during transfer from the River Brent to the Grand Union Canal for treatment at Iver WTWs. Element of uncertainty at this stage until further studies have been carried out. .	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	The pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the route, new WTW and new reservoir cell but this is uncertain at this stage. Please refer to assessment question 5.d where other mitigation measures are discussed/ identified. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	-1	The construction of the new pipeline may result in the loss of Priority Habitats (in particular deciduous woodland). Potential for disturbance to species during the construction of the pipeline, new WTW and reservoir cell. However, this is uncertain at this stage given the urban context. Potential for a minor negative effect during construction. During operation there is the potential for the release of water from the Brent Reservoir to have impacts on water quality and levels that could affect important water dependant habitats and the species they support. Please refer to assessment question 5.d where this issue is discussed in more detail.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new pipeline, WTW and reservoir cell. Opportunities for biodiversity net gain should also be sought after, in accordance with NE recommendations. Any opportunity for bankside habitat improvements should be explore. Improving marginal habitats may enhance the resilience of the SSSI notified features to fluctuations in water levels.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long	Temporary	Permanent	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever	-2	-1	Infrastructure delivered as part of this scheme is not likely to have impacts on any designated landscapes. Potential for minor negative effects on the	-1

						term (>25 years)					possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. The new WTW should also be designed sympathetically to fit in with the surrounding landscape and screening used where appropriate. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored. More detailed mitigation measures should be set out at the detailed design stage.			landscape/ townscape in the short term as a result of the new pipeline. The construction of the new WTW and in particular the new reservoir cell are likely to have negative impacts on landscape/ townscape in the short term. The new WTW is situated close to the M25 and adjacent to a scrap metals business so is unlikely to have a significant impact during construction. The new reservoir cell would be situated on greenfield land at Harrow on the Hill. This is likely to be visible during construction within an area of open/green space within the existing urban area and that is used regularly for recreation. During operation there is not likely to be any significant impacts as a result of the pipeline or the reservoir as it will be buried. Once mitigation is taken into account it is considered that there is the potential for a long-term minor negative effect on the landscape/ townscape. It is likely that more specific mitigation identified at the detailed design stage will be able to reduce the significance of the residual negative effect in the short and longer terms.	
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		Moderate	Low	Short term (< 5 years) to Medium term (5 -25 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	The majority of the scheme falls within an AQMA. Potential impacts on air quality and the AQMA are most likely to arise during construction as a result of the increased number of HGVs on the road network and disruption to traffic during construction of the pipeline. During operation it is considered unlikely that there would be any significant negative impacts on local air quality as a result of increased traffic or operations.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years) to Medium term (5 -25 year)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2

	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	The release of water from the Brent Reservoir could reduce the resilience of the reservoir and its environment to climate change. However, the scheme could also improve the resilience of the River Brent as it would improve flows.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipe jacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	0	The WFD assessment found that this option would have no impact in terms of hydromorphological status. Potential for impacts during construction as the new pipeline crosses a number of watercourses. It is considered that there is suitable mitigation available to ensure that there will be a residual neutral or minor negative effect during construction. During operation there will not be any impacts.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The water will be treated and then transferred to harrow reservoir; therefore there will be no improvements.	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment found that this option will not alter water levels in the Lower Brent.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The WFD assessment found that this option will not increase the risk of saline or other intrusions.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Monitor water levels in the Brent Reservoir to inform the use of Hands off Flow conditions/ restrict release of water to maintain suitable water levels and avoid adverse effects. NE expects abstraction to be restricted at sensitive times for breeding birds (Brent Reservoir SSSI).	0	-1	The WFD assessment for this scheme found that there would be no impacts on surface levels and flows for the Lower Brent surface water body. However, at this stage the impact of this scheme on water levels in the Brent Reservoir is uncertain. Further hydrological study/ data required to determine the extent and frequency of drawdown in the reservoir.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of	0	0	Construction of the new WTW and reservoir cell fall within Flood Risk Zone 1 so no impacts are likely. Sections of the new pipeline fall within areas of high flood risk; however there is suitable mitigation available to ensure that there is a residual neutral effect.	0

											a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete.					
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-2	-1	The new pipeline passes in close proximity to a number of Listed Buildings. The new WTW is not likely to affect the setting of any designated heritage assets given distance/ views. The new reservoir cell is in close proximity to the Harrow Park Registered Park and Gardens. There is therefore potential for negative effects during the construction phase of the pipeline. However, appropriate reinstatement of any land affected by the pipeline should ensure that negative effects of the new pipeline are in the short-term, temporary and not experienced during the operational phase. The construction of the new WTW and in particular the new reservoir cell are likely to have negative impacts on landscape/ townscape and the historic environment in the short term. The new WTW is situated close to the M25 and adjacent to a scrap metals business and is not in view of any designated heritage assets so is unlikely to have a significant impact on the historic environment during construction. The new reservoir cell would be situated on greenfield land at Harrow on the Hill, in close proximity to a Registered Park and Garden. This is likely to be visible during construction within an area of open/green space within the existing urban area. There is also the potential for archaeological activity/remains at the site, which would likely be impacted by the construction of the reservoir cell and associated infrastructure. Archaeological investigations should be carried out prior to any construction work. During operation there is not likely to be any significant impacts as a result of the pipeline or the reservoir as it will be buried. Once mitigation is	-1

													taken into account it is considered that there is the potential for a long-term minor negative effect on the historic environment. It is likely that more specific mitigation identified at the detailed design stage will be able to reduce the significance of the residual negative effect in the short and longer terms.	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected by this scheme.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

4.2.1.6 AFF-RES-WRZ7-0839

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The scheme involves reuse of effluent from Broomfield Banks wastewater treatment works (WwTW), which treats wastewater from Folkestone and Dover (AW ID 294). The effluent (which is currently discharged to sea) would be provided with tertiary treatment to a suitable standard for discharge to the River Dour. Treated effluent will be discharged to the River Dour at various locations along a 2 km stretch of river downstream from Alkham, although care will be required to avoid significant impact on levels at the Wolverton Lodge observation borehole, which is a regional drought indicator site. The increased river flow will benefit the Buckland Mill abstraction (drought resilience only), such that the environmental condition on flows at Crabble Mill will not be triggered, thereby preventing the need to reduce abstraction from 6Ml/d to 4Ml/d. The key benefit from the scheme is where flow is re-captured again at the Dour estuary as it enters the docks and treated before being transferred to the Dover Intermediate (Connaught) Service reservoir. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape (part of scheme falls within an AONB), historic environment, agricultural land, surface and groundwater body status, road infrastructure and air quality. Key issues during operation relate to potential long-term effects on the landscape and historic environment as well as potential benefits and impacts on water levels/ flow.	N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 8Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	N/A	0	0	While the discharge of treater effluent in the River Dour could potentially improve water levels, it is not anticipated to significantly improve opportunities for new recreation.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	Further information and assessment may be required.	0	?	The abstraction is near the mouth of the River Dour and may affect water levels in the Marina and Harbour and therefore existing recreational activities. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires approximately 8.5km of new pipeline which is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV	-1	0	Well used roads could be affected by the scheme. Including: B2011, A266, A258. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0

										routes and working hours.				
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Regional	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	8.5km of new pipeline, new booster pumps, new surface water intake, new WTW and expansion of Dover Intermediate (Connaught) Service Reservoir.	0
	4.b. Result in higher levels of reuse of waste?	Low	High	Short term (< 5 years)	Medium term (5–25 years) to Long term (>25 Years)	Temporary	Temporary	Local	High	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found the following: This option involves the reuse of effluent from Broomfield Banks wastewater treatment works (WwTW) which treats wastewater from Folkestone and Dover. The River Dour intake to Dover Intermediate (Connaught) Service Reservoir pipeline route is located 900m from Dover to Kingsdown Cliffs SAC and is 4.4km from Lydden & Temple Ewell Downs SAC. The proposed pipeline from Broomfield banks to the River Dour is located 1.9km from Lydden & Temple Ewell Downs SAC. The pipeline is 3.8km from Etchinghill Escarpment SAC. Due to the distance and sensitivity of the closest designated sites no linking impact pathways are anticipated and thus no likely significant effects will arise. The Dover to Folkestone MCZ and Dover to Deal MCZ are situated within 1km of Dover Port/ Harbour. The	-1

														River Dour flows into the Dover Harbour. The option will not significantly affect the level/ flow of water or the quality into the Harbour. It is therefore not likely to have any impacts on the interest features of the MCZs.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Good practice dust suppression measures during the construction of the pipeline when it is in close proximity to the Alkham, Lydden & Swingfields Wood SSSI.	-1	0	The River Dour intake to Dover Intermediate (Connaught) Service Reservoir pipeline route is located 900m from Dover to Kingsdown Cliffs SSSI, 2.1km from Folkestone Warren SSSI and 3.8km from Alkham, Lydden & Swingfield Woods SSSI. No impact pathways to any SSSIs. The proposed pipeline from Broomfield banks to the River Dour is located 100m from Alkham, Lydden & Swingfields Wood SSSI at one point along Hogbrook Hill Lane, which is also in part designated as an Ancient Woodland. The SSSI is predominantly in a favourable or favourable recovering condition status with only one unit unfavourable declining (due to high levels of sycamore. Broad habitats include broadleaved, mix and yew woodlands and calcareous grassland. The SSSI and Ancient Woodland is situated at a higher elevation to Hogbrook Hill Lane so the new pipeline will not significantly affect water levels or quality. Construction of the pipeline could result in dust that could affect interest features but this is unlikely to be of significance given that only a small proportion of the pipeline is in close proximity to the SSSI and Ancient Woodland and that impacts will be temporary.	
	5.c. Impact on non-native species?		?	Moderate	?	Medium term (5–25 years) to Long term (>25 Years)	?	Temporary	Regional	Moderate	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	-1	This option has been identified through the WRMP19 Supply Side Constrained Options Report (2018) as being at risk of transporting INNS. This option involves abstracting from the River Dour docks area and transferring inland for treatment, and will therefore need additional work to evaluate the INNS risk. If selected as a preferred option this scheme should be assessed further	

														for INNS risk during the feasibility study phase.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	Potential for acoustic, light and dust disturbance during construction. CEMP should be implemented during construction. Potential for changes in hydrology of the sites depending on depth of pipeline. Detailed ecological survey required.	-1	0	The River Dour intake to Dover Intermediate (Connaught) Service Reservoir pipeline route runs adjacent to BAP Priority habitat of deciduous woodland. The Dover Intermediate (Connaught) Service Reservoir is 13m form BAP Priority habitat deciduous woodland. The proposed pipe is 40m from BAP Priority habitat lowland calcareous grassland. The proposed pipeline from Broomfield banks to the River Dour runs adjacent to BAP Priority habitat deciduous woodland and is 150m from lowland calcareous grassland. While it is unlikely that the options would result in the loss of any priority habitat there is the potential for disturbance (noise, light and dust) during construction to priority habitats and species. Any impacts will be local and temporary and good practice construction should ensure that there are no negative effects of significance.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail at the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5– 25 years) to Long term (>25 Years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. Mitigation measures should include the retention of hedgerows, trees,	-2	-2	The new tertiary treatment works and new treated water pipeline fall entirely within the Kent Downs AONB. The new WTW work falls outside the AONB but is still in close proximity. Potential for a moderate residual negative effect during construction as a result of location within the AONB. During operation, the new pipeline will be buried; however, there is potential for a minor negative effect during operation as a result of the new tertiary treatment and WTW as well as associated buildings. At this stage the precise size, design and layout of new buildings for the tertiary treatment works and WTW is not known. Mitigation, such as sensitive design and screening/ planting may help to reduce	-2

												fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.			the significance of the effect during operation but this is uncertain at this stage.	
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	HGVs and other vehicles relating to the construction and operation could be routed to avoid any AQMAs.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant. It is noted that a very small proportion of the pipeline falls within the Dover AQMA. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Temporary	Local	Low	Design and construction methods should follow sustainable design principles.	-2	-2	New infrastructure will require raw materials and there is likely to be increased energy use during operation.	-2
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	National	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	0
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles. Ensure monitoring and Licencing of water abstraction.	0	?	The WFD assessment found that the release of treated effluent into the River Dour could have benefits in terms of flow. This could help to improve the resilience of the local environment to climate change. Conversely, the WFD assessment identifies that flows could be affected after the abstraction point. As a result the operational effect is identified as uncertain at this stage.	?

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form. WFD assessment states that balance of discharge and abstraction will need to be determined.	0	-2	The new main does not cross any waterbodies and the WFD assessment concludes no likely significant impact to hydromorphology. However during operation the WFD assessment found the scheme has the potential to reduce river flow. A reduction in energy in the river system from the abstraction will impact sediment transport, potentially increasing deposition of suspended solids, that may result in a habitat reduction and changes in community structure.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	WFD assessment recommends that further studies are carried out to determine the balance of discharge and abstraction.	0	-2	The WFD assessment identifies that there is the potential for deterioration of ecological quality of the Dour from Kearnsey to Dover surface water body as a result of the abstraction. Abstraction at estuary may lead to an impact ion WFD classification elements. It recommends that the balance of discharge and abstraction will need to be determined.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not have impacts on water table levels or amount of water within aquifers.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not increase the risk of saline or other intrusion risks.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term	N/A	Temporary	Local	Moderate	Monitoring scheme and trigger levels downstream of abstraction	0	-2	The WFD assessment identifies that the treated effluent discharged into the River Dour could improve flows but that the abstraction downstream could have a negative impact. A reduction	-2

						(>25 years)							of river flow at abstraction is expected.		
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Sections of this option are located within a floodplain area (identified by the Environment Agency). However re-instatement measures should avoid any loss of useable floodplain. The new WTW could increase the area of hardstanding but not significantly and within an existing urban area.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. Given the potential for archaeological activity/remains, archaeological investigations will likely be required prior to any construction work.	-1	-1	The new pipelines are within 40m of a Scheduled Monument as well as within 10m of a number of Listed Buildings. The new WTW is in close proximity to a listed building and Scheduled Monument. There is therefore potential for minor negative effects during the construction and operational phases. At this stage the precise size, design and layout of new buildings for the tertiary treatment works and WTW is not known. Mitigation, such as sensitive design and screening/ planting may help to reduce the significance of the effect during operation but this is uncertain at this stage. There is also the potential for archaeological activity/remains at the site, which would likely be impacted by the expansion of the reservoir and associated infrastructure. Archaeological investigations should be carried out prior to any construction work.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses grade 2 agricultural land; therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

4.3 NSW

4.3.1.1 AFF-NSW-WRZ6-0462

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme involves uprating the treatment capacity at the existing Egham WTW by 20 Ml/d. As a minimum the scheme provides additional security of supply in the event of losing the existing Iver, Chertsey or Walton sites due to outage. However the scheme also provides additional peak benefit. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to material consumption, public rights of way, non-designated biodiversity and the carbon footprint. Key issues during operation relate to potential long-term effects on SEA objectives relating to waste, WFD status and water levels/ flow.	N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 20Ml/d (peak output) equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not result in any new opportunities for recreation.	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Local	Low	Further information and assessment may be required	0	?	While the WFD assessment identifies that the abstraction may have impacts on water levels/ flows of the Thames it is uncertain whether this will have impacts on current water-based recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option does not involve any new pipelines, demolishing the old WTW and building a new upgraded one will not have impacts on PRoW or other recreational areas.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Agreement of HGV routes and working hours.	0	0	The option does not involve any new pipelines, demolishing the old WTW and building a new upgraded one will have temporary and local impacts on roads but these will be negligible.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Agreement of HGV routes and working hours.	0	0	The option does not involve any new pipelines, demolishing the old WTW and building a new upgraded one will have temporary and local impacts on roads but these will be negligible.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will require the demolition of existing WTW infrastructure and its replacement with new infrastructure.	-1
	4.b. Result in higher levels of reuse of waste?		High	Moderate	Short term	Medium term (5–25	Temporary	Temporary	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential	

					(< 5 years)	years) to Long term (>25 Years)							for long-term negative effects during operation given that the new WTW will have a higher capacity, increasing the level of waste produced.		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	?	Short term (< 5 years)	Medium term (5–25 years) to Long term (>25 Years)	Temporary	Temporary	Local	High	Good practice construction to manage surface water flow on site and avoid any impacts on water quality in the River Thames. Monitor the water levels and flow of the River Thames and issue hands-off flow condition during periods of low water levels/ flow.	0	?	The demolishing and construction of the WTW will be in close proximity to the River Thames but good practice construction practices should ensure that there are no impacts on water quality in the short term that could affect SSSIs downstream. The increased abstraction is within license; however, the WFD assessment found that there is the potential for the scheme to reduce river flow as a result of the abstraction at low flow. This could have impacts on SSSIs downstream but this is unlikely given the water levels and flows of the Thames are monitored and a hands-off flow condition could be issued. Uncertainty identified until further investigation has been carried out.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	?	Short term (< 5 years)	Medium term (5–25 years) to Long term (>25 Years)	Temporary	Temporary	Local	High	Detailed ecological survey of works area required to identify potential effects on protected species and habitats. Potential for acoustic, light and dust disturbance during construction on adjacent habitats. Good practice construction methods should ensure that there are no significant effects. CEMP should be implemented during construction.	-1	?	Egham treatment works is in close proximity to the River Thames. Egham treatment works being demolished & re-built, potential for bat or nesting bird species to be present within the buildings, detailed ecological survey required. Potential for disturbance to species utilising the River Thames; however, good practice construction methods should ensure that there are no significant negative effects. The increased abstraction is within license; however, the WFD assessment found that there is the potential for the scheme to reduce river flow as a result of the abstraction at low flow. This could have impacts on important habitats and species downstream but this is unlikely given the water levels and flows of the Thames are monitored and a hands-off flow condition could be issued. Uncertainty identified until further investigation has been carried out.	0
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water to or between surface water bodies or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will require the demolition of existing infrastructure and its replacement with new infrastructure. The upgraded infrastructure will occupy the same site footprint and it is assumed it would be a similar height. It is therefore considered not likely to have any significant effects on Landscape either during construction or operation.	0
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	?	N/A	0?	?	There may be opportunities for landscape enhancement as part of the new infrastructure development such as through incorporating green infrastructure into the design and by planting and other mitigation measures. However, this is uncertain at this stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Agreement of HGV routes and working hours.	0	0	It is considered unlikely that the scale of proposed development would have any significant impacts on air quality during the construction or operational phases. The presence of the M25 in close proximity to the site also means that any impacts are likely to be minor. However, it is noted that the site is in close proximity to the Spelthorne AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Moderate	Moderate	Short term (< 5 years)	Medium term (5–25 years) to Long term (>25 Years)	Temporary	Temporary	Local	Moderate	N/A		-1	-1	This options requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 - 25 years)	N/A	Temporary	N/A	Moderate	N/A		0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	High	N/A	Long term >25 years	N/A	Temporary	N/A	Moderate	Further investigations required and mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level.		0	-1	During operation, abstraction should remain within current licence limits and should therefore not have adverse effects on the environment as this should have already been assessed for the upper limits of the licence. However, it is recognised that the situation may have changed and that increased abstraction at peak times could have an impact on water levels/ flows in the Thames, as identified through the WFD assessment.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage.		0	-1	Increase of abstraction at peak time may have some potential impact on water levels/ flows in the Thames according to the WFD assessment. There is potential for this to have a minor negative effect but this will be local and temporary.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Low	High	Short term (<5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Good practice construction methods should ensure no impacts on quality of surface water bodies during construction. If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on		-1	-2	WFD assessment states potential impact water quality from construction in proximity to watercourse however following best construction practice should mean any impacts are small, temporary and localised. During operation there is potential impact on reduction in water quality with lower water levels and flows. Has potential to cause deterioration in status if not managed.	

											the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.				
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level.	0	-2	WFD assessment states that during operation there is potential impact on reduction in water quality with lower water levels and flows. Has potential to cause deterioration in status if not managed.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Specific mitigation should be explored further at the detailed design stage.	0	-2	WFD assessment states possible loss of recharge at time of low hydraulic heads depending on the connection to groundwater.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation could include a hands-off flow condition to prevent abstraction at low flows below a certain level. This should be given further consideration at the detailed design stage. WFD assessment states a scheme to provide compensatory flows will need instigating.	0	-2	Increase of abstraction at peak time may have some potential impact on water levels/ flows in the Thames according to the WFD assessment. There is potential for this to have a minor negative effect but this will be local and temporary. WFD assessment states without instigation of a scheme to provide compensation flows by Thames Water then this measure will be impacted and the Environment Agency are unlikely to license. A reduction of river flow due to abstraction is expected unless a scheme to provide compensatory flows is instigated by Thames Water.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The footprint of the new WTW will be the same as the old building. No significant impacts.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No designated heritage assets within the influence of this option.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No agricultural land will be affected by this option.	0

5. Treatment options

5.1 NTW

5.1.1.1 AFF-NTW-WRZ4-1003

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option will have moderate positive effects in terms of providing adequate supply of water. This option may have a minor negative operation phase effect on public rights of way due to the anticipated loss of open farm land which may detract from the aesthetics of the footpath along the River Colne. The option may also have minor negative effects during construction on landscape. It is estimated that this option will also have moderate negative effects on Affinity Waters carbon footprint during construction and operation. it may also have a minor negative effect on the environments resilience to climate change. Dewatering might be required to install foundation works therefore there may be minor construction phase negative effects on surface and ground water bodies in the vicinity.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-1
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	-1	There are no public rights of way or public facilities on the anticipated site footprint. Despite the lack of significant impacts on the local landscape (given the urban/industrial locality and expected mitigation planting) in operation, it is anticipated that loss of open farmland (at the site) may detract from aesthetics of the footpath along River Colne (to immediate east of site) in the long term.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires new treatment works and associated infrastructure.	-1

	4.b. Result in higher levels of reuse of waste?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	?	?	?	?	?	?	?	?	Construction and operation may affect nearby deciduous woodland. CEMP should be in place.	?	?	Construction and operation may affect nearby deciduous woodland.	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include appropriate re-instatement and screening. Heritage and Landscape character assessments should be carried out where significant infrastructure works will be undertaken.	-1	0	There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase. Presence of the M25 reduces the likelihood for negative effects on the landscape.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M25 adjacent to the site. However, it is noted that the sites is partially within an AQMA.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

5.1.1.2 AFF-NTW-WRZ4-1005

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option will have a major positive effect in terms of adequately supply water. This option may have a minor negative operation phase effect on public rights of way due to the anticipated loss of open farm land which may detract from the aesthetics of the footpath along the River Colne. It will also have a major negative effect regarding Affinity Water's carbon footprint. Additionally, there may be minor negative effects on the environment's resilience to climate change. Dewatering might be required to install foundation works therefore there may be minor construction phase negative effects on surface and ground water bodies in the vicinity.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 100 Ml/d equates to a significantly positive effect	3
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	3		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	-1
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	-1	There are no public rights of way or public facilities on the anticipated site footprint. Despite the lack of significant impacts on the local landscape (given the urban/industrial locality and expected mitigation planting) in operation, it is anticipated that loss of open farmland (at the site) may detract from aesthetics of the footpath along River Colne (to immediate east of site) in the long term.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires new treatment works and associated infrastructure.	-1
	4.b. Result in higher levels of reuse of waste?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that the option will not have a likely significant alone.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?	?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	?	?	?	?	?	?	?	?	Construction and operation may affect nearby deciduous woodland and the River Colne. CEMP should be in place.	?	?	Construction and operation may affect nearby deciduous woodland and the River Colne.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include appropriate re-instatement and screening. Heritage and Landscape character assessments should be carried out where significant infrastructure works will be undertaken.	-1	0	There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase. Presence of the M25 reduces the likelihood for negative effects on the landscape.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M25 adjacent to the site. However, it is noted that the sites is partially within an AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction phase activities are likely to increase Affinity Water's carbon footprint significantly. Operation phase effects are likely to increase the footprint.	-2	-3	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-3

	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

5.1.1.3 AFF-NTW-WRZ1-1011

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operation effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option will have moderate positive effects in terms of providing adequate supply of water. The new WTW site is located 750m away from the Ruislip SSSI and NNR. As such, there is potential for disturbance to this SSSI during construction and potential for disturbance to BAP priority deciduous woodland. Therefore this option may have minor negative effects during construction. There are likely to be minor negative effects on landscape during construction phase. There is also likely to be minor negative effects during operation phase in terms of Affinity Water's carbon footprint. Additionally, there may be minor negative effects on the environment's resilience to climate change. Dewatering might be required to install foundation works, therefore there may be minor construction phase negative effects on surface and ground water bodies in the vicinity. This option has the potential to affect the setting of a number of Listed Buildings and will therefore have minor negative effects during both construction and operation. The pipeline route also crosses an area of grade 2 agricultural land. Assuming appropriate re-instatement there will be minor negative effects during construction.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 50Ml/d equates to a moderate positive effect.	2
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	2		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No riverine (or stillwater) impacts are anticipated as part of this scheme.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No riverine (or stillwater) impacts are anticipated as part of this scheme.	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The construction impacts are not anticipated to be significant as it is anticipated that the footpath will be rerouted whilst the construction is underway. No operation impacts are anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Construction work is not anticipated to occur outside the anticipated site boundaries (which contains no roads). Therefore no effects are predicted.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	-1
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Harefield New Treatment Works will include raw water transferred from Sunnymeades (River Thames) to new treatment works at Harefield. This is a stand-alone option and the transfer of raw water and treated water will be considered separately. The treated water is expected to be transferred to Harefield Service Reservoir. The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction. Detailed ecological survey required.	-1	0	The new WTW site is located 750m away from Ruislip SSSI and National Nature Reserve (NNR). Potential for disturbance to SSSI during construction.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	?	Medium term (5 -25 years)	?	Permanent	?	Local	?	Avoid loss of BAP Priority habitat where possible. If loss of BAP Priority Habitat cannot be avoid then compensatory habitats will be required. CEMP should be implemented during construction due to potential for acoustic, light and dust disturbance during construction. Detailed Ecological survey required.	-1	?	Potential for loss of BAP Priority habitat deciduous woodland within new WTW site. Potential loss of hedgerow habitat. The site is adjacent to French Grove ancient woodland. Potential for noise, light and dust disturbance during construction and operation. Potential for protected species to be affected. Ecological survey required. The new WTW is 240m from Bishops Wood CWS which also has the potential for noise, light and dust disturbance during construction.	?
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	?

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures.	-1	-1	There are likely to be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect during operational phase, however a minor residual negative effect is likely to remain as a result of development on a greenfield location and proximity to Mount Vernon Hospital and the Riverside recreation club.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	?
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for dust to be produced during the construction phase and this could affect the nearby hospital; however, it is assumed that there is suitable mitigation available at the development control/ project level to minimise impacts and reduce residual effects. There is unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This options requires significant new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Proving geology at site to establish thickness of London Clay. Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works which could impact on Radlett Tributaries aquifer so there could be a short term impact on groundwater level.	

	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Proving geology at site to establish thickness of London Clay. Best construction practice if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works which could impact on Radlett Tributaries aquifer so there could be potential paths for pollution to groundwater body.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Proving geology at site to establish thickness of London Clay. Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works which could impact on Radlett Tributaries aquifer so there could be a short term impact on groundwater level.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Moderate	Moderate	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Heritage impact assessment should be carried out to determine the effect of the new WTW on the historic environment.	-1	-1	This option has the potential to affect the setting of a number of Listed Buildings. Negative effects are more likely to be of significance during construction but there is the potential for appropriate screening. Mitigation such as planting/screening should reduce the significance of the residual negative effect during operation. It should be noted that it is not known at this stage if there are any prominent views from the Listed Buildings to the proposed site.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

5.1.1.4 AFF-NTW-WRZ4-1042

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The site for this option is located within the Chilterns AONB. This option requires construction of significant new infrastructure in a peri-rural setting of high landscape value. Consequently there will be moderate negative effects during construction and minor negative effects during operation. There is also likely to be minor negative effects during operation phase in terms of Affinity Water's carbon footprint. Additionally, there may be minor negative effects on the environment's resilience to climate change.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0Ml/d equates to a negligible effect.	0
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	0	0	There is likely to be some works traffic generated during construction. This is not expected to lead to significant impacts as the site is on a minor road that is not anticipated to experience congestion as a consequence.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option requires new treatment works and associated infrastructure.	-1
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	None identified. However, associated schemes may impact Grafham Water SSSI which is distant from the option, but an associated scheme.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the	

												spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Low	Low	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	Local	Low	Use of CEMP to reduce noise/dust disturbance to adjacent woodland. Detailed ecological investigation and desk study required.	0	?	Land required is adjacent to BAP priority habitat deciduous woodland. Potential for disturbance during construction. Associated schemes (i.e. increased abstraction) may impact Grafham Water SSSI, designated for wintering and passage bird species, which is distant from the scheme.	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan.	-2	-1	The site for this option is located within the Chilterns AONB. This option requires construction of new infrastructure (NTW) in a peri-rural setting of high landscape value. There will therefore be major temporary negative effects associated with construction. During operation minor adverse effects anticipated on landscape setting and character associated with the visible infrastructure (NTW).	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This options requires significant new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No groundwater or surface water bodies near the NTW	0

	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No groundwater or surface water bodies near the NTW	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No groundwater or surface water bodies near the NTW	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No groundwater or surface water bodies near the NTW	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No groundwater or surface water bodies near the NTW	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

5.1.1.5 AFF-EGW-WRZ4-1064

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option affects numerous well sued roads and will therefore have moderate construction phase effects on strategic transport infrastructure with knock on minor negative effects on critical services and industries. The option will also have minor negative construction phase effects on the Ruislip Woods SSSI and nearby BAP priority habitat. The operation phase effects on biodiversity are uncertain. Regarding landscape, the option is likely to have a minor negative effect during both construction and operation. The pipeline route also passes through an AQMA and as such, the option has the potential to create a minor negative effect on air quality during construction. The option will result in a minor negative effect on Affinity Water's carbon footprint during operation and as it requires further abstraction it may result in a minor negative operation phase effect with regards to the resilience of the local environment to climate change. Furthermore the pipeline may have a minor negative effect on the hydro morphology of rivers during construction and there may also be minor negative effects on surface water and groundwater bodies. The new pipeline is within close proximity to heritage assets and may therefore have minor negative effects during construction and operation.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 9 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is anticipated that the River Pinn and Yeading Brook are not used by water craft in the vicinity of anticipated impacts due to the size of the water body and availability of more navigable water bodies nearby (e.g. River Colne, canals). The anticipated levels (minor significant impact at construction) of river water quality change are not anticipated to have material impacts on the enjoyment of in-stream recreation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	0	0	The construction impacts on footpaths are anticipated to be insignificant as it is anticipated that the footpaths will be rerouted whilst the pipeline construction is underway. No operation impacts are anticipated.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	Well used roads will be affected by the scheme: A4180 0.1 (km), A4090 4.1, A4127 1.9, A404 0.4, A4005 0.7, Unclassified 6.6. "	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-2	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	National	Moderate	Materials for construction should be re-used or sourced locally where possible.	-2	0	This option will require new WTW, 3 x 75 kW Borehole Pumps at Ickenham Boreholes (2 x Duty, 1 x Boxed Spare), 4 x 45 kW Booster Pumps at Ickenham Pump Station (3 x Duty, 1 x Standby), 4 x 37 kW Booster Pumps at New Harrow Reservoir (3 x Duty, 1 x Standby), 9 Ml New Harrow Service Reservoir, 16.47 km of new 350 mm Diameter Main, 1 x 14 m3 Surge Vessel, 1 x 3 m3 Surge Vessel, 1 x 350 mm Diameter, and Pressure Sustaining Valve	-1
	4.b. Result in higher levels of reuse of waste?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years	Temporary	Permanent	National	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Medium term (5 -25 years)	N/A	Temporary	?	Regional	Moderate	A CEMP should be in place during construction, and ecological surveys are required.	-1	0	The Ickenham site is 321m from Ruislip Woods Site of Special Scientific Interest (SSSI). The Ickenham site is 2.8km from Mid Colne Valley SSSI. The New harrow reservoir is 4.4km from Brent Reservoir SSSI. The proposed pipeline is 1.8km from Frays Farm Meadows SSSI, 2.1km from Denham Lock Wood SSSI, 3.1km from Harefield Pit SSSI, 4km from Old Rectory Meadows SSSI, 4.1km from Old Park Wood SSSI, and 4.6km from Kingcup Meadows & Oldhouse Wood SSSI. Potential for acoustic, light and dust disturbance to Ruislip Woods SSSI during construction of the boosters and boreholes at the Ickenham site.	?

	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Moderate	N/A	Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Low	A CEMP should be in place during construction, and ecological surveys are required.	-1	0	The Ickenham site is 80m from BAP Priority habitat wood quality semi-improved grassland. The proposed pipeline route is adjacent to BAP Priority habitat good quality semi-improved grassland and deciduous woodland. Potential for acoustic, light and dust disturbance to BAP Priority habitat deciduous woodland and good quality semi-improved grassland during construction of the pipeline.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures.	-1	-1	The new pipeline will be buried so will not have any negative effects on the landscape during the operational phase. There is the potential for minor negative effects as a result of the new reservoir and treatment works but this is uncertain at this stage. Mitigation measures such as screening/ planting should ensure any residual negative effects during operation are minor. The pipeline route travels through multiple residential areas. Therefore, there will be short-term temporary negative effects on residents associated with pipeline excavation work of residential streets, but not domestic properties. Residents will not be affected by the pipeline during the operational phase as it will be buried. The new reservoir and treatment works could also affect the landscape for a number of residents depending on the level of mitigation provided. However, this is uncertain at this stage.	-1

	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Any proposal for this option should seek to reduce impacts on traffic during the construction phase of the pipeline.	-1	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality. However, it is noted that the pipeline route passes within an AQMA. There are likely to be negative effects on air quality during construction of the new pipeline as a result of increased traffic.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading supply resilience this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licenced.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	N/A	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	N/A	Local	Low	Best construction practice.	-1	0	WFD assessment states that there is the potential to lead to adverse effects from construction in proximity to watercourse however following best construction practice should mean any impacts are small, temporary and localised.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised'.	-1	-2	Located in proximity to River Pinn. The WFD assessment identifies that temporary and localised dewatering may be required during construction. Abstracted water returned to groundwater or adjacent surface waters where possible. Creation of new preferential pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to	

										WFD assessment requires further information and assessment to identify potential operational impacts.			water quality. Bringing source back into supply has potential to mobilise poor quality groundwater from the landfill. Further information and assessment required to identify potential impacts of this.	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	High	Undertake assessment of potential effect of increased abstraction on groundwater. Implement groundwater level monitoring and trigger levels.	0	-1	Located in proximity to the River Pinn. The WFD assessment identifies that temporary and localised dewatering may be required during construction with abstracted water returned to adjacent surface water or groundwater. Foundations may disrupt groundwater flow if encountered and causing localised mounding although unlikely to reach the Chalk given presence of London Clay. Restart of abstraction may impact on water balance in aquifer although unlikely to be significant impacts.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	N/A	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	High	Monitor water quality regularly and set pollutant concentration trigger levels given existing groundwater quality issues associated with nearby landfill.	-1	0	A WFD assessment will be required to quantify the impact on the surface water and groundwater bodies during construction of the new treatment plant as well as potential in combination effects on surface water bodies during pipeline construction.	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Low	Hydrogeological survey and monitoring of groundwater levels in the Chalk.	-1	-1	WFD assessment states that temporary and localised dewatering may be required during construction. Abstracted water returned to groundwater or adjacent surface waters. Foundations may disrupt groundwater flow and cause minor obstruction to groundwater flows causing localised mounding although unlikely to reach the Chalk given presence of London Clay.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	National	High	Heritage impact assessment should be carried out to determine the effect of the pipeline and reservoir on designated heritage assets.	-1	-1	The new pipeline is within 40m of a Scheduled Monument and within 20m of a significant number of Listed Buildings, additionally, the new Harrow service reservoir is within 50m of a Registered Park and Garden. There is therefore potential for negative effects during the construction phase. Appropriate reinstatement of any land affected should ensure that negative effects are reduced during the operational phase. However there may be minor negative residual effects.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No impacts anticipated	0

5.1.1.6 AFF-NTW-SRZ4-1088

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	There may be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect post construction; however, there is likely to be a small residual negative effect due to the scale of new infrastructure. The scale of new infrastructure means that there are likely to be major negative effects during operation phase in terms of Affinity Water's carbon footprint. Additionally, there may be minor negative effects on the environment's resilience to climate change. Dewatering might be required to install foundation works, therefore there may be minor construction phase negative effects on surface and ground water bodies in the vicinity.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0Ml/d equates to a negligible effect.	0
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	0	0	Construction of new WTW anticipated to generate significant levels of construction traffic. However, this traffic is anticipated to access the site through Palmers Moor Lane, and is not anticipated to be sufficiently concentrated to generate significant negative impacts.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	Low	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	The option will require new treatment works.	-1
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2017) for the dWRMP found that there are no identified impact pathways to European designated sites.	?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There are no identified impact pathways to any SSSIs or their interest features.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of	

													increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Construction and operation may affect nearby deciduous woodland. CEMP should be in place.	?	?	Construction and operation may affect nearby deciduous woodland (disturbance).	
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Mitigation measures should include appropriate re-instatement and screening. Heritage and Landscape character assessments should be carried out where significant infrastructure works will be undertaken.	-1	-1	The proposed site is located adjacent to the M25 and the built up area of Uxbridge, therefore landscape character of this area is not particular sensitive to development. However, there may be minor negative effects on landscape during construction phase. Mitigation measures such as screening/planting will reduce the residual effect post construction; however, there is likely to be a small residual negative effect due to the scale of new infrastructure. Presence of the M25 reduces the likelihood for significant negative effects on the landscape.	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	It is considered unlikely that the construction or operational phases would result in significant impacts on local air quality given the presence of the M25 adjacent to the site. However, it is noted that the site is partially within an AQMA.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	2	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	0	This scheme is not predicted to significantly impact water levels and quality. It is therefore unlikely to affect the resilience of the local environment or assets to climate change.	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	10.c. Alter water table levels and amount of water within aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Dewatering might be required to install foundation works so there would be a short term impact on groundwater level and potential paths for pollution to groundwater body.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

6. Reuse options

6.1 EFF

6.1.1.1 AFF-EFF-WRZ3-0180

(In the Expected and High Growth Futures)

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is for the provision of a new STW local to Stevenage in order to provide tertiary treated effluent that can be used to restore flows in the River Middle Beane, via Stevenage Brook (WRZ3). Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to biodiversity, landscape, and historic environment. Key issues during operation relate to potential long-term effects on the landscape and protecting and improving surface and groundwater body status. Long-term positive effect during operation relate to avoiding adverse impacts on surface and groundwater levels and flows and protecting and improve surface and groundwater body status.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This option requires a new STW, booster pumps, new operation building for STW, and 250m of 600mm sewage rising main.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified	0	0	The HRA (2019) for the rdWRMP concluded that there are no	?

and other important habitats and species?													identified impact pathways to European sites.
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None identified.	0	0	The proposed sewage treatment works (STW) is located 2.8km from Benington High Wood Site of Special Scientific Interest (SSSI) and is 3.7km from Knebworth Woods SSSI. Given the distance of the STW and the closest SSSI, no adverse impacts are anticipated.
	5.c. Impact on non-native species?	?	?	?	N/A	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new STW would help to prevent any INNS being transferred any further Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid the introduction and spread of INNS.	?	?	This scheme is to increase river flows in river Beane via discharge of treated effluent in Stevenage Brook. This has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Permanent	N/A	Local	Low	The loss of priority habitat should be avoided where possible. Where it is not possible to avoid the priority habitat then the provision of compensatory habitat should be explored in consultation with NE. There may also be the potential for biodiversity net gain by enhancing lower quality habitats around the new STW and main but this is uncertain at this stage. A CEMP should be in place during construction. More detailed ecology surveys will be required to inform the detailed design stage.	-1	0	Bragbury Lane Hedgerow County Wildlife Site (CWS) is within the centre of the proposed footprint of the STW. The STW is 39m from Bragbury Lane Scrub CWS and 591m from Astonbury Wood CWS which is also designated as ancient woodland. The STW is 157m from BAP Priority habitat deciduous woodland. It is assumed that the STW will result in the loss of the Bragbury Lane Hedgerow CWS. There is also potential for disturbance to any species supported by these habitats. There is potential for acoustic, light and dust disturbance during construction.
	5.e. Provide opportunities for biodiversity enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the new STW and mains. Opportunities for biodiversity net gain are not clear at this stage, recommend that these are explored in more detail and the detailed design stage.

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	High	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Temporary	Local	Moderate	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures	-2	-1	Potential for moderate negative effects during construction on a relatively open greenfield site. Mitigation including screening/planting should reduce the significance of the effect during operation.	-1
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.	0	0	None of the scheme falls within in AQMA and is not likely to significantly increase traffic within an AQMA during construction or operation. There is the potential for minor negative effects on local air quality during construction and operation but it is unlikely to be of significance.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Permanent	Permanent	National	Moderate	Construction and operation activities should follow sustainable design principles.	-2	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	?	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. By upgrading the storage capacity this option should result in positive effects on the resilience of the company to the effects of climate change.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles. Ensure monitoring and licensing of water abstraction.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	High	High	Short term (< 5 years)	Medium term (5–25 years) and Long term >25 years	Temporary	Permanent	Local	Moderate	Best construction practice.	-1	-1	Discharge of treated water into surface water channel could lead to increase in nutrients which could be mobilised to the hydraulically connected groundwater body. Further information and investigation required to understand connection between the SW and GW bodies.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	High	N/A	Medium term (5–25 years) and Long	N/A	Temporary	Regional	Moderate	Treat water to potable standards before release to the Stevenage Brook. Monitor river water quality.	0	-1	WFD states that the discharge of treated water into surface water channel could lead to increase in nutrients which could be mobilised to the hydraulically connected groundwater body. Further information and	

					term >25 years								investigation required to understand connection between the SW and GW bodies.		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Regional	Moderate	Beneficial so no mitigation needed. WFD assessment states further information and investigation required to understand the extent of benefit and connection between the GW and SW bodies.	0	2	This scheme is to increase river flows in river Beane via discharge of treated effluent in Stevenage Brook. Chalk is unconfined at that location so there is a hydraulic connection and this would potentially increase recharge into the aquifer. WFD assessment states further information and investigation required to understand the extent of benefit and connection between the GW and SW bodies.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	Low	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Regional	Moderate	WFD requires further information and investigation required to understand connection between the SW and GW bodies.	0	-2	WFD states that the discharge of treated water into surface water channel could lead to increase in nutrients which could be mobilised to the hydraulically connected groundwater body. Further information and investigation required to understand connection between the SW and GW bodies.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5–25 years) and Long term >25 years	N/A	Temporary	Regional	Moderate	Beneficial so no mitigation needed.	0	2	This scheme is to increase river flows in river Beane via discharge of treated effluent in Stevenage Brook. WFD assessment states addition of river flow should help to improve the current status.	2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water runoff.	
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Mitigation measures should include the retention of hedgerows, trees, fields, walls wherever possible. Use construction methods that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage. New above-ground infrastructure (such as new STWs) should avoid being sited in a designated site.	-1	0	The construction phase of the STW could affect the setting of a number of listed buildings. Mitigation including screening/planting should reduce the significance of the effect during operation.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	0

												of potential unknown archaeological assets.				
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The scheme will not result in the loss of any BMV agricultural land.	0

6.1.1.2 AFF-EFF-WRZ7-0605

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme involves tertiary treatment of effluent from Southern Water's Hythe wastewater treatment works, followed by injection of effluent into the gravels aquifer for re-abstraction. Re-abstracted water will be brackish and will require RO treatment before pumping it to Saltwood Reservoir. The effluent will need to have tertiary treatment and be disinfected before discharging into an infiltration trench. Negotiation with Southern Water will be required to ensure availability of effluent quantity and quality. Key issues during construction phase relate to the delivery of new infrastructure and potential impacts on SEA objectives relating to material consumption, road infrastructure, biodiversity, landscape, historic environment, and WFD status. Key issues during operation relate to potential long-term effects on biodiversity, landscape, historic environment and on surface and groundwater levels/ flows and quality.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option will not result in any new opportunities for water-based recreation.	
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further assessment may be required.	0	?	The WFD assessment found that the abstraction may influence the water balance in the Kent Romney Marsh GW Body and this could also reduce contributions reduce contributions to surface water bodies. The anticipated residual impacts on water quality/ flow may be perceptible to informal recreation users. There is an element of uncertainty until further investigations are carried out.	?
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Access is not anticipated to change as a result of this scheme.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The anticipated pipelines' routes follow the footprints of several roads and so are anticipated to cause such impacts. Well used roads will be affected by the scheme: A259 and A261. The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline.	

											routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Materials for construction should be re-used or sourced locally where possible.	-1	0	This option requires new STW Effluent Treatment and Desalination plant for new WTW, 3x 5.5kW booster pumps from STW to Tertiary treatment plant (2x Duty, 1x Standby), 4 x 30 kW booster pumps from Desalination to Saltwood Reservoir (2 x Duty, 1 x Standby), New 390m main, 300mm diameter new 1000m main, a new 2.22 km pipeline, and a 5.56km pipeline.	0
	4.b. Result in higher levels of reuse of waste?		Low	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Minimise waste during construction and reuse materials where possible.	-1	-1	The option will temporarily result in higher levels of waste production during construction. There is also the potential for long-term negative effects as a result of the waste produced by the new WTW.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Best practice construction methods should ensure that there are no impacts on water quality and no significant disturbance to the Dungeness, Romney Marsh and Rye Bay SPA. A travel plan during construction could potentially enable vehicle movements past the Folkestone to Etchinghill Escarpment SAC to be minimised.	-1	0	The HRA (2017) for the dWRMP found the following: This option will allow the tertiary treatment of effluent from Southern Water's Hythe wastewater treatment works. There will thus be no change in abstraction associated with this Option. Effluent will need to be disinfected before discharging into an infiltration trench. Re-abstracted water will be brackish and will thus require reverse osmosis treatment before pumping into Saltwood Reservoir. The trench and pipeline are both approximately 200m from Dungeness, Romney Marsh and Rye Bay potential SPA. More detailed technical analysis is not possible at this level prior to detailed scheme design. However, standard methods exist that would mean adverse effects on integrity can be avoided through careful attention to details of construction. The Dungeness, Romney Marsh & Rye Bay pSPA is intended to protect the feeding waters of the tern colonies associated with the existing SPA. Disturbance is unlikely to be an adverse effect; the birds are not resting in this area, they are actively plunge-diving for fish during daylight hours. It is unlikely that construction activities on shore would disturb them and a given bird happened to be foraging close to shore and was disturbed it would simply move to forage elsewhere in the very large pSPA until the disturbing activity had ceased. Provided the trench and	?

													pipeline installation avoided polluting the water it is considered that no adverse effect on the integrity of the SPA is expected to arise. Standard construction controls would prevent pollution. The scheme is located 3km from Folkestone to Etchinghill Escarpment SAC and construction traffic may use the M20/A20 to access the site. Folkestone to Etchinghill Escarpment is sensitive to increased nitrogen deposition and one such source of nitrogen is NOx emissions from traffic moving within 200m of the SAC when considered in combination. Depending on the direction from which construction traffic may arrive/leave, this could mean that they pass within 200m of the SAC. However, the number of construction vehicles involved (in terms of vehicle movements per day on this stretch of road) is likely to be very small (tens of vehicle movements per day), short-term (for months rather than years) and temporary. Such small temporary changes are likely to be lost in the day-to-day variation in flows that will be seen on this road. Moreover a travel plan during construction could potentially enable vehicle movements past the SAC to be minimised even further. Small scale short-term temporary changes in emissions will have no effect on the integrity of the SAC since botanical changes stem from long-term (many years) regular deposition, which is why nitrogen deposition rates are expressed as kilograms of nitrogen over a given area per year. During operation no significant impacts are predicted on European sites. There are no impact pathways to MCZs.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Good practice construction methods.	0	0	Pipeline passes 270m from Lympne Escarpment SSSI, which is designated broadly for broadleaved, mixed and yew woodland, calcareous grassland and neutral grassland. The SSSI is currently in a 100% favourable and favourable recovering condition status. Given the distance of the SSSI and its elevation on the escarpment there are no pathways for impact during construction or operation.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard	

										of any construction as per standard construction practice.			construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation; it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Moderate	Short term (< 5 years)	N/A	Temporary/ Permanent	Temporary	Local	Moderate	Avoid loss of BAP Priority Habitat where possible. If not possible, compensatory habitat may be required but this could not be feasible given habitat type. Good practice construction methods should ensure that disturbance to Priority Habitats and species in close proximity to infrastructure are not significantly affected. Further information and investigation required to determine the likelihood of hydrological impacts and identification of more detailed mitigation if necessary.	-2	-1	Trench and associated pipeline is within BAP Priority habitat coastal vegetated shingle and BAP Priority habitat deciduous woodland. These habitats would be lost and disturbed (by noise, light and dust) during construction. Vegetated shingle has a very slow recovery rate so one of its largest threats is disturbance by trampling and vehicles, which erode and degrade the vegetation and damage the natural shingle ridge patterns. Pipeline to reservoir passes adjacent to BAP Priority habitat deciduous woodland. Potential for noise, light and dust disturbance during construction. Pipeline crosses the Royal Military Canal via a road bridge. Potential for disturbance to this habitat. Ecological surveys required. The WFD assessment found that there could be impacts to some groundwater dependant terrestrial ecosystems during operation as a result of impacts on groundwater and surface water levels.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the pipeline and reservoir. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures (such desalinisation plant) should be designed sympathetically to fit in with the surrounding	-2	-1	The option requires abstraction trenches / beach wells, a new desalination plant near Hythe, 5.56km of pipeline from the desalination plant to Saltwood Reservoir. The pipeline will not be visible during operation phase however the desalination plant will remain visible. Approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction. However, it is likely that the desalination plant will affect landscape quality after mitigation measures and will be visible from the AONB.	-1

										landscape, and/or screened as appropriate by landscaping and planting. To this effect, mitigation measures such as ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland, and the reinstatement of soil/land following construction of the pipeline will reduce the residual effect during operational phase. More detailed mitigation measures should be set out at the detailed design stage. New opportunities are to be created for improved access, recreation and amenity provision across the area to reduce adverse effects during the operation phase.				
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	N/A	Moderate	Good practice construction methods.	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There are unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5–25 years) to Long term (>25 Years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-1	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option provides a 6.5Ml/d storage capacity	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5–25 years) to Long term (>25 Years)	N/A	Temporary	Regional	Moderate	Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies.	0	-2	The WFD assessment found that this option could have a negative effect during operation on groundwater dependent terrestrial ecosystems. This could reduce the resilience of the local environment to climate change.	-2

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies. A hands-off flow condition could be used to avoid any significant impacts on surface water levels during operation.	-1	-1	The WFD assessment found that temporary and localised dewatering may be required during drilling and construction phase (likely to be minor and local impact) with abstracted water returned to adjacent surface water or groundwater. During operation the new abstraction may reduce contributions to surface water bodies although impacts may be negated by reinjection.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Moderate	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Good practice construction methods should ensure no impacts on quality of surface water bodies during construction. Further information and investigation required to determine the likelihood of identification of more detailed mitigation if necessary.	-1	-2	The WFD assessment found that the option could have impacts on surface water quality during construction of the trench and pipeline; however, good practice construction methods should ensure that this is not significant. It also found that during operation the reinjection of treated effluent and potentially mobilised poorer quality saline water during abstraction may reach surface water bodies.	
	10.c. Alter water table levels and amount of water within aquifers?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	WFD assessment requires further investigation and assessments.	-1	-2	The WFD assessment found that the abstraction may influence the water balance in the Kent Romney Marsh GW Body although impacts may be negated by reinjection. Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on water balance.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and investigation required to determine the likelihood of impacts and identification of more detailed mitigation if necessary.	0	-1	The WFD assessment found that the abstraction in groundwater body may draw in poorer quality saline water although impacts may be negated by reinjection. Further assessment required to assess the impact of this.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Further information and investigation required to determine the likelihood of impacts and identification of more detailed mitigation if necessary.	0	-2	The WFD assessment found that the abstraction may influence the water balance in the Kent Romney Marsh GW Body and this could also reduce contributions to surface water bodies although impacts may be negated by reinjection.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		Moderate	N/A	Short term (< 5 years) to Medium term (5 -25 years)	N/A	Temporary	N/A	Local	Moderate	Construction methods should be adopted to minimise the impact of localised flooding during construction of the pipeline, including dewatering and treatment of the groundwater prior to	0	0	The option will not lead to loss of floodplain or significantly increase surface water run-off.	0

											discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. The scheme would not affect flood storage once operational and the necessary flood plain compensation complete.				
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	Mitigation measures should include re-routing the new pipeline to avoid damaging Listed Buildings, Scheduled Monuments and Registered Parks and Gardens, especially those within 10m / working area. Use of directional drilling underneath the sites to avoid permanent damage should also be investigated. additionally mitigation should include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. Use construction methods and barriers/hoardings that are sympathetic to the aesthetics of the surrounding landscape and historic environment. The delivery of screening/planting should ensure that the residual effects during operation are reduced. More detailed mitigation measures should be explored at the detailed design stage.	-2	-1	The new pipeline route crosses over the Royal Military Canal Scheduled Monument as well as passes within 10m of a further Scheduled Monument and a Listed Building. There is therefore potential for negative effects during the construction phase. However, burial of the pipeline and appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. It should also be noted that the new pipeline follows existing infrastructure. The new STW and WTW infrastructure may be visible from the Dymchurch Redoubt Scheduled Monument so there is the potential for negative effects during construction and operation. Mitigation measures such as screening/planting could reduce the residual effect during operational phase; however, this is uncertain at this stage and further assessments are required.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected by this scheme.	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-2	0	The pipeline route crosses an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

7. Desalination options

7.1 DES

7.1.1.1 AFF-DES-WRZ7-0008

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline route crosses several major roads and therefore the option will result in minor operation phase effects on the strategic transport infrastructure. Trench and associated pipeline is within BAP priority habitat coastal vegetated shingle and BAP priority habitat deciduous woodland. Consequently there will be moderate negative construction phase effects on biodiversity. Assuming a CEMP is in place and appropriate compensatory habitat is planted the construction phase effect will be neutral. Approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in a moderate negative construction phase effects. However, it is likely that the desalination plant will have a minor negative effect on landscape quality after mitigation measures. Construction and operation activities are likely to increase Affinity Water's carbon footprint and will therefore have moderate negative effects in this regard. There may also be moderate negative operational phase effects with regards to the water table and risk of saline intrusion., as well as river channel hydromorphology and the resilience of the local environment to climate change. The new pipeline route crosses the Royal Military Canal Scheduled Monument and passes within 10m of a further Scheduled Monument and a Listed Building. There is therefore potential for moderate negative effects during the construction phase. However, appropriate reinstatement should ensure that negative effects are not experienced during the operational phase.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	WFD assessment requires. Further information and assessment	0	?	WFD assessment states potential for groundwater abstraction to mobilise poorer quality saline water which could reach surface water. The anticipated residual impacts on water quality/ flow may be perceptible to informal recreation users. WFD assessment requires further information and assessment to assess the impact of this.	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also	-1	0	The construction traffic impact is not anticipated to be a significant impact or last longer than a few months at any one section/site. No significant impacts are anticipated during operation. Well used roads will be affected by the scheme: A259 3.2 (km), A261 0.2, Unclassified 1.6.	0

											help to minimise impacts.					
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option requires abstraction trenches / beach wells, a new desalination plant near Hythe, 5.56km of pipeline from the desalination plant to Saltwood Reservoir.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		High	High	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	High	Potential effect on Dungeness, Romney Marsh and Rye potential SPA, Dungeness, Romney Marsh and Rye Bay SPA and Ramsar, and Dungeness SAC. Investigations required, including ecology and hydrology. Due to proximity of the scheme to Folkestone and Etchinghill Escarpment SAC located adjacent to the M20, there is potential for increased traffic flows from the scheme to result in increases in atmospheric pollution deposition on the SAC. Traffic modelling and potential subsequent air quality modelling required to support Habitat Regulations Assessment. Further assessment regarding impact on MCZ may be required.	-2	-2	The HRA (2017) for the dWRMP found the following: This option is a desalination scheme taking water from a set of beach wells / trenches intercepting outflow from the aquifer to the sea. The interception of water from the aquifer as it flows to the sea could impact upon the level of water in the aquifer before it is recharged by sea water, and thus potentially impact upon the designated sites. Additional borehole yield test and/or modelling will required to determine if appropriate abstraction can be achieved without impacting on water levels within the Dungeness European sites. The trench and pipeline are both approximately 200m from Dungeness, Romney Marsh and Rye potential SPA at their closest. More detailed technical analysis is not possible at this level prior to detailed scheme design. However, standard methods exist that would mean adverse effects on integrity can be avoided through careful attention to details of construction. The Dungeness, Romney Marsh & Rye Bay pSPA is intended to protect the feeding waters of the tern colonies associated with the existing SPA. Disturbance is unlikely	-2

														to be an adverse effect; the birds are not resting in this area, they are actively plunge-diving for fish during daylight hours. It is unlikely that construction activities on shore would disturb them and a given bird happened to be foraging close to shore and was disturbed it would simply move to forage elsewhere in the very large pSPA until the disturbing activity had ceased. Provided the trench and pipeline installation avoided polluting the water it is considered that no adverse effect on the integrity of the SPA is expected to arise. Standard construction controls would prevent pollution. The scheme is located 3km from Folkestone to Etchinghill Escarpment SAC and construction traffic may use the M20/A20 to access the site. Folkestone to Etchinghill Escarpment is sensitive to increased nitrogen deposition and one such source of nitrogen is NOx emissions from traffic moving within 200m of the SAC when considered in combination. Depending on the direction from which construction traffic may arrive/leave, this could mean that they pass within 200m of the SAC. However, the number of construction vehicles involved (in terms of vehicle movements per day on this stretch of road) is likely to be very small (tens of vehicle movements per day), short-term (for months rather than years) and temporary. Such small temporary changes are likely to be lost in the day-to-day variation in flows that will be seen on this road. Moreover a travel plan during construction could potentially enable vehicle movements past the SAC to be minimised even further. Small scale short-term temporary changes in emissions will have no effect on the integrity of the SAC since botanical changes stem from long-term (many years) regular deposition, which is why nitrogen deposition rates are expressed as kilograms of nitrogen over a given area per year.	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No mitigation required.	0	0	Pipeline passes 270m from Lympne Escarpment SSSI. However as this SSSI is an escarpment no effect is anticipated.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Low	Avoid loss of BAP priority habitat if possible. If not possible, compensatory habitat may be required. CEMP should be in place during construction.	-2	0	Trench and associated pipeline is within BAP priority habitat coastal vegetated shingle and BAP priority habitat deciduous woodland. These habitats would be lost and disturbed (by noise, light and dust) during construction. Vegetated shingle has a very slow recovery rate so one of its largest threats is disturbance by trampling and vehicles, which erode and degrade the vegetation and damage the natural shingle ridge patterns. Pipeline to reservoir passes adjacent to BAP priority habitat deciduous woodland. Potential for noise, light and dust disturbance during construction. Pipeline crosses the Royal Military Canal via a road bridge. Potential for disturbance to this habitat. Ecological surveys required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit	-2	-1	The option requires abstraction trenches / beach wells, a new desalination plant near Hythe, 5.56km of pipeline from the desalination plant to Saltwood Reservoir. The pipeline will not be visible during operation phase however the desalination plant will remain visible. Approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction.	-1

													in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.			However, it is likely that the desalination plant will affect landscape quality after mitigation measures.	
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?		At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There are unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2		This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	2	2		Predicted climatic changes in England include hotter and drier summers. This option provides a 6.5Ml/d storage capacity	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles. WFD assessment states further information and assessment required to assess the impact of this.	-1	-1		Further abstraction may have a negative effect on the environment if not properly monitored and licensed, the pipeline is not likely to have permanent adverse effects. Potential Impact on Romney Marshes and a number of nearby designated sites which may contain groundwater dependent species. WFD assessment states further information and assessment required to assess the impact of this.	-1

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	WFD assessment states further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies.	-1	-2	WFD assessment states new abstraction may reduce contributions to surface water bodies. Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on surface water bodies.	-2		
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	-1	WFD assessment states potential for groundwater abstraction to mobilise poor quality water. Creation of new preferential pathways into the aquifer due to new drilling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality.			
	10.c. Alter water table levels and amount of water within aquifers?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Use of best construction practice. WFD assessment states further assessment and information required.	-1	-2	WFD assessment states temporary and localised dewatering may be required during drilling and construction phase (likely to be minor and local impact) with abstracted water returned to adjacent surface water or groundwater. Foundations may disrupt groundwater flow if encountered and causing localised mounding. New abstraction may influence the water balance in the GW Body. Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on water balance.	-2		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best construction practice. WFD assessment states further information and assessment required.	-1	-2	WFD assessment states potential for groundwater abstraction to mobilise poorer quality saline water which could reach surface water and may also impact groundwater quality. Further information and assessment required to assess the impact of this.			

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Low	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Use of best construction practice. WFD assessment states further assessment and information required.	-1	-2	WFD assessment states temporary and localised dewatering may be required during drilling and construction phase (likely to be minor and local impact) with abstracted water returned to adjacent surface water or groundwater. Foundations may disrupt groundwater flow if encountered and causing localised mounding. New abstraction may influence the water balance in the GW Body. Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on water balance.	-2
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Heritage impact assessment should be carried out to determine the effect of the pipeline on designated heritage assets.	-2	0	The new pipeline route crosses the Royal Military Canal Scheduled Monument and passes within 10m of a further Scheduled Monument and a Listed Building. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No grade 1 or 2 agricultural land will be affected by this option.	0

7.1.1.2 AFF-DES-WRZ7-0309

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							

1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline route crosses several major roads and therefore the option will result in minor negative operation phase effects on the strategic transport infrastructure and public rights of way. There may also be minor negative effects on biodiversity as the pipeline crosses marsh habitat which may link to the nearby Romney Marsh and Rye SPA, Ramsar and Dungeness SAC. The pipeline also passes adjacent to BAP priority habitat deciduous woodland and vegetated shingle. There will be moderate negative construction phase and minor negative operational effects on Landscape because approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction. However, it is likely that the desalination plant will affect landscape quality after mitigation measures. Construction and operation activities are likely to increase Affinity Water's carbon footprint and there will be moderate negative effects in regard to this during both construction and operation. The option is also likely to have operational phase effects on the river channel hydromorphology and the resilience of the local environment to climate change.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires 11.8km of pipeline from the desalination plant to Saltwood Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		Low	N/A	Short term (> 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The pipeline route follows the A259 for some sections and also crosses the Romney, Hythe and Dymchurch Railway line the remainder of the route follows smaller B roads. It is considered that construction works may have a short term minor negative effect on this infrastructure.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Low	N/A	Short term (> 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

												also help to minimise impacts.			
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (> 5 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option requires sea intake pipes, a new desalination plant near Hythe, 11.8km of pipeline from the desalination plant to Saltwood Reservoir.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (> 5 years)	N/A	Temporary	N/A	Local	Low	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	National	Low	HRA and in combinations assessment likely to be required. Further assessment regarding impact on MCZ may be required.	?	?	The HRA (2017) for the dWRMP found the following: This option is a full desalination scheme. Raw water will be abstracted from sea and treated using RO system. Treatment of the water would be via reverse osmosis plant. The treated water would be delivered to Saltwood Reservoir. The potential water treatment works would be approximately 200m from the Dungeness, Romney Marsh & Rye potential SPA at its closest. There is thus potential for disturbance (noise, light, dust etc.) to the potential SPA during construction depending on the sensitivity of the designated features and the details of construction. The operational works is not expected to be a noisy facility and operational site lighting would not illuminate areas 200m distant. As such, operational disturbance will not arise. More detailed technical analysis is not possible at this level prior to detailed scheme design. However, standard methods exist that would mean adverse effects on integrity can be avoided through careful attention to details of construction. The Dungeness, Romney Marsh & Rye Bay pSPA is intended to protect the feeding waters of the tern colonies associated with the existing SPA. Disturbance is unlikely to be an adverse effect; the birds are not resting in this area, they are actively plunge-diving for fish during daylight hours. It is unlikely that construction activities on shore would disturb them and a given bird happened to be foraging close to shore and was disturbed it would simply move to forage elsewhere in the very large pSPA until the disturbing activity had ceased. Provided the trench and pipeline installation avoided polluting the water it is considered that no adverse effect on the integrity of the SPA is expected to arise. Standard construction controls would prevent pollution.	?

														The scheme is located 3km from Folkestone to Etchinghill Escarpment SAC and construction traffic may use the M20/A20 to access the site. Folkestone to Etchinghill Escarpment is sensitive to increased nitrogen deposition and one such source of nitrogen is NOx emissions from traffic moving within 200m of the SAC when considered in combination. Depending on the direction from which construction traffic may arrive/leave, this could mean that they pass within 200m of the SAC. However, the number of construction vehicles involved (in terms of vehicle movements per day on this stretch of road) is likely to be very small (tens of vehicle movements per day), short-term (for months rather than years) and temporary. Such small temporary changes are likely to be lost in the day-to-day variation in flows that will be seen on this road. Moreover a travel plan during construction could potentially enable vehicle movements past the SAC to be minimised even further. Small scale short-term temporary changes in emissions will have no effect on the integrity of the SAC since botanical changes stem from long-term (many years) regular deposition, which is why nitrogen deposition rates are expressed as kilograms of nitrogen over a given area per year.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		?	?	?	?	Temporary	Permanent	Regional	High	Pipeline passes 270m from Lympne Escarpment SSSI. However as this SSSI is an escarpment no effect is anticipated. Pipeline and water treatment works are 1.8km from Sugeness, Romney Marsh and Rye Bay SSSI. Ecological surveys required.	0	0	Pipeline passes 270m from Lympne Escarpment SSSI. However as this SSSI is an escarpment no effect is anticipated. Pipeline and water treatment works are 1.8km from Sugeness, Romney Marsh and Rye Bay SSSI. This SSSI is designated for its diverse range of biological and geological features, specifically the coastal geomorphology of Dungeness and Rye Harbour and the following nationally important habitats: saltmarsh, sand dunes, vegetated shingle, saline lagoons, standing waters, lowland ditch systems, and basin fens. These habitats and others within the site support the following nationally important species interests: populations of four vascular plant species listed in Schedule 8 of the Wildlife and Countryside Act 1981 (as amended); an assemblage of Schedule 8, nationally rare and nationally scarce vascular plants; populations of the vulnerable Warne's thread-moss Bryum warneum; populations of water voles Arvicola terrestris; an	

													assemblage of breeding birds associated with shingle beaches and saltmarsh, lowland damp grasslands, lowland open waters and their margins, and scrub; breeding numbers of 16 species of bird; assemblage of over 20,000 waterfowl in the non-breeding season; wintering numbers of 17 species of bird and three species during passage periods; metapopulations of great crested newts Triturus cristatus; endemic species and subspecies of invertebrates; populations of two invertebrate species listed in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); populations of ten endangered, vulnerable and rare invertebrate species; assemblages of invertebrates occurring on 'dry' coastal habitats; and assemblages of wetland invertebrates. The SSSI is in a favourable (67.53%) and unfavourable – recovering (32.23%) condition. The Environment Agency and Natural England together with the planning authorities are bringing about the recovery of the SSSI units from adverse effects such as disturbance. The WFD assessment states that there is potential for scheme to impact on Romney Marshes and a number of designated sites which may contain groundwater dependent species. However, WFD assessment concludes any impacts likely to be localised, minor and temporary. Nonetheless it is considered that this may need to be investigated further.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Local	Low	CEMP should be in place during construction to reduce potential for disturbance to priority habitats. Although not a BAP priority habitat - pipeline crosses areas of marsh and ditches that may be sensitive to changes in hydrology and support protected species. Reduce loss of this habitat where possible. Ecological surveys will be required.	-1	0	Pipeline to reservoir passes adjacent to BAP priority habitat deciduous woodland and vegetated shingle. Potential for noise, light and dust disturbance during construction. Pipeline crosses the Royal Military Canal via a road bridge. Potential for disturbance to this habitat. Pipeline crosses area of marsh with associated waterbodies. Potential for loss of and disturbance to these habitats. Potential for hydrological changes depending on the depth of the pipeline. WFD assessment states potential for scheme to impact on Romney Marshes and a number of designated sites which may contain groundwater dependent species. However, WFD assessment concludes any impacts likely to be localised, minor and temporary.	

	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice.	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-2	-1	The option requires sea intake pipes, a new desalination plant near Hythe, 11.8km of pipeline from the desalination plant to Saltwood Reservoir. The pipeline will not be visible during operation phase however the desalination plant will remain visible. Approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction. However, it is likely that the desalination plant will affect landscape quality after mitigation measures.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These	

												should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	This option requires new infrastructure which will use energy and raw materials in construction. Operation will result in increased energy use. This is likely to have a negative impact on the carbon footprint of the Company.	-2
	8.b. Maximise the company's resilience to a changing climate?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	?	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include 1.5Ml/d storage capacity	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	?	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed, the pipeline is not likely to have permanent adverse effects.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	-1	-1	The pipeline crosses river channels whose hydromorphology could potentially be impacted.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	If required, any temporary flow diversions will be subject to agreement with the EA to avoid any material adverse effects on the river environment and ensuring WFD compliance. Furthermore pipejacking could be used to mitigate impacts on the watercourses if necessary. Watercourse diversions could be designed using a 'naturalised' form.	-1	0	WFD assessment states there is potential for the creation of new preferential pathways into the aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from below ground workings. CoPC and best practice for design, construction and operations reduce risks to water quality.	
	10.c. Alter water table levels and amount of water within aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Best construction practice and monitoring for nearby abstractions if dewatering is required during construction works	-1	0	Potential for negative impact effect during construction (although very short term during construction and reversible) .	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Best construction practice if dewatering is required during	0	0	WFD assessment highlights that dewatering in groundwater body may draw in poorer quality saline water. However, likely to be	

										construction works.			minor and local.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	If dewatering is required calculations may be needed to estimate extent of dewatering and the associated radius of influence.	-1	-1	WFD assessment found that temporary and localised dewatering may be required during drilling and construction phase (likely to be minor and local impact) with abstracted water returned to adjacent surface water or groundwater. Foundations may disrupt groundwater flow if encountered and causing localised mounding.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Heritage impact assessment should be carried out to determine the effect of the pipeline on designated heritage assets.	-2	0	The new pipeline route crosses the Royal Military Canal Scheduled Monument and passes within 10m of a further Scheduled Monument and a Listed Building. There is therefore potential for negative effects during the construction phase. However, appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include reinstatement of land	-2	0	Approximately 7km of the pipeline route is located within grade 2 agricultural land. There will be short term temporary negative effects on this agricultural land during construction. Assuming appropriate reinstatement, the residual effect during construction should be neutral.	0

7.1.1.3 AFF-DES-WRZ7-0396

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The pipeline route crosses several major roads and therefore the option will result in minor negative operation phase effects on the strategic transport infrastructure and public rights of way. Trench and associated pipeline is within BAP Priority habitat coastal vegetated shingle and BAP Priority habitat deciduous woodland. Consequently there will be moderate negative construction effects in this regard. Assuming avoidance, or compensation with a CEMP in place the operation phase effect should be neutral. There will be moderate negative construction phase and minor negative operational effects on Landscape because approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction. However, it is likely that the desalination plant will affect landscape quality after mitigation measures. The option has the potential to have moderate negative operational phase effects on both water level and water quality in the Romney Marshes groundwater body. It may also have minor negative effects on surface water bodies. There will be moderate negative construction phase and minor negative operational effects on Landscape because approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction. However, it is likely that the desalination plant will affect landscape quality after mitigation measures.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	?
	2.b. Alter water levels that affect water-based recreation assets?		N/A	?	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	Further information and assessment may be required.	0	?	The anticipated residual impacts on water quality/ flow may be perceptible to informal recreation users. There is an element of uncertainty until further investigations are carried out.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation should include the diversion of public rights of way. Further more specific mitigation can be identified and the detailed design stage.	-1	0	The option requires 5.56km of pipeline from the desalination plant to Saltwood Reservoir. A new pipeline of this length is likely to sever sections of public rights of way and other amenity assets. This has the potential for a temporary short term minor negative effect.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	the pipeline route follows the A259 for some sections, the remainder of the route follows smaller B roads. It is anticipated that construction will take longer than a few months, but that traffic impacts will not last the full duration of construction (due to anticipated concentration of deliveries at key stages of construction).	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include the phased delivery of new infrastructure as well as the creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with new mains pipelines.	

											help to minimise impacts.					
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Local	Low	Materials for construction should be re-used or sourced locally where possible.	-2	0	The option requires abstraction trenches / beach wells, a new desalination plant near Hythe, 5.56km of pipeline from the desalination plant to Saltwood Reservoir.	-2	
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	N/A	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production during construction.		
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		High	High	Medium term (5 -25 years) to Long term (>25 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Potential effect on Dungeness, Romney Marsh and Rye potential SPA, Dungeness, Romney Marsh and Rye Bay SPA and Ramsar, and Dungeness SAC. Investigations required, including ecology and hydrology. Due to proximity of the scheme to Folkestone and Etchinghill Escarpment SAC located adjacent to the M20, there is potential for increased traffic flows from the scheme to result in increases in atmospheric pollution deposition on the SAC. Traffic modelling and potential subsequent air quality modelling required to support Habitat Regulations Assessment. Further assessment regarding impact on MCZ may be required.	-2	-2	The HRA (2017) for the dWRMP found the following: This Option is a desalination scheme taking water from a series of beach wells / trenches intercepting outflow from the aquifer to the sea. Additional borehole yield test and/or modelling will be required to determine the most appropriate abstraction. The treated water will be mineralised onsite and subsequently pumped to Saltwood Reservoir. The interception of water from the aquifer as it flows to the sea could impact upon the level of water in the aquifer before it is recharged by sea water, and thus potentially impact upon the designated sites. Additional borehole yield test and/or modelling will required to determine if appropriate abstraction can be achieved without impacting on water levels within the Dungeness European sites. Trench and pipeline are approximately 200m from Dungeness, Romney Marsh and Rye potential SPA at its closest. More detailed technical analysis is not possible at this level prior to detailed scheme design. However, standard methods exist that would mean adverse effects on integrity can be avoided through careful attention to details of construction. The Dungeness, Romney Marsh & Rye Bay pSPA is intended to protect the feeding waters of the tern colonies associated with the existing SPA. Disturbance is unlikely to be an adverse effect; the birds are not resting in this area, they are actively plunge-diving for fish during daylight hours. It is unlikely that construction activities on shore would disturb them and a given bird happened to be foraging close to shore and was disturbed it would simply move to forage elsewhere in the very large pSPA until the disturbing activity had ceased. Provided the trench and pipeline installation avoided polluting the water it is considered that no adverse effect on the integrity of the SPA is expected to arise. Standard construction controls would prevent pollution. The scheme is located 3km from Folkestone to Etchinghill Escarpment SAC and construction traffic may use the M20/A20 to access the site. Folkestone to Etchinghill Escarpment is sensitive to increased nitrogen deposition and one such source of nitrogen is NOx emissions	-2	

														from traffic moving within 200m of the SAC when considered in combination. Depending on the direction from which construction traffic may arrive/leave, this could mean that they pass within 200m of the SAC. However, the number of construction vehicles involved (in terms of vehicle movements per day on this stretch of road) is likely to be very small (tens of vehicle movements per day), short-term (for months rather than years) and temporary. Such small temporary changes are likely to be lost in the day-to-day variation in flows that will be seen on this road. Moreover a travel plan during construction could potentially enable vehicle movements past the SAC to be minimised even further. Small scale short-term temporary changes in emissions will have no effect on the integrity of the SAC since botanical changes stem from long-term (many years) regular deposition, which is why nitrogen deposition rates are expressed as kilograms of nitrogen over a given area per year.	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		?	?	?	?	?	?	?	?	Potential effect on SSSI associated with Sungeness, Romney Marsh and Rye Bay SPA and Dungeness SAC. Investigations required, including ecology and hydrology.	0	0	Pipeline passes 270m from Lympne Escarpment SSSI and 2.2km from Folkestone to Etchinghill Escarpment SSSI. However as these SSSIs are escarpments no effect is anticipated. Trench and pipeline are 7.1km from the SSSI associated with Dungeness, Romney Marsh and Rye Bay SPA and Ramsar site, and Dungeness SAC. Investigations required, including ecology and hydrology.	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	N/A	Local	Low	Avoid loss of BAP Priority habitat if possible. If not possible, compensatory habitat may be required. CEMP should be in place during construction.	-2	0	Trench and associated pipeline is within BAP Priority habitat coastal vegetated shingle and BAP Priority habitat deciduous woodland. These habitats would be lost and disturbed (by noise, light and dust) during construction. Vegetated shingle has a very slow recovery rate so one of its largest threats is disturbance by trampling and vehicles, which erode and degrade the vegetation and damage the natural shingle ridge patterns. Pipeline to reservoir passes adjacent to BAP Priority habitat deciduous woodland. Potential for noise, light and dust disturbance during construction. Pipeline crosses the Royal Military Canal via a road bridge. Potential for disturbance to this habitat. Ecological surveys required.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	Invasive species on site should be identified and removed in advance of any construction as per standard construction practice..	?	?	While, there is the potential for introducing or spreading INNS during construction it is considered that standard construction practices should ensure that the risk is low. This scheme will not result in the transfer of raw water or increased recreation, it is therefore considered that there is low risk of increasing the spread of INNS during operation.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	High	A landscape and visual impact assessment will be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the AONB Management Plan. New structures should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. More detailed mitigation measures should be set out at the detailed design stage. To this effect, mitigation measures could include the retention of hedgerows, trees, fields, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline.	-2	-1	The option requires abstraction trenches / beach wells, a new desalination plant near Hythe, 5.56km of pipeline from the desalination plant to Saltwood Reservoir. The pipeline will not be visible during operation phase however the desalination plant will remain visible. Approximately 500m of the pipeline will be located in the Kent Downs AONB. This will not be visible once re-instatement measures have been carried out although will result in significant short term temporary impacts during construction. However, it is likely that the desalination plant will affect landscape quality after mitigation measures.	-1
	6.b. Provide opportunities for landscape enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	There is the potential for minor negative effects during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There are unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Permanent	Permanent	National	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	Construction and operation activities are likely to increase Affinity Water's carbon footprint.	-2
	8.b. Maximise the company's resilience to a changing climate?		Low	Low	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option provides a 6.5Ml/d storage capacity	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed, the pipeline is not likely to have permanent adverse effects.	-1

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Permanent	Local	Low	Best construction practice.	-1	-1	The pipeline crosses river channels whose hydromorphology could potentially be impacted.	-2
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		Moderate	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Best practice construction.	-1	0	WFD assessment states temporary and localised dewatering may be required during drilling and construction phase (likely to be minor and local impact) with abstracted water returned to adjacent surface water or groundwater. Foundations may disrupt groundwater flow if encountered and causing localised mounding.	
	10.c. Alter water table levels and amount of water within aquifers?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Use of best construction practice. Hydrogeological survey and monitoring of groundwater levels in the Romney Marsh groundwater body to confirm groundwater flow and impacts. Implement trigger levels for any potential dewatering during construction and operation of new treatment works and abstractions from new trench/wells. WFD assessment states further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on water balance.	-1	-2	Potential for negative impact effect during construction of new abstraction well (although very short term during construction and reversible). WFD assessment states new abstraction may influence the water balance in the GW Body. Further assessment and information including hydrogeological conditions, water features, water balance and abstraction information required to consider impact on water balance.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best Construction practice. WFD assessment states further information and assessment required to assess impacts.	-1	-2	The WFD found that there is potential for groundwater abstraction to mobilise poorer quality saline water which could reach surface water. Potential impact on groundwater levels may impact Romney Marshes and a number of nearby designated sites which may contain groundwater dependent species. Further information and assessment required to assess the impact of this. WFD assessment concludes there is potential for groundwater abstraction to mobilise poor quality water. Creation of new preferential pathways into the aquifer due to new drilling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term	Temporary	Temporary	Local	High	WFD assessment requires further information and assessment to assess the impact of this	-1	-2	WFD assessment highlights that potential impact on groundwater levels may impact Romney Marshes and a number of nearby designated sites which may contain groundwater	-2

				(>25 years)								dependent species. Further information and assessment required to assess the impact of this.		
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Heritage impact assessment should be carried out to determine the effect of the pipeline on designated heritage assets.	-2	-1	The new pipeline route crosses over the Royal Military Canal Scheduled Monument as well as passes within 10m of a further Scheduled Monument and a Listed Building. There is therefore potential for negative effects during the construction phase. However, burial of the pipeline and appropriate reinstatement of any land affected should ensure that negative effects are in the short-term, temporary and not experienced during the operational phase. The new desalination plant may be visible from the Dymchurch Redoubt Scheduled Monument so there is the potential for negative effects during construction and operation. Mitigation measures such as screening/planting could reduce the residual effect during operational phase; however, this is uncertain at this stage and further assessments are required.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependant heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No grade 1 or 2 agricultural land will be affected by this option.	0

7.1.1.4 AFF-DES-WRZ8-4021

SEA Objective	Assessment questions (would the options / programme…?)	Impact description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option is a full desalination scheme located near Harwich on the Tendring peninsula. The treatment works will consist of abstraction of raw water from the sea for treatment which will include ultra-filtration and a Reverse Osmosis (RO) system. The purpose of this option is to ensure that Affinity Water is able to offset any severe sustainability reductions should they arise. The scheme will provide an additional flow of up to 15 Ml/d for use within WRZ8. The scheme will require a new desalinisation plant, 3 x 30kW booster pumps, 1km pipeline, 2m3 surge vessel, 2.75km intake pipeline and 5m3 survey vessel. The option will provide minor positive effects against all objective 1 sub objectives. The pipeline route follows a small portion of road and crosses Clacton Road; therefore minor negative effects are anticipated during construction in terms of impact on transport and strategic infrastructure. The desalination plant and pipeline are at its closest only 17m from Hamford Waters SPA/SAC/Ramsar/SSSI/NNR. With the current design of the desalination plant and pipeline there is no direct landtake from the European/Nationally designated sites. However, the permanent loss of arable fields and marshland during construction may cause a significant adverse effect on the bird populations utilising this land during high tide. Construction of the pipeline could also cause disturbance to the birds for which the SPA/Ramsar is designated (which may lead to abandonment of eggs). The pipeline appears to be crossing several streams/ water bodies across the north east of the designated sites; this has the potential to cause hydrological changes to important and protected habitats and changes to species composition downstream within the SAC/SPA/Ramsar/SSSI/NNR. The construction of desalinisation plant and pipeline could affect local residents and recreation users within Little Oakley. Moderate and minor negative effects are predicted during construction and operation respectively. There is potential for moderate negative effects during construction and minor during operation as a result of impacts on the setting of Listed Buildings in Little Oakley. The new Desalination Plant will likely be visible from these listed buildings and Scheduled Monument located within 500m of the site. Potential for negative effects during construction and operation. Construction phase activities will result in	N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 15Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Low	Mitigation should include the diversion of public rights of way. Furthermore specific mitigation can be identified and the detailed design stage.	0	0	The intake of raw water from the sea takes place in Dovercourt Bay, north of Middle Beach. The pipeline also crosses a number of small surface water bodies (streams and ponds). The seaside and the ponds have footpath access, and it is anticipated that these are moderately well used (access to the seaside but no public facilities). However, any potential negative impacts are not anticipated to be perceptible to informal recreation users. No operational impacts are anticipated. The site of the new desalination plant appears to be an agricultural (arable) land, and is therefore assumed inaccessible to the public.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	The pipeline route follows a small portion of road and crosses Clacton Road. The scheme is therefore likely to result in digging up or closure of roads. The construction traffic impact is not anticipated to be a significant impact (small portion of road will be affected). Minor temporary negative effects anticipated during construction.	0

	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	an increase to Affinity Water's carbon footprint. The duration of these activities will be short term and temporary however the effects (i.e. carbon emitted) will be permanent. Operation phase effects are likely to increase the footprint leading to moderate negative effects. There may also be moderate negative operational phase effects with regards to the water table and risk of saline intrusion., as well as river channel hydromorphology.	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	There could be indirect negative effects on critical services and industries due to congestion etc. caused by construction works associated with the new pipeline. However the construction traffic impact is not anticipated to be a significant impact (small portion of road will be affected). Minor temporary negative effects therefore anticipated during construction.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		High	N/A	Short term (< 5 years)	N/A	Permanent	N/A	Local	N/A	Materials for construction should be re-used or sourced locally where possible.	-2	0	The scheme will require a new desalinisation plant, 3 x 30kW booster pumps, 1km pipeline, 2m3 surge vessel, 2.75km intake pipeline and 5m3 surge vessel.	0
	4.b. Result in higher levels of reuse of waste?		Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	N/A	Minimise waste during construction and reuse materials where possible.	-1	0	The option will temporarily result in higher levels of waste production.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	A full suite of ecological surveys and an HRA will be required in order to assess the full impacts of the desalination plant and the pipeline to the nationally and internationally designated sites and any functionally linked land and to recommend appropriate measures to mitigate those impacts. It is recommended that the pipeline be constructed at least 200m away from the European designated sites in order to reduce the likelihood of disturbance to wintering/breeding birds. Further assessment regarding impact on MCZ may be required.	-3	?	The desalination plant and pipeline are at its closest only 17m from Hamford Waters SPA/SAC/Ramsar/SSSI/NNR. These sites are designated for Fisher's Estuarine Moth (SAC) which only occurs within two sites in the UK where the food plant Hogs Fennel (SSSI) is restricted too. The sites are also designated for wetland and estuarine habitats, notable invertebrates, plants and molluscs (SSSI) as well as for breeding terns (SPA/Ramsar) and wintering and passage bird populations (SPA/Ramsar) and a wintering bird assemblage of over 20,000 waterfowl and waders (SPA/Ramsar). With the current design of the desalination plant and pipeline there is no direct landtake from the European/Nationally designated sites. However, the arable fields to the east of the SPA/Ramsar and the marshland to the north of the SPA/Ramsar, those which the desalination plant and pipelines are built in and through may act as functionally linked land for roosting and feeding of the SPA/Ramsar designated species during high tide. The permanent loss of this land to the desalination plant and during the construction of the pipeline may cause a significant adverse effect on the populations which may use this land during high tide. In addition to the potential loss of functional land, the pipeline is only 17m from the designated sites. Due to the low lying open nature of the land it is likely that the construction of the pipeline could cause disturbance to the birds for which the SPA/Ramsar is designated. During the summer this may be breeding little terns and in the winter this may be passage or wintering waterfowl and waders. Causing disturbance to these birds is likely to cause abandonment of eggs (terns) or over expenditure of energy resulting in higher mortality rates (wintering/ passage waterfowl and waders). Finally the pipeline appears to be crossing several streams/ water bodies across the north east of the designated sites, this has the potential to cause changes in water quality during the construction through pollution and also potential hydrological changes to the habitats immediately south east of the pipeline. The desalination plant is 4.5km from Blackwater, Crouch, Roach and Colne Estuaries Marine Conservation Zone	?

														(MCZ). It is considered that elevated salinity concentrations can arise in the estuarine water body due to the discharge of the treatment process wastewater which can contain a high saline content. As such there is the potential for impacts on coastal designated sites. Adverse effects could result from impingement and entrainment at intake pipe, hypersaline discharge impacts, thermal discharge, source of discharge and timing of discharge. While the scheme is a considerable distance from the MCZ, the need for further discussion of the potential impacts of construction/operational disturbance may still be required.	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		High	Low	Medium term (5 - 25 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	Moderate	The desalination plant and the pipeline should avoid priority habitats and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed.	-2	0	The landtake for the construction of the desalination plant and the pipeline will occur outside of the SAC/SPA/Ramsar/SSSI/NNR, however there is the potential that the arable fields to the east of the SPA and marshland to the north of the SPA where the construction will take place could potentially be functionally linked land to the SPA/Ramsar site which is designated for wintering populations and assemblages of waterfowl and waders. The species for which the site is designated may use the arable fields at high tide for roosting or foraging. The permanent loss of this land could have an effect on the species for which the SPA/Ramsar is designated. In addition to the potential loss of functional land, the pipeline is only 17m from the designated sites. Due to the low lying open nature of the land it is likely that the construction of the pipeline could cause disturbance to the birds for which the SPA/Ramsar is designated. During the summer this may be breeding little terns and the winter this may be passage or wintering waterfowl and waders. Causing disturbance to these birds is likely to cause abandonment of eggs (terns) or over expenditure of energy resulting in higher mortality rates (wintering/ passage waterfowl and waders). Saltmarsh is a priority habitat within itself and construction through it could alter the hydrology and therefore the species composition of this habitat. In addition, the current indicative construction route, for the pipeline, bisects several ponds, streams and field drains. Construction through these features is likely to have an effect on water quality, water flow and changes in the hydrology of the features and the surrounding areas. There is also the potential to cause hydrological changes to important and protected habitats and changes to species composition downstream within the SAC/SPA/Ramsar/SSSI/NNR. This has the potential to cause a loss of the food plant hogs fennel, on which the fisher's estuarine moth depends.	
	5.c. Impact on non-native species?		?	?	?	?	?	?	?	?	INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Appropriate filtration systems should be in place to ensure that the scheme does not lead to the spread of INNS. Treatment at the new WTW would help to prevent any INNS being transferred any further. INNS risk assessment and ecological surveys will be required to inform the detailed design stage. Any INNS should be identified and removed in advance of any construction as per standard construction practice. The further assessments will inform the development of specific mitigation measures to avoid	?	?	The option will result in the transfer of raw water, which has the potential to result in the spread of INNS. It is considered that there is suitable mitigation available to reduce the residual risk of the introduction or spread of INNS as a result of this scheme. These should be explored further at the detailed design stage.	

											the introduction and spread of INNS.				
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	The pipeline route should avoid designated sites and further assessments including more detailed mitigation should be set out at the detailed feasibility stage if this scheme is progressed. This could include ensuring that it is a suitable distance from important habitats.	-2	0	The desalination plant and pipeline are at its closest only 17m from Hamford Waters SSSI. This site is a large and shallow estuarine basin comprising tidal creeks, intertidal mud and sand flats, saltmarshes, etc. The site is designated for breeding Litte Terns and wintering Dark-bellied Brent Geese, wildfowl and waders, and also supports communities of rare coastal plants including Hog's Fennel. With the current design of the desalination plant and pipeline there is no direct landtake from the nationally designated site. The pipeline is only 17m from the designated sites. Due to the low lying open nature of the land it is likely that the construction of the pipeline could cause disturbance to the birds for which the SSSI is utilised. During the summer this may be breeding little terns and in the winter this may be passage or wintering waterfowl and waders. Causing disturbance to these birds is likely to cause abandonment of eggs (terns) or over expenditure of energy resulting in higher mortality rates (wintering/ passage waterfowl and waders). Finally the pipeline appears to be crossing several streams/ water bodies across the north east of the designated site, this has the potential to cause changes in water quality during the construction through pollution and also potential hydrological changes to the habitats immediately south east of the pipeline.	
	5.e. Provide opportunities for biodiversity enhancement?		?	?	?	?	?	?	?	?	N/A	?	?	Potential for enhancements to low quality habitats in the vicinity of the option. Opportunities for biodiversity net gain are not clear at this stage; recommend that these are explored in more detail and the detailed design stage.	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	National	High	A landscape impact assessment may be required to determine the sensitivity of the receiving landscape and potential effects of the option as well as appropriate mitigation measures. This may include screening/planting.	-2	-1	The option requires a new Desalination Plant (near Harwich on the Tendring peninsula). 1km pipeline from the Desalination Plant to the existing network and 2.75km intake pipeline to the Desalination Plant. The Desalinisation Plant is 300m south of the main settlement of Little Oakley. Given the open arable landscape between the Desalinisation Plant and the residential area it is considered that residents may be affected during construction and operation of the Desalinisation Plant. Moderate negative effects anticipated in this respect. Construction of the pipeline could affect a significant number of local residents and recreation users, being located adjacent to the Essex Way promoted route. Short-term temporary minor negative effects are predicted during construction. However, once the pipeline has been buried and	-1

														land reinstated it is predicted that there will be a residual neutral effect during operation for the pipeline.	
	6.b. Provide opportunities for landscape enhancement?	?	?	?	?	?	?	?	?	N/A	?	?	At this stage it is not clear if there are any opportunities for landscape enhancements. These should be explored at the detailed design stage.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	Low	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	0	0	There is the potential for minor negative effects on local air quality during construction but these are unlikely to be significant given that the route does not pass through any AQMAs. There are unlikely to be any significant impacts on local air quality during operation.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Permanent	Permanent	Regional	Moderate	Design and construction methods should follow sustainable design principles.	-2	-2	This scheme involves a new desalinisation plant, mains laying and installation of surge vessel and booster pumps. This will require extensive construction works which will result in an increase of energy use. Desalinisation plant, plus transfer main and pumps will result in considerable electricity demand for operation. Construction and operational activities are therefore likely to increase Affinity Water's carbon footprint.	-2
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	1	Predicted climatic changes in England include hotter and drier summers. This option provides a 15.00Ml/d storage capacity.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 - 25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Design and construction methods should follow sustainable design principles.	0	-1	Further abstraction may have a negative effect on the environment if not properly monitored and licensed, the pipeline is not likely to have permanent adverse effects.	-1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Regional	Low	Best practice construction.	-1	0	Several drains, streams and ponds are bisected with the current indicative route for the pipeline construction. No details for construction methodology are currently available however, there is the potential to cause an impact through changes in water quality and water flow within these water bodies and downstream should these features be bisected with the pipeline construction. Neutral effect during operation anticipated.	-1

	10. b. Improve water treatment and water quality before it returns to surface water bodies?	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Regional	Low	WFD assessment may be required.	-1	-1	WFD assessments highlights option located in proximity of Ramsey River. Temporary and localized dewatering may be required along the route of the new mains or for the plant foundations construction. Abstracted water returned to ground or surface water where possible. Creation of new preferential pathways into aquifer due to below ground workings. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoPC and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts predicted.	
	10.c. Alter water table levels and amount of water within aquifers?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best practice construction.	0	0	WFD assessment states temporary and localised dewatering may be required along the route of new mains or at the site of the new treatment works. Abstracted water returned to groundwater or adjacent surface waters. Underground mains or foundations may disrupt groundwater flow depending on the depth and cause minor obstruction to groundwater flows causing localised mounding. Local or temporary effects. No change in status predicted.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	Low	Moderate	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best practice construction.	0	0	WFD assessment states that temporary dewatering for construction may draw in poorer quality saline water. However, likely to be minor and local. Abstraction during operations would be carefully monitored to understand impact on water levels in water bodies.	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	Low	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Temporary	Local	High	Best practice construction. Hydrogeological survey to confirm groundwater interaction with surface water and monitoring of groundwater levels in the groundwater body.	0	0	Abstraction may have a negative effect if not properly monitored and licenced. WFD assessment states underground mains may disrupt groundwater flow and cause minor abstraction to groundwater flow causing localised mounding. Local/temporary effects anticipated. No change in water status predicted.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option will not lead to loss of floodplain or significantly increase surface water run off.	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		High	Low	Short term (< 5 years)	Medium term (5 - 25 years) to Long term (>25 years)	Temporary	Permanent	Local	Moderate	Heritage impact assessment should be carried out to determine the effect of the pipeline and in particular the new reservoir on designated heritage assets.	-2	-1	There is potential for moderate negative effects during the construction phase as a result of impacts on the setting of Listed Buildings in Little Oakley. However, burial of the pipeline and appropriate reinstatement of any land affected should ensure that moderate negative effects are short-term, temporary and not experienced during the operational phase. The Desalinisation Plant is 320m from the Scheduled Monument and within 500m of five listed buildings located within Little Oakley, predominately along Harwich Road. These are: - Foulton Hall Farm House - Grape Vine Cottages - K6 Telephone Kiosk outside Post Office - Cherry Tree Cottage - Barn Cottages The new Desalination Plant will likely be visible from the Scheduled Monument and listed buildings so there is the potential for negative effects during construction and operation. As above, mitigation measures such as screening/planting could reduce the residual effect during operational phase; however, this is uncertain at this stage. Further assessments are likely to be required.	-1
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Further investigation may need to be carried out. This may include a full archaeological survey on site to determine the location of potential unknown archaeological assets.	0	0	At this stage it is not considered likely that any water dependent heritage assets would be significantly affected.	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	High	Mitigation measures should include full re-instatement of any land or soil affected by construction.	-1	0	The pipeline and desalinisation plant cross an area of grade 2 agricultural land. Therefore short term negative effects are expected resulting from loss of top soil during construction phase. However, appropriate re-instatement and mitigation measures should result in this effect being temporary.	0

8. Demand

8.1.1.1 WEFF901

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves a comprehensive household water audit and retrofit. No impact on health or hygiene is anticipated but some people will incur disruption from audit visit. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Water efficient devices should held to reduce water usage during operational phase, and therefore contribute to a lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option involves a comprehensive household water audit and retrofit. Improving water efficiency and reducing PCC would have a positive by helping to reduce pressure on water resources and also help to reduce costs.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No - option requires new Water Efficient devises. These are not expected to involve significant construction.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effect on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will protect water levels.	1

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.2 WEFF569

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option would involve installation of water efficient devices and householders encouraged to change water-use behaviour by provision of water efficiency information. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Water efficient devices should held to reduce water usage during operational phase, and therefore contribute to a lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option would involve installation of water efficient devices and householders encouraged to change water-use behaviour by provision of water efficiency information. No impact on health or hygiene is anticipated but some people will incur disruption from installation. Improving water efficiency and reducing PCC would have a positive by helping to reduce pressure on water resources and also help to reduce costs.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No - option requires new Water Efficient devises. These are not expected to involve significant construction.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate Medium	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand and therefore lowered abstraction. This will have positive effects on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic	13. a. Conserve and/or enhance heritage assets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

environment, heritage assets and their settings?	and the historic environment?														
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.3 WEFF1000

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	An analysis of business and water use would be undertaken. This option initially proposes provision of cistern displacement device or dual flush retrofit devices and taps inserts and provision of water use saving information for businesses. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Water efficient devices should held to reduce water usage during operational phase, and therefore contribute to a lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option would involve installation of water efficient devices and businesses encouraged to change water-use behaviour by provision of water efficiency information. No impact on health or hygiene is anticipated but some people will incur disruption from audit visit. Improving water efficiency and reducing PCC would have a positive by helping to reduce pressure on water resources and also help to reduce costs.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No - option requires new Water Efficient devices. These are not expected to involve Signiant construction	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effect on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Water efficient devices should reduce water usage during operational phase, and should contribute to a lowered water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic	13. a. Conserve and/or enhance heritage assets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

environment, heritage assets and their settings?	and the historic environment?														
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.4 WEFF567

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option proposes to target one town/community per year with behavioural change methods to enhance a specific river/and or sustainability reductions. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement as a result of behavioural change. Behavioural change could held to reduce water usage during operational phase, and therefore contribute to a lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option is proposed to target one town/community per year with behavioural change methods to enhance a specific river/and or sustainability reductions. No impact on health or hygiene is anticipated but some people will incur disruption from visit. Improving water efficiency and reducing PCC would have a positive by helping to reduce pressure on water resources and also help to reduce costs.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Behavioural changes should help to reduce water usage during operational phase, and could contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Behavioural changes should help to reduce water usage during operational phase, and could contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effect on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Behavioural changes should reduce water usage during operational phase, and could contribute to a lowered water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Behavioural changes should reduce water usage during operational phase, and could contribute to a lowered water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.5 WEFF990

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	AFW would liaise with developers and cover the marginal cost of more water-efficient fittings and/or greywater/rainwater harvesting systems as part of new developments. This option would be implemented at the start of the planning period (assuming some preliminary development is carried out during this AMP), as a measure to help meet the PCC target. Option will have positive effects as improved water efficiency and lower PCC will help to reduce pressure on water resources and improve resilience.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Improving water efficiency in new homes and reducing PCC would have a positive by helping to reduce pressure on water resources and also help to reduce costs.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No – option seeks to improve the water efficiency of new development.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Given that the development will already taking place this option will not have any impacts.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Development will already be occurring therefore no impacts expected during construction phase. Potential for a carbon saving during operation associated with reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will have a positive effect on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

assets and their settings?	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.6 WEFF1050

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option would allow WEFF options that are largely outside of Affinity Water's direct control to be implemented more rapidly leading to earlier savings. This alternative option explores how options that are largely outside of Affinity Water's direct control can be implemented. These include: • Further reductions to WC flush volumes for new WC cistern purchases and installations. • Encouraging further innovation, market transformation and point of sale control for other water using devices in the home; such as automatic dishwashers, washing machines, low water use showers, recycling showers, and low flow taps. • Encouraging wide spread behaviour change of water using habits and practice • Building control to deliver water efficient new homes. • Planning control to support water efficient or water neutral developments Option will have positive effects as improved water efficiency and lower PCC will help to reduce pressure on water resources and improve resilience.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Improving water efficiency and reducing PCC will have a positive by helping to reduce pressure on water resources and also help to reduce costs for customers.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Given that the development will already taking place this option will not have any impacts.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Potential for a carbon saving during operation associated with reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will have a positive effect on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Improved water efficiency and reduced PCC will reduce water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.7 MET904

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves all customers having fixed network meters installed to reach 90% meter penetration. No impact on health or hygiene is anticipated but some people will incur disruption from visit to install meter. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Water meters should help to reduce PCC during operational phase, and therefore contribute to a lower water demand. This could result in an overall positive operational effect for objectives 1, 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The installation of meters will help to reduce PCC and have a positive by helping to reduce pressure on water resources. Some people will save money through metered bills; others may pay more.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No installation of water meters will not have impacts.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	2	Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Installing meters will help to reduce PCC. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Installing meters will help to reduce PCC. This will have a positive effect on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Installing meters will help to reduce PCC and should contribute to a lowered water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Installing meters will help to reduce PCC and should contribute to a lowered water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

assets and their settings?	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.8 MET1002

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	
			Probability		Duration		Permanence					Con	Opp		Worst case operation effect
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves conversion of AMR drive by to a fixed network. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Metering could reduce water usage during operational phase, and therefore lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option involves a fixed network of compulsory metering. There will be disturbance for customers with internal meters. There will be no disturbance for meters will be installed in boundary boxes already in pavement in front of properties. Some people will save money through metered bills; others may pay more.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	2	Delivery of the service entails travel to participating properties which will generate some emissions associated with installation and embodied carbon footprint of meters and boundary boxes. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement. Furthermore, reduced carbon emissions during operational phase due to meters being read remotely.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should reduce water usage during operational phase, and could contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during operational phase, and could contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effects on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	(e.g. due to additional areas of hard standing)?														
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.9 MET186

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option would involve Affinity Water changing its policy to enforce the installation of meters when unmetered properties change ownership using existing powers under the Water Industry Act 1991. This option could be applied in a targeted manner if appropriate. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Metering could reduce water usage during operational phase, and therefore lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option involves a fixed network of compulsory metering. There will be disturbance for customers with internal meters. There will be no disturbance for meters will be installed in boundary boxes already in pavement in front of properties. Some people will save money through metered bills; others may pay more.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	N/A	-1	2	Delivery of the service entails travel to participating properties which will generate some emissions associated with installation and embodied carbon footprint of meters and boundary boxes. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should reduce water usage during operational phase, and could contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during operational phase, and could contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effects on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.10 MET531

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option is to enforce existing powers and to install meters for 8,500 of unmeasured non-household properties in the supply area. This option could be applied in a targeted manner if appropriate. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Metering could reduce water usage during operational phase, and therefore lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option involves a fixed network of compulsory metering. There will be disturbance for customers with internal meters. There will be no disturbance for meters will be installed in boundary boxes already in pavement in front of properties. Some people will save money through metered bills; others may pay more.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	2	Delivery of the service entails travel to participating properties which will generate some emissions associated with installation and embodied carbon footprint of meters and boundary boxes. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should reduce water usage during operational phase, and could contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during operational phase, and could contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effects on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

assets and their settings?	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.11 MET1010

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves a fixed network of metering in WRZ4 and WRZ6. Delivery of the service entails travel to participating properties which will generate some emissions. Careful operation of scheme can minimise these. However, there is a medium term carbon saving associated with the reduced water requirement. Metering could reduce water usage during operational phase, and therefore lower water demand. This could result in an overall positive operational effect for objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	This option involves a fixed network of metering in WRZ4 and WRZ6. There will be disturbance for customers with internal meters. There will be no disturbance for meters will be installed in boundary boxes already in pavement in front of properties. Some people will save money through metered bills; others may pay more.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Minimal waste associated with this option.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Delivery of the service entails travel to participating properties which will generate some emission. Careful operation of scheme can minimise these.	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		Moderate	Moderate	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	2	Delivery of the service entails travel to participating properties which will generate some emissions associated with installation and embodied carbon footprint of meters and boundary boxes. Careful operation of scheme can minimise these. However there is a medium term carbon saving associated with the reduced water requirement.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should reduce water usage during operational phase, and could contribute to a lowered water demand. This will contribute to Affinity's resilience to a changing climate.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during operational phase, and could contribute to a lowered water demand and therefore lowered abstraction. This will have a positive effects on the local environment and affinity assets with regards to climate change adaptation.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	N/A	Moderate	N/A	0	1	Metering should help to reduce water usage during the operational phase, and could contribute to a lower water demand. This will protect water levels.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

assets and their settings?	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.12 REUSE620

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves the implementation of a rainwater harvesting system in Luton Airport Terminal and Hangar Buildings. It would require Installation of free standing rainwater tanks at optimal collection points across Luton site. However a further study is required to establish the detailed design. The Public not be affected by tank installation or operation with no interruption to supply. The option Utilises rainwater, an otherwise wasted resource, and will therefore have positive effects for objective 4. There will be an associated reduction in carbon output and mains water usage which corresponds to positive operational phase effects for objectives 8,9,10,11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Public not affected by tank installation or operation with no interruption to supply	0
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires installation of polyethylene rainwater tanks - not considered to be a significant effect.	0
	4.b. Result in higher levels of reuse of waste?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Rather than waiting for rainwater to enter catchment water resources and then require treatment and pumping through the mains system, the option instead utilises rainwater directly at the source. This should result in a reduced material consumption and generation of waste.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be embodied carbon in a polyethylene rainwater tank and operational carbon. However, Carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in significant carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.13 REUSE621

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves surface water reuse (Luton Airport). It will make use of water coming from run-off and will be collected into central drainage pipework, then reaccepted in a contact tank, then treated via Reed Beds Filter and finally stored in a tank. This water would be used for non-potable usage such as toilet flushing and ground surface cleaning. Further study required to establish the scale of the project. Public not affected by capture and reticulation. The option utilises rainwater, an otherwise wasted resource, and will therefore have positive effects for SEA objective 4. There will be an associated reduction in carbon output and mains water usage which corresponds to positive operational phase effects for SEA objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Public not affected by capture and reticulation	0
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires excavation and installation of new reticulation network as earth materials can be recycled this is not considered to be a significant effect.	0
	4.b. Result in higher levels of reuse of waste?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Rather than waiting for rainwater to enter catchment water resources and then require treatment and pumping through the mains system, the option instead utilises rainwater directly at the source. This should result in a reduced material consumption and generation of waste.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be embodied carbon in the excavation and installation of new reticulation network and operational carbon. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in significant carbon savings.	1	
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.		
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1	
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	
13. Conserve and enhance the historic	13. a. Conserve and/or enhance heritage assets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	

environment, heritage assets and their settings?	and the historic environment?														
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.14 REUSE606

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Exploratory option involving water recycling within Stansted airport's facility. The recycled water would come from greywater and/or surface waters. Currently rainwater run off flows into series of onsite balancing pond. The option requires storage ponds, detention ponds, roof runoff directed to swales and surface water optimisation and capture investigation. Further study required to establish savings and detailed design. Public not affected by capture and recycling. The option utilises rainwater, an otherwise wasted resource, and will therefore have positive effects for SEA objective 4. There will be an associated reduction in carbon output and mains water usage which corresponds to positive operational phase effects for SEA objectives 8 ,9, 10, 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Public not affected by capture and recycling system.	0
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires excavation and installation of new recycling system as earth materials can be recycled this is not considered to be a significant effect.	0
	4.b. Result in higher levels of reuse of waste?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Rather than waiting for rainwater to enter catchment water resources and then require treatment and pumping through the mains system, the option instead utilises rainwater directly at the source. This should result in a reduced material consumption and generation of waste.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape	6.a. Impact views from public rights of way, designated landscapes,		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

character and visual amenity?	parks or other valued places?														
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be embodied carbon in the excavation and installation of new recycling system and operational carbon. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in significant carbon savings.	1	
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.		
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1	
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.		
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0	

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.15 REUSE603

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This is a speculative option to fit rainwater recycling system (with dual reticulation network) in a new housing development, at a community scale. After basic disinfection, the rainwater used for toilet flushing, clothes washing and outdoor use. House prices may be higher on development to recover initial outlay cost by developer. Therefore, there is expected to be a negative effect on SEA objective 1. The option utilises rainwater, an otherwise wasted resource, and will therefore have positive effects for SEA objective 4. There will be an associated reduction in carbon output and mains water usage which corresponds to positive operational phase effects for SEA objectives 8, 9, 10 and 11.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	House prices may be higher on development to recover initial outlay cost by developer.	-1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	Moderate	N/A	0	-1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The option requires construction and installation of new reticulation network. However, this is not considered to be a significant effect.	0
	4.b. Result in higher levels of reuse of waste?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Rather than waiting for rainwater to enter catchment water resources and then require treatment and pumping through the mains system, the option instead utilises rainwater directly at the source. This should result in a reduced material consumption and generation of waste.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be embodied carbon in construction and installation of new reticulation network. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in significant carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Utilising rainwater, an otherwise wasted resource will result in a reduction in the mains water requirement over the operational phase. This should alleviate pressure from water resources in the supply area.	1

12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.16 LE637

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option involves leak reduction through greater ALC. Carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings. Additionally, this water saving over the operational phase will maximise both Affinity Water's and the local environment's resilience to climate change and the associated decrease in water availability. This will result in positive effects for SEA objectives 8 and 9.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	0	1	Carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		0

8.1.1.17 LE423

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option requires installation of new PRVs to attain leakage reductions. There will be short term increase in the carbon footprint associated with the installation of the new PRV's. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9 during operation.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Leakage reductions will have a positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the installation of the new PRV's. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.18 LE424

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This option requires installation of new pressure reducing valves to attain leakage reductions. There will be short term increase in the carbon footprint associated with the installation of the new pressure reducing valves. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Leakage reductions will have a positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the installation of the new pressure reducing vales. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A		0

8.1.1.19 LE1011

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires installation of new trunk mains equipment and replacement of some existing equipment. There will be short term increase in the carbon footprint associated with the installation of the new equipment. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Leakage reduction will have a positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the installation of the equipment. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.20 LE1008

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires renewal of communication pipes. There will be short term increase in the carbon footprint associated with the installation of the new equipment. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9. There may be some supply disruptions during construction which will result in a negative construction phase effect for SEA objective 1. There is also likely to be a minor negative construction phase effect for objective 3 due to pedestrian and vehicle delays as a result of construction activities.	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There may be some supply disruptions during construction. Leakage reductions have the potential for a positive effect in the longer-term	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Impact to pedestrian and vehicle delays are considered likely during construction. However, assuming appropriate reinstatement there should be no negative effects during operation.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on biodiversity during construction but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	6.b. Provide opportunities for landscape enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the installation of the equipment. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on the historic environment during construction but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.21 LE1012

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires renewal of selected DMAs. There will be a short term increase in the carbon footprint associated with the installation of the new equipment. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9. There may be some supply disruptions during construction which will result in a negative construction phase effect for SEA objective 1. There is also likely to be minor negative construction phase effects for SEA objective 3 due to pedestrian and vehicle delays as a result of construction activities.	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There may be some supply disruptions during construction. Leakage reductions could have a positive effect during operation.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Impact to pedestrian and vehicle delays are considered likely during construction. However, assuming appropriate reinstatement there should be no negative operational phase effects.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on biodiversity during construction but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	6.b. Provide opportunities for landscape enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the installation of the equipment. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on the historic environment during construction but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.22 LE1009

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires complete renewal of DMAs. There will be a short term increase in the carbon footprint associated with the installation of the new equipment. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9. There may be some supply disruptions during construction which will result in a negative construction phase effect for SEA objective 1. There is also likely to be minor negative construction phase effects for SEA objective 3 due to pedestrian and vehicle delays as a result of construction activities .	High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	N/A	-1	0	There may be some supply disruptions during construction. Leakage reductions could have a positive effect during operation.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Impact to pedestrian and vehicle delays are considered likely during construction. However, assuming appropriate reinstatement there should be no operational phase effects.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on biodiversity during construction but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	6.b. Provide opportunities for landscape enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the installation of the equipment. However, carbon savings related to the reduction in the volume of water supplied and therefore reduced pumping / heating requirements over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on the historic environment during construction but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.23 LE1007

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires enhanced SP repair policy. There will be a minor increase in the carbon footprint associated with travel for home visits. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9. There may be some supply disruptions during construction which will result in a negative construction phase effect for SEA objective 1. There is also likely to be minor negative construction phase effects for SEA objective 3 due to pedestrian and vehicle delays as a result of construction activities.	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	N/A	-1	0	There may be some supply disruptions during construction. Leakage reductions could have a positive effect during operation.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Impact to pedestrian and vehicle delays are considered likely during construction. However, assuming appropriate reinstatement there should be no operational phase effects.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on biodiversity during construction but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects are neutral. Element of uncertainty as the location is unknown at this stage.	0
	6.b. Provide opportunities for landscape enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be a short term increase in the carbon footprint associated with home visits for the home visits. However, the associated carbon savings associated with the reduced water and pumping requirements should outweigh this effect during operation.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on the historic environment during construction but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.24 LE955

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires reduction in DMA size in Zone R07 only. Impact to pedestrian and vehicle delays are considered likely during construction, and will periodically reoccur every 10 years. There will be negative effects against SEA objective 3a for both construction and operation. However, assuming appropriate reinstatement there should be no operational phase effects between these installations. There will be short term increase in the carbon footprint associated with the additional energy required for the loggers and meters. However, carbon savings related to the reduction in the volume of water supplied over operational phase should result in carbon savings. This will result in positive effects for SEA objectives 8 and 9.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Leakage reductions could have a positive effect during operation.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	-1	Pedestrian and vehicle delays are considered likely during construction, and will periodically reoccur every 10 years. However, assuming appropriate reinstatement there should be no operational phase effects between these installations.	-1
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0	Potential for an impact on biodiversity during construction and operation but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual negative effects are neutral.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term	Temporary	Temporary	?	?	N/A	0	0		

				(>25 years)										
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction and operation but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual negative effects are neutral.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the additional energy required for the loggers and meters. However, carbon savings related to the reduction in the volume of water supplied over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0	Potential for an impact on the historic environment during construction and operation but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual negative effects are neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.25 LE1006

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires reduction in DMA size in Zone R08 only. Impact to pedestrian and vehicle delays are considered likely during construction, and will periodically reoccur every 10 years. There will be negative effects against SEA objective 3a for both construction and operation. However, assuming appropriate reinstatement there should be no operational phase effects between these installations. There will be short term increase in the carbon footprint associated with the additional energy required for the loggers and meters. However, carbon savings related to the reduction in the volume of water supplied over operational phase should result in carbon savings. This will result in positive effects for SEA objectives 8 and 9.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Leakage reductions could have a positive effects during operation.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	-1	Impact to pedestrian and vehicle delays are considered likely during construction, and will periodically reoccur every 10 years. However, assuming appropriate reinstatement there should be no operational phase effects between these installations.	-1
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0	Potential for an impact on biodiversity during construction and operation but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual negative effects are neutral.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term	Temporary	Temporary	?	?	N/A	0	0		

				(>25 years)										
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction and operation but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual negative effects are neutral.	0
	6.b. Provide opportunities for landscape enhancement?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be short term increase in the carbon footprint associated with the additional energy required for the loggers and meters. However, carbon savings related to the reduction in the volume of water supplied over operational phase should result in carbon savings.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0	Potential for an impact on the historic environment during construction and operation but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual negative effects are neutral.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	?	?	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

8.1.1.26 LE1010

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst case operational effect
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The option requires enhanced use of WSP meters. There will be a short term increase in the carbon footprint associated with the installation of the new equipment. However, there should be associated carbon savings associated with the reduced water and pumping requirements. This will result in positive effects for SEA objectives 8 and 9. There may be some supply disruptions during construction which will result in a negative construction phase effect for SEA objective 1. There is also likely to be minor negative construction phase effects for SEA objective 3 due to pedestrian and vehicle delays as a result of construction activities.	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Local	Moderate	N/A	-1	0	There may be some supply disruptions during construction. Leakage reductions could have a positive effect during operation.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		High	N/A	Short term (< 5 years)	N/A	Temporary	N/A	Local	Moderate	Mitigation measures should include creation of road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours. The phased delivery of infrastructure will also help to minimise impacts.	-1	0	Impact to pedestrian and vehicle delays are considered likely during construction. However, assuming appropriate reinstatement there should be no operational phase effects.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on biodiversity during construction but the location of works is not known at this stage. It is assumed that designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.c. Impact on non-native species?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
	5.e. Provide opportunities for biodiversity enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on landscape/townscape during construction but the location of works is not known at this stage. It is assumed that the designated sites for biodiversity can be avoided and suitable mitigation is available to ensure that any residual effects are neutral. Element of uncertainty as the location is unknown at this stage.	0
	6.b. Provide opportunities for landscape enhancement?	?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	High	High	Short term (< 5 years)	Medium term (5 -25 years) to Long term (>25 years)	Temporary	Temporary	Regional	Moderate	Construction and operation activities should follow sustainable design principles.	-1	1	There will be a short term increase in the carbon footprint associated with home visits for the home visits. However, the associated carbon savings associated with the reduced water and pumping requirements should outweigh this effect during operation.	1
	8.b. Maximise the company's resilience to a changing climate?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This will maximise the company's resilience to climate change and the associated decrease in water availability.	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in water requirement should result in water savings over the operational phase. This should reduce the overall impact of Affinity Water's activities on the local environment and therefore help boost the environment's resilience to the effects of climate change.	1
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	Reduction in the volume of water lost to leakage should result in water savings over the operational phase. This should alleviate pressure from water resources in the supply area.	1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0	Potential for an impact on the historic environment during construction but the location of works is not known at this stage. It is assumed that the designated sites for heritage can be avoided and suitable mitigation is available to ensure that any residual effects during construction are neutral. Element of uncertainty as the location is unknown at this stage.	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		?	N/A	Short term (< 5 years)	N/A	Temporary	N/A	?	?	N/A	0	0		0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9. Drought

9.1.1.1 AMER

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD score
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme is an Affinity Water drought permit to increase abstraction temporarily to meet the pre sustainability reductions peak DO of 12 Ml/d (and potentially average DO of 7 Ml/d). This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect. Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily. Minor negative operational phase effects are predicted for objectives 10 and 11 as reduction in water volume is expected, which may affect quality but effect should be minor compared to natural drought impacts.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Low flows are well known to residents at present. Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Low flows are well known to residents at present. Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required.	0	-1	Increased abstraction has the potential to impact upon chalk river priority habitat. Impacts to species expected from natural drought conditions will be exacerbated by abstraction. These effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use). Minor negative effects predicted during operation.	
	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	1
	6.b. Provide opportunities for landscape enhancement?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use under extreme drought).	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use under extreme drought).	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.2 HUNT

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD score
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This scheme represents the use of a drought permit (e.g. once every 50 to 75 years) where the flow constraint on the Gaddesden Group Licence would be lifted, allowing an increase in abstraction to the full unconstrained licensed volume of 12 Ml/d. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.91Ml/d equates to a minor positive effect. Minor positive effect also predicted against SA Objective 6 as a result of morphological improvements which will improve the local landscape immediately adjacent to the river. Minor negative operational phase effects are predicted for objectives 10 and 11 as reduction in water volume is expected, which may affect quality but effect should be minor compared to natural drought impacts.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.91Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Low flows are well known to residents at present. Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Low flows are well known to residents at present. Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Impacts to species expected from natural drought conditions, will be exacerbated by abstraction but these effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use).	

	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river.	1
	6.b. Provide opportunities for landscape enhancement?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river. I	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use under extreme drought).	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use under extreme drought).	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.3 BOWB

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The Bowbridge licence was revoked as part of the AMP6 sustainability reductions in 2016. This scheme is to implement a drought permit to temporarily reinstate abstraction of 5.82 Ml/d from the Bowbridge source. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5.82Ml/d equates to a minor positive effect. Minor positive effect also predicted against SA Objective 6 as a result of morphological improvements which will improve the local landscape immediately adjacent to the river. Minor negative effect for SA Objective 8 predicted as increased abstraction will use more energy; however, not considered significant as the scheme will only operate for a limited period of time. Minor negative operational phase effects are predicted for objectives 10 and 11 as reduction in water volume is expected, which may affect quality but effect should be minor compared to natural drought impacts.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5.82Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Impacts to species expected from natural drought conditions, will be exacerbated by abstraction but these effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use).	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river.	1
	6.b. Provide opportunities for landscape enhancement?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	Moderate	N/A	Long term >25 years	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use under extreme drought).	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use under extreme drought).	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.4 HUGH

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The licence for the Hughenden source was revoked in April 2017 as part of Affinity Water's Sustainability Reductions. A drought permit will be required to bring HUGH back into supply under severe drought (e.g. once every 50 to 75 years), with the target of abstracting the Peak demand Deployable Output rate of 1.75 Ml/d. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5.82Ml/d equates to a minor positive effect. Minor negative effect for SA Objective 8 predicted as increased abstraction will use more energy; however, not considered significant as the scheme will only operate for a limited period of time. Minor negative operational phase effects are predicted for objectives 10 and 11 as reduction in water volume is expected, which may affect quality but effect should be minor compared to natural drought impacts.	N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5.82Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required.	-1	-1	75 m of pipeline will be needed to connect the borehole to the treatment works. The works lies within 50 m of BAP habitat deciduous woodland. During construction there could be dust or other proximity related construction impacts without mitigation. During operation, increased abstraction has the potential to impact upon chalk river priority habitat. Impacts to species expected from natural drought conditions will be exacerbated by abstraction. These effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use). Minor negative effects predicted during operation.	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No landscape changes in catchment anticipated.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No landscape changes in catchment anticipated.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Low	N/A	Medium term (5 -25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected which may affect quality, but the effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will have no effect on the Hughenden stream. Targets peak-use, which should limit additional drying (although average use is possible).	-1
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected which may affect quality, but the effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will have no effect on the Hughenden stream. Targets peak-use, which should limit additional drying (although average use is possible).	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.5 WHIH

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	This permit is required to temporarily abstract the pre sustainability reduction peak DO of 28 Ml/d, a potential increase of 18 Ml/d. If the drought is prolonged the potential average increase may be 16.18 Ml/d. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 18.18Ml/d equates to a minor positive effect. A minor positive effect is predicted for objective 6 as morphological improvements are ongoing which will improve drought resilience and reduce the impact on the riverine habitat from drought and operation of the scheme. Improvements expected to be noted throughout Beane valley. A minor negative effect is predicted for objective 8 as increased abstraction will use more energy but not considered significant as the scheme will only target peak demand period. Minor negative operational phase effects are predicted for objectives 10 and 11 as reduction in water volume is expected, which may affect quality but effect should be minor compared to natural drought impacts.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 18.18Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted which should limit additional drying (although potential for prolonged operation under extreme drought). There is the potential for disturbance (noise, light, dust etc.) to the Dane End Tributary during the construction works at the Sacombe site. A CEMP should be in place during construction.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.b. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		Low	Moderate	Short term (< 5 years)	Medium term (5-25 years) to Long term (<25 years)	Temporary	Permanent	Local	Moderate	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required.	-1	-1	The Sacombe site is 200m from an area of BAP Priority habitat deciduous woodland, and is located next to the Dane End Tributary. There is also the potential for disturbance to BAP Priority habitat deciduous woodland and river habitats. A CEMP should be in place during construction. During operation, increased abstraction has the potential to impact upon chalk river priority habitat. Impacts to species expected from natural drought conditions will be exacerbated by abstraction. These effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use). Minor negative effects predicted during operation.	
	5.d. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements are ongoing which will improve drought resilience and reduce the impact on the riverine habitat from drought and operation of the scheme. Improvements expected to be noted throughout Beane valley.	1
	6.b. Provide opportunities for landscape enhancement?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements are ongoing which will improve drought resilience and reduce the impact on the riverine habitat from drought and operation of the scheme. Improvements expected to be noted throughout Beane valley.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements are ongoing which will improve drought resilience and reduce the impact on the riverine habitat from drought and operation of the scheme. Improvements expected to be noted throughout Beane valley.	-1
	10. b. Improve water treatment and water quality before it returns to surface water bodies?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?		N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	0	-1	Reduction in water volume expected which may affect quality, but the effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will have no effect on the Hughenden stream. Targets peak-use, which should limit additional drying (although average use is possible).	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	Moderate	N/A	Short term (< 5 years)	N/A	Temporary	Local	High	N/A	-1	-1	Reduction in water volume expected which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted which should limit additional drying (although potential for prolonged operation under extreme drought). There is the potential for disturbance (noise, light, dust etc.) to the Dane End Tributary during the construction works at the Sacombe site. A CEMP should be in place during construction.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.6 FRIA

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD Score
			Probability		Duration		Permanence					Con	Opp		Operational effect (worst case)
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The Friars Wash source has an annual average licence volume of 3.8 Ml/d and retains a peak licence of 15.91 Ml/d post sustainability reductions. By declaring an emergency under the Ver Operating Agreement, Affinity Water can increase the annual average volume to that of the original average licence volume (15.91 Ml/d). Therefore a drought permit application is not required (unlike for other drought plan options). Note that the benefit of the scheme is only 9.79 Ml/d and not 12.11 Ml/d owing to deployable output constraints at the Friars Wash source. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 9.79Ml/d equates to a minor positive effect. Morphological improvements are ongoing which will improve local areas of Landscape in close proximity to the river. Improvements expected to be noted throughout Ver valley. This will result in minor positive operational phase effects for objectives 6 and 10. Increased abstraction will use more energy but not considered significant as the scheme will only target peak demand period, this will however result in a minor negative effect for SEA objective 8.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 9.79Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted which should limit additional drying (although potential for prolonged operation under extreme drought). There is the potential for disturbance (noise, light, dust etc.) to the Dane End Tributary during the construction works at the Sacombe site. A CEMP should be in place during construction.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required.	0	-1	Increased abstraction has the potential to impact upon chalk river priority habitat. Impacts to species expected from natural drought conditions will be exacerbated by abstraction but these effects are considered to be small compared to natural drought conditions. Minor negative effects anticipated during operation.	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	Morphological improvements are ongoing which will improve local areas of Landscape in close proximity to the river. Improvements expected to be noted throughout Ver valley.	1
	6.b. Provide opportunities for landscape enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	Morphological improvements are ongoing which will improve local areas of Landscape in close proximity to the river. Improvements expected to be noted throughout Ver valley.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?		N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?		N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements are ongoing which will improve drought resilience and reduce the impact on the riverine habitat from drought and operation of the scheme. Improvements expected to be noted throughout Beane valley.	0

	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected which may affect quality, but the effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Data from sustainability reductions monitoring suggests little impact on flow from Friars Wash.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected which may affect quality, but the effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Data from sustainability reductions monitoring suggests little impact on flow from Friars Wash.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.7 WELL

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	Worst
			Probability		Duration		Permanence					Con	Opp		
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The Well Head source has a Memorandum of Understanding (MoU) requiring Affinity Water to support flows in the upper River Hiz through augmentation of the Mill Pond. Under extreme drought conditions, Affinity Water would apply for a drought permit to reduce this pond / river support, such that an additional 0.3 Ml/d is available for supply. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.3Ml/d equates to a minor positive effect. No other additional impacts identified.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 0.3Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	
	2.c.. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.e. Provide opportunities for biodiversity enhancement?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0				
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.					
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				
8. Minimise the carbon footprint of the Company?	8.a.Reduce / increase predicted carbon footprint?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A					
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A					
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Augmentation scheme currently is not considered to significantly benefit flows during drought with much augmented water lost to the aquifer, preventing a wetted perimeter to remain continuous downstream. Most impact is therefore natural drought effects.					
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A					
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Drought use only should limit reductions in flow.	0	-1	Option re-directs abstraction for flow augmentation to supply. Potential for reduction in river flow during operation. Drought use only should limit reductions in flow. Taking a precautionary approach the potential for a minor negative effect has been identified during operation.	-1				
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A					
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0				

9.1.1.8 PICC

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Following the 2018 Sustainability Reduction in the catchment, average annual abstraction from Piccotts End will reduce from 15.72 Ml/d to 5.72 Ml/d (i.e. by 10 Ml/d) and the peak daily abstraction will reduce from 15.72 Ml/d to 10.72 Ml/d (i.e. by 5 Ml/d). This scheme is to temporarily increase abstraction at the source by 5 Ml/d under a drought permit. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect. Morphological improvements are ongoing which will improve local areas of Landscape in close proximity to the river. This will result in minor positive effects for objective 6 and 10. Increased abstraction will use more energy but not considered significant as the scheme will only target peak demand period, this will however result in a minor negative effect for SEA objective 8.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 5Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required.	0	-1	Increased abstraction has the potential to impact upon chalk river priority habitat. Impacts to species expected from natural drought conditions will be exacerbated by abstraction. These effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use). Minor negative effects predicted during operation.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	Morphological improvements are ongoing which will improve local areas of Landscape in close proximity to the river.	1
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	Morphological improvements are ongoing which will improve local areas of Landscape in close proximity to the river.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	N/A	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Augmentation scheme currently is not considered to significantly benefit flows during drought with much augmented water lost to the aquifer, preventing a wetted perimeter to remain continuous downstream. Most impact is therefore natural drought effects.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Augmentation scheme currently is not considered to significantly benefit flows during drought with much augmented water lost to the aquifer, preventing a wetted perimeter to remain continuous downstream. Most impact is therefore natural drought effects.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.9 UTTL

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Under the Uttlesford licence, Affinity Water is required to provide a support flow to the River Cam when flows at the Great Chesterford gauging station fall below 12.7 Ml/d. The river support can be up to half of that being taken into supply, with the intention of maintaining a flow of 12.7 Ml/d at the gauging station. By releasing this condition under a drought permit, up to 6 Ml/d of water could be utilised. This scheme is to remove the requirement to augment flows in the River Cam and use this water for additional supply. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 6Ml/d equates to a minor positive effect. A minor negative effect on objective 5 is predicted as there will be impacts to species expected from natural drought conditions, which ordinarily are prevented by augmentation. No change in abstraction but assumed more water in supply network will use more energy but not considered significant as the scheme will largely operate for peak demand (although prolonged use is possible under extreme drought). There will be minor negative effects on option 8 because although there is no change in abstraction it is assumed more water in supply network will use more energy but not considered significant as the scheme will largely operate for peak demand (although prolonged use is possible under extreme drought).	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 6Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	-1	The site is adjacent to an area of BAP Priority habitat deciduous woodland, and the River Cam. However, as no construction is required there is no effect anticipated. However, Impacts to species expected from natural drought conditions, which ordinarily are prevented by augmentation.						
	5.e. Provide opportunities for biodiversity enhancement?	N/A	Medium	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	High	N/A	0	0							
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0					
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A						
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0					
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	No change in abstraction but assumed more water in supply network will use more energy but not considered significant as the scheme will largely operate for peak demand (although prolonged use is possible under extreme drought). No new infrastructure required so neutral effect in the short term.	-1					
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A						
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0					
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0					
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A						
	10.c. Alter water table levels and amount of water within aquifers?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Local	High	N/A	0	0	Significant reduction in water volume expected which may affect quality though this would lead toward more natural drought impacts (i.e. free of flow augmentation).						
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A						
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term	N/A	Temporary	Regional	Moderate	Drought use only should limit reductions in flow.	0	-1	Option re-directs abstraction for flow augmentation to supply. Potential for reduction in river flow during operation. Drought use only should limit reductions in flow. Taking a precautionary approach the	-1					

						(>25 years)								potential for a minor negative effect has been identified during operation.	
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.10 THUN

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Under the licence for the Thundridge source, Affinity Water is required to reduce abstraction from a peak of 11.82 Ml/d to the Licence of Right volumes of 9.09 Ml/d when the river flow condition at Wadesmill Gauging Station is triggered. The option is for a drought permit application to suspend this constraint and permit abstraction at the higher rate of 11.82 Ml/d, regardless of flows in the Rib. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.37Ml/d equates to a minor positive effect. No other effects are predicted.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO provided by the option. 2.37Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	

	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Low	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. AMP study indicates abstraction does not affect flow in the River Rib but groundwater discharges to the River Lee. Drought use only should limit reductions in flow.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. AMP study indicates abstraction does not affect flow in the River Rib but groundwater discharges to the River Lee. Drought use only should limit reductions in flow.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.11 FULL

SEA Objective		Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
				Probability		Duration		Permanence					Con	Opp		Worst
				Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?		1.a. Provide affordable access to clean water adequate to support health?	The licence for the Fulling Mill source is to be revoked in April 2018 as part of the company's sustainability reductions, though Affinity Water intend to cease abstraction from April 2017. A drought permit will be required to bring the source back into supply, abstracting at the historic peak deployable output volume of 9.09 Ml/d. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 9.09 Ml/d equates to a minor positive effect. Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river, and will result in positive effects for options 6 and 10. Increased abstraction will use more energy and will result in a minor negative effect for objective 8 but not considered significant as the scheme will only operate for peak demand.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 9.09 Ml/d equates to a minor positive effect.	1
		1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
		1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.		2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	0
		2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No in-stream activities possible. Flow reductions will be perceived but are the result of drought and not scheme operation.	
		2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?		3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
		3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?		4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
		4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?		5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	-1
		5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

		5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
		5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Moderate	Loss of priority habitat/species should be avoided where possible. If not possible, compensatory habitat may be required.	0	-1	Increased abstraction has the potential to impact upon chalk river priority habitat. Impacts to species expected from natural drought conditions will be exacerbated by abstraction. These effects considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use). Minor negative effects predicted during operation.	
		5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?		6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river.	1
		6.b. Provide opportunities for landscape enhancement?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing which will improve the local landscape immediately adjacent to the river.	
7. Minimise the effects of the option / plan on air quality and noise?		7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?		8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
		8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?		9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?		10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	Local	Low	N/A	0	1	Morphological improvements such as removal of weirs are ongoing. Improvements expected to be noted downstream of Amersham at the Chalfonts primarily.	0
		10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

		10.c. Alter water table levels and amount of water within aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use focus should limit additional drying (although average use is possible in a prolonged drought). Note that modelling also considers the Chalk aquifer to be fully unconfined and possible confining layers from alluvium and boulder clay are not represented.	
		10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?		11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use focus should limit additional drying (although average use is possible in a prolonged drought). Note that modelling also considers the Chalk aquifer to be fully unconfined and possible confining layers from alluvium and boulder clay are not represented.	0
12. Minimise the risk of flooding taking account of climate change?		12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?		13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
		13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?		14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.12 OUGH

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	Licence 6/33/13/11 permits the abstraction of 6.55 Ml/d from Oughton pumping station with a licence condition requiring Affinity Water to support flows in the upper River Oughton when the water level at Oughton Head spring is at or below 57.54 m AOD. The maximum volume of support is 0.45 Ml/d. Licence 6/33/13/9 permits the abstraction of 1.14 Ml/d from Offley Bottom pumping station. At the same trigger described above, Offley has to augment flow by up to 0.55 Ml/d. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 1 Ml/d equates to a minor positive effect. No change in abstraction but assumed more water in supply network will use more energy (but not considered significant as the scheme will only operate for peak demand). This could result in a minor negative effect on objective 8.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 1 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Scheme impact considered not to make a significantly perceptible difference compared to overall natural impact of drought.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	The HRA (2019) for the rdWRMP concluded that there are no identified impact pathways to European sites.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable construction practices	0	-1	Construction and operation activities should follow sustainable design principles.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be minor compared to natural drought impacts. AMP study indicates abstraction does not affect flow in the River Rib but groundwater discharges to the River Lee. Drought use only should limit reductions in flow.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	Drought use only should limit reductions in flow.	0	-1	Option re-directs abstraction for flow augmentation to supply. Potential for reduction in river flow during operation. Drought use only should limit reductions in flow. Taking a precautionary approach the potential for a minor negative effect has been identified during operation.	-1
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

assets and their settings?	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.13 SBUC

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The licence for SBUC applies to that source only and was granted on 31 March 2016 (original issue 30 May 2003). The licence is time limited and expires on 30 March 2028. Licensed rates of abstraction for SBUC are 4 Ml/d average and 6 Ml/d peak. The MoU introduced a low flow condition and Special Condition 9.1 in the licence reduces the rate of abstraction for public water supply purpose to 4 Ml/d whenever the flow in the River Dour, as measured at Crabble Mill, falls below 0.209 cumecs (18.06 Ml/d). Whenever the reduced rate of abstraction is taking place, Affinity Water is required to make a release of 50% of the quantity of water abstracted into the River Dour for augmentation purposes. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 4 Ml/d equates to a minor positive effect. No change in abstraction but assumed more water in supply network will use more energy (but not considered significant as the scheme will only operate for peak demand).	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 4 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate limited connection between river and aquifer in source area and limited additional accretion downstream. Drought use only should limit reductions in flow.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate limited connection between river and aquifer in source area and limited additional accretion downstream. Drought use only should limit reductions in flow.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated	5.a. Impact on European sites?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Impacts to species expected from natural drought conditions, which the option offers limited prevention.	0

and other important habitats and species?	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

assets and their settings?	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.14 SHOL

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The original licence for SHOL was granted on 16 March 1981 and was amended (Amendment 04) on 25 June 2007 to include a low flow condition relating to the River Dour. The licence was then reissued on 7 March 2016 and the condition expires on 21 March 2028. The low flow condition limits abstraction to 2.5 Ml/day when the flow in the River Dour (as measured at Crabble Mill) falls below 0.105 cumecs (11.23 Ml/d). This scheme is to release the flow related restriction to restore normal conditions peak abstraction; an increase of 0.77 Ml/d. In the case of prolonged drought this increase in yield benefit may extend to average conditions. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 4 Ml/d equates to a minor positive effect. No change in abstraction but assumed more water in supply network will use more energy (but not considered significant as the scheme will only operate for peak demand). This could result in a minor negative effect on objective 8.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 0.77 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate limited connection between river and aquifer in source area and limited additional accretion downstream. Groundwater flow from source may actually be toward sea. Drought use only should limit reductions in flow.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate limited connection between river and aquifer in source area and limited additional accretion downstream. Groundwater flow from source may actually be toward sea. Drought use only should limit reductions in flow.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	

5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Impacts to species expected from natural drought conditions, will be exacerbated by abstraction but these effects considered to be small compared to natural drought conditions.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact.	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact.	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

	additional areas of hard standing)?														
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.15 SDRE

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The current licence to abstract water at SDRE was granted on 7 March 2016 (original issue 15 February 1967) and is a group licence covering SLYE, SDRE and SLOW. The group licence is not time-limited. The current licence to abstract water at SDRE is covered by the same group licence detailed above. Licensed rates of abstraction for SDRE are 9 Ml/d average and 10 Ml/d peak. A similar low flow restriction exists and Special Condition I.2 of the MoU reduces the rate of abstraction at SDRE to 8 Ml/d when groundwater levels at Wolverton observation borehole (OBH) is at or below 34.8 mAOD. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 1 Ml/d equates to a minor positive effect.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 1 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate abstraction does not affect flow in the Upper River Dour but may affect lower reaches in River Dour. This can be mitigated by reducing abstraction before drought use if this can be anticipated and draw water from additional aquifer storage during drought should minimise downstream loss of baseflow. Drought use only should limit reductions in flow.	0

	2.b. Alter water levels that affect water-based recreation assets?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate abstraction does not affect flow in the Upper River Dour but may affect lower reaches in River Dour. This can be mitigated by reducing abstraction before drought use if this can be anticipated and draw water from additional aquifer storage during drought should minimise downstream loss of baseflow. Drought use only should limit reductions in flow.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Impacts to species expected from natural drought conditions, will be exacerbated by abstraction but these effects considered to be small compared to natural drought conditions.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1

	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

9.1.1.16 SLYE

SEA Objective	Assessment questions (would the options / programme…?)	Impact Description	Likelihood of effect, taking into account						Scale of impact	Sensitivity of the receptor	Mitigation proposals	Residual effect		Effect Description	EBSD parameters
			Probability		Duration		Permanence					Con	Opp		Worst
			Con	Op	Con	Op	Con	Op							
1. Ensure the availability of adequate supply, and quality, of water to support health and hygiene and the regeneration ambitions of the study area?	1.a. Provide affordable access to clean water adequate to support health?	The current licence to abstract water at SLYE was granted on 7 March 2016 (original issue 15 February 1967) and is a group licence covering SLYE, SDRE and SLOW. The group licence is not time-limited. Licensed rates of abstraction for SLYE are 6 Ml/d Average and 7 Ml/d peak. However the MoU introduced a low flow condition. Special Condition I.2 reduces the rate of abstraction at SLYE to 3.5 Ml/d whenever the Wolverton Observation Borehole (OBH) is at or below 34.8m AOD. This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 2.5 Ml/d equates to a minor positive effect.	N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1	This option will provide positive effects against all Objective 1 sub objectives. The significance of the effect is assessed against the DO (in the focal WRZ) provided by the option. 2.5 Ml/d equates to a minor positive effect.	1
	1.b. Ensure that customers are not disproportionality affected by cost?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
	1.c. Enable the growth ambitions of the study area to be realised?		N/A	High	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Temporary	Regional	Moderate	N/A	0	1		
2. Protect and enhance (and ensure access to) tourism, recreation and amenity facilities.	2.a. Result in increased water-based recreational opportunities or new tourist attractions?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate abstraction does not affect flow in the Upper River Dour but may affect lower reaches in River Dour. This can be mitigated by reducing abstraction before drought use if this can be anticipated and draw water from additional aquifer storage during drought should minimise downstream loss of baseflow. Drought use only should limit reductions in flow.	0
	2.b. Alter water levels that affect water-based recreation assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Reduction in water volume expected, which may affect quality but effect should be small compared to natural drought impacts. Studies indicate abstraction does not affect flow in the Upper River Dour but may affect lower reaches in River Dour. This can be mitigated by reducing abstraction before drought use if this can be anticipated and draw water from additional aquifer storage during drought should minimise downstream loss of baseflow. Drought use only should limit reductions in flow.	
	2.c. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
3. Maintain key infrastructure in support of the local economy?	3.a. Impact on strategic transport infrastructure such as airports, major roads and railway lines?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	

4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	4.b. Result in higher levels of reuse of waste?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Impacts to species expected from natural drought conditions, will be exacerbated by abstraction but these effects considered to be small compared to natural drought conditions.	0
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	5.c. Impact on non-native species?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No conservation sites along river or groundwater dependent sites.	
	5.e. Provide opportunities for biodiversity enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
6. Conserve and enhance landscape character and visual amenity?	6.a. Impact views from public rights of way, designated landscapes, parks or other valued places?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	0
	6.b. Provide opportunities for landscape enhancement?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	No new infrastructure required.	
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?	N/A	Moderate	N/A	Medium term (5 -25 years) to Long term (>25 years)	N/A	Permanent	National	Moderate	Operation activities should follow sustainable design principles.	0	-1	Increased abstraction will use more energy. This is likely to have a negative impact on the carbon footprint of the Company during operation. This not considered significant as the scheme will only operate for a limited period of time. No new infrastructure required so neutral effect in the short term.	-1
	8.b. Maximise the company's resilience to a changing climate?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
9. Adapt to climate change?	9.a. Affect the resilience of the local environment and Affinity Water assets to climate change?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
10. Protect and improve surface and groundwater body status?	10. a. Contribute to the naturalisation of water bodies, for example through the removal of artificial structures or channel modifications?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	10. b. Improve water treatment and water quality before it returns to surface water bodies?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
	10.c. Alter water table levels and amount of water within aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	

11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Drought will worsen flow naturally but scheme will make little perceptible difference to the drought related impact	0
12. Minimise the risk of flooding taking account of climate change?	12.a. Lead to the loss of floodplain and/or potentially increase rates of surface water run-off (e.g. due to additional areas of hard standing)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
13. Conserve and enhance the historic environment, heritage assets and their settings?	13. a. Conserve and/or enhance heritage assets and the historic environment?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	
14. Minimise loss of soil quality and sterilisation of mineral resources?	14. a. Impact upon best and most versatile agricultural land (ALC grades 1 – 2)?		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0

Appendix VI: Cumulative effects

Introduction

This appendix sets out the method and findings of the cumulative effects assessment for the reasonable alternative programmes and the rdWRMP preferred programme identified through Affinity Water's programme appraisal stage.

Method

The approach and method used for the cumulative effects assessment (CEA) is in line with the regional approach to CEA proposed by Water Resources South East (WRSE) group. A regional approach to CEA was explored by WRSE in response to some short comings in the SEAs of WRMPs produced in 2014 identified by consultees and also with the aim of supporting an improved approach for the next round of WRMPs (2019). The study published in early 2017 and updated in 2018, sets out a systematic procedure for identifying and evaluating the risk of cumulative effects.[107]

The CEA focuses on supply schemes as they have specific locations and are most likely to result in cumulative significant effects. Proposed demand management schemes are non-site specific and the assessment (see Chapter 4 of the Environmental Report) found that they are unlikely to result in a significant negative effect. Overall, they are more likely to have a significant cumulative positive effect with the supply side options by helping to balance the supply demand deficit and reduce water use. This approach is supported through the WRSE work on cumulative effects and there is recognition that there is the potential at a regional scale for beneficial cumulative effects arising as a result of demand management options.

In line with the suggested approach by WRSE, the supply schemes under each of the reasonable alternative programmes were screened in order to identify the potential for cumulative effects. Using GIS as well as the findings of the SEA, HRA and WFD assessments for constrained options, an initial screening was carried out to determine if there is the potential for cumulative effects:

1. During construction (are any schemes within 5km of each other and have similar delivery dates);
2. Through hydrological / hydrogeological connectivity:
    a. Hydrological (are schemes affecting the same Water Framework Directive (WFD) surface water body).
    b. Hydrogeological (are schemes affecting the same WFD groundwater body).
3. For high value key receptors; schemes located within or in close proximity to the same high value receptors. In line with the WRSE study, high value receptors are considered to be the following:
    - Biodiversity, flora and fauna:
        - Special Areas of Conservation (SAC) and candidate SACs;
        - Special Protected Area (SPA) candidate SPAs;
        - Ramsar Sites;
        - Sites of Special Scientific Interest (SSSI); and
        - Marine Conservation Zones.
    - Landscape and visual:
        - Areas of Outstanding Natural Beauty (AONB);
        - National Parks; and
        - Heritage Coasts.

A matrix was then produced for each reasonable alternative programme to identify the potential interactions. The key for the interaction matrices is presented below.

Table AVI.1: Interaction key

Key

	Potential adverse construction effects if constructed simultaneously
	Potential effects on same surface or groundwater body
	Potential effects on same high value receptor
	Potential for all of the above
	No cumulative effects

[107] WRSE (2017 and update in 2018) Environmental Information to inform Water Company SEAs - Cumulative Effects Assessment in WRMP SEAs.

Supply schemes are listed on both the x and y axes to allow identification of interactions.

The schemes and interactions highlighted through the initial screening process were then reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)) in terms of cumulative effects related to:

- **Construction** - if schemes were determined to be within 5km of another option and have similar delivery dates, the potential for cumulative effects associated during the construction phase were considered in more detail. This included a consideration of the cumulative effects related to noise, nuisance, traffic and air quality as well as more direct and proximal effects to physical receptors such as heritage assets.
- **Surface or groundwater** - if schemes affect the same WFD surface water or groundwater body and identified through the WFD assessment as having the potential for deterioration in status they were considered in more detail.
- **High value receptors** - if schemes were screened are located within or in close proximity to the same high value receptor.

Following a consideration of the interactions between schemes proposed under each of the programmes, consideration was given to the potential for interactions between the schemes under each programme and those in other WRMPs. WRSE carried out a study to identify potential cumulative effects arising as a result of interactions between schemes being proposed through emerging WRMPs within their area (as at September 2018)[108]. This study has informed the cumulative effects assessment in this Environmental Report

Cumulative effects assessment of reasonable alternative programmes

Affinity Water identified nine reasonable alternative programmes (see Chapter 5 in the main report for further details). These are:

- **LC_2** - This is a least cost run with 2025 targets on leakage and PCC.
- **ATL_1** - This run involved metric scoring, which excluded key demand management options on the basis of risk.
- **DMT_1** - This run explores the utilisation of a relatively high amount of water efficiency schemes.
- **AD_1** - This run contains optimistic demand management savings with an expected supply-side future i.e. no supply side restrictions.
- **AD_2** - This run contains expected levels of demand management savings, and also will not allow any strategic options (Options with +50Ml/d benefit) to be selected. This model run has an otherwise expected supply-side future. This would help to simulate what options would be required if Affinity Water were unable to progress with a strategic option.
- **AD_3** - This run contains low levels of demand management savings, and also will not allow any strategic options (Options with +50Ml/d benefit) to be selected. This would help to simulate what options would be required if Affinity Water were unable to progress with a strategic option.
- **Aspirational Adaptive Run** - This run contains optimistic levels of demand management savings and the expected supply-side future; however, it looks towards long-term ‘stretch’ targets. These targets are a reduction in PCC to 110 l/p/d and a 50% reduction in leakage by 2050.
- **Expected Future Adaptive Run** - This run is Affinity Water’s central, expected future. This contains the levels of demand management option savings that Affinity Water would expect to see, as well as an expected supply-side future, i.e. no restrictions.
- **High Growth Future Adaptive Run** - This run looks to simulate a challenging future by incorporating greater levels of population growth within our forecasts. All of the supply-side options are available, including strategic options (Options with +50Ml/d benefit).
- **Supply-side Challenging Future Adaptive Run** - This run includes expected levels of demand management savings, but is challenging on the supply-side as it looks to simulate greater levels of Sustainability Reductions to determine potential solutions, and the yields of some schemes flagged by Affinity Water’s WFD assessment for the rdWRMP19 have been halved to understand the impact this would have.
- **Optimistic Adaptive Run** - This run is an adaptation of the **Aspirational Adaptive Run** which looks to bring the 50% reduction leakage target forward to 2044/45.
- **Environmental Adaptive Run** - This run is an adaptation of the **Expected Future Adaptive Run** and focuses on minimising environmental effects taking account of the findings of the SEA. Options which are identified in the SEA as having the potential for a moderate (-2) or major negative (-3) effect during operation are not selected for this run[109]. This run includes expected levels of demand management savings.

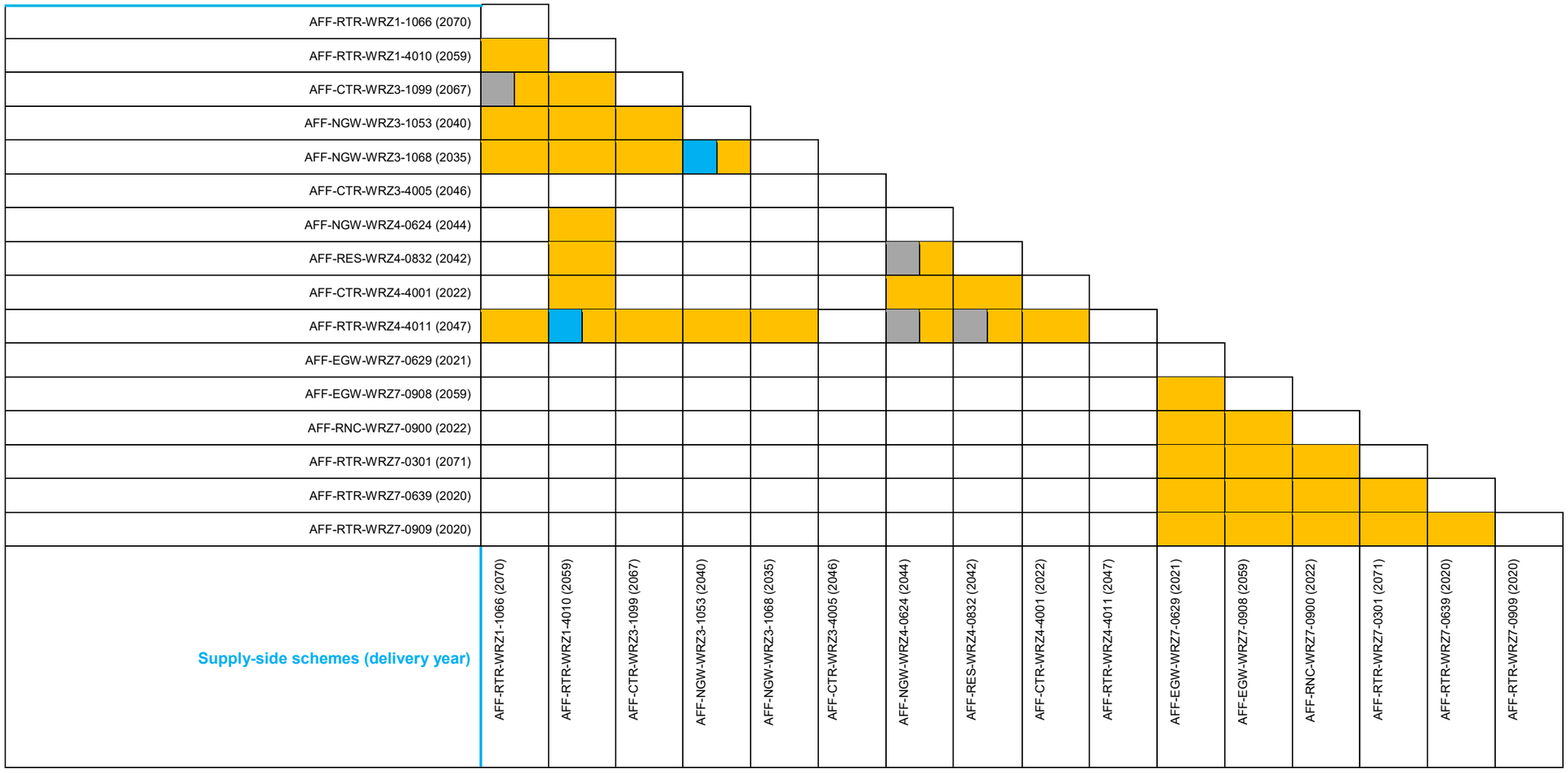
The findings of the cumulative effects assessment for these programmes is presented below.

[108] WRSE (2017 and updated in 2018) Environmental information to inform Water Company SEAs – Identification of potential for cumulative effects between water companies for WRMP19 SEAs. Prepared by Ricardo.
[109] In line with extant SEA guidance for WRMPs, schemes identified as having a moderate (-2) or major (-3) major negative effect during operation against SEA Objective 8 (Carbon Footprint) were not excluded as part of this run to avoid double counting. Carbon impacts and costs are already monetised through the programme appraisal stage.

AD_1

Interactions between supply schemes

Table AVI.2: AD_1 supply-side scheme interactions (adapted from UKWIR SEA guidance)



The initial screening identified the potential for:

- Four interactions relating to the potential for cumulative effects from construction;
- Two interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 39 interactions relating to the potential for cumulative effects on 5 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The four interactions identified at the screening stage translated to a total of five schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.3: AD_1 construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-RTR-WRZ1-1066 (2070) AFF-CTR-WRZ3-1099 (2067)	Local population (Population and human health)	***Identifying sources:*** AFF-RTR-WRZ1-1066 (2070) is the transfer of water from the Severn Trent Minworth Sewage Treatment Plant via the Grand Union Canal for abstraction at Hemel Hempstead. From here water would be transferred to a new Boxted Treatment Works for treatment and storage in an expanded Boxted Reservoir. The scheme requires a new water intake, two new pumps, a new treatment works adjacent to Boxted Reservoir, a capacity upgrade of Boxted Reservoir and a new transfer between Pouchen End and Boxted Treatment Works and Reservoir. This is linked to AFF-RTR-WRZ3-1099 (2067) which is a transfer of treated water from Boxted Pump Station to Chaul End Reservoir via Friars Wash. This scheme will require new mains, four new pumps and a capacity upgrade of Chaul End Reservoir. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around the existing Boxted Reservoir – the schemes divert in different directions from this location. Interactions between a small proportion of the pipeline and the Reservoir could occur during construction and this is likely to be focused around Berkhamsted Road. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Population and human health.	**Low**
AFF-NGW-WRZ4-0624 (2044) AFF-RTR-WRZ4-4011 (2047) AFF-RES-WRZ4-0832 (2042)	Local population (Population and human health) Historic environment (cultural heritage, including architectural and archaeological heritage)	***Identifying sources:*** AFF-NGW-WRZ4-0624 (2044) proposes obtaining supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area. The water is to be pumped via a new pipeline along the Grand Union Canal towpath for treatment at a new Iver 2 WTW location. A new pipeline will then take the water to existing Iver for onward transfer to an upgraded Harrow Service Reservoir. AFF-RTR-WRZ4-4011 (2047) is a strategic scheme to increase raw water abstraction from the River Thames at Sunnymeads and onwards transfer by a new main for treatment at Iver 2 WTW. The scheme requires a new South East Strategic Reservoir, four new intake pumps at Sunnymeads and the mains transfer. AFF-RES-WRZ4-0832 (2042) is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at a new Iver 2 WTW location. The option includes upgraded storage at Harrow service reservoir. These schemes are linked by the connections to Iver 2 WTW. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around the existing Iver WTW when the mains intersect to deliver water for treatment. Iver Court Farmhouse is a Listed Building; however, this is located further north of the interaction point and surrounded by other built development. As such, it is not considered likely that the schemes will lead to significant adverse cumulative effects in regards to the historic environment. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**

Potential effects on surface water or groundwater

Two interactions identified at the screening stage translated to a total of four schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.4: AD_1 surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2040) AFF-NGW-WRZ3-1068 (2035)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2040) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2035) proposes new abstraction from an existing groundwater borehole. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on surface water (River Ivel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water	**Medium**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	
Lower Thames Gravels Groundwater Body	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads supported by flow augmentation releases from the South East Strategic Reservoir ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on groundwater and surface water which may affect the ecological and chemical status of the waterbody. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames (Cookham to Egham) Surface Water Body	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads supported by flow augmentation releases from the South East Strategic Reservoir. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary impacts on habitat and fish communities that may lead to deterioration of the WFD ecological and physico-chemical status. The abstraction may also lead to changes in fluvial regimes and a reduction in energy in the river system. There is also a potential impact on water quality with lower water levels and flows. However, if managed under the LTOA abstraction regime and with flow augmentation from the South East Strategic Reservoir, abstraction will be supported by the upstream flow releases and impact on water quality is likely to be minor, temporary and localised. Overall, the WFD assessment does not anticipate a deterioration in status as a result of the interactions of these schemes. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Colne (from confluence with Chess to River Thames) Surface Water Body	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary localised impacts on habitats and fish communities and on the physio-chemical status of the water body; but no deterioration in status is anticipated. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames; (Evenlode to Thame) (Wallingford to Caversham) Reading to Cookham) Surface Water Bodies.	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential to improve flow rates, and may help improve habitats, improved low flows and chemistry which may positively impact the surface water bodies.	**N/A**

Potential effects on high value receptors

39 interactions identified at the screening stage translated to a total of 15 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.5: AD_1 high value receptors CEA

High value receptor	Scheme	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RTR-WRZ7-0301 (2071) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2059) AFF-RTR-WRZ7-0909 (2020)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2071) and AFF-RNC-WRZ7-0900 (2022) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[110] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Chilterns AONB	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047) AFF-RTR-WRZ1-1066 (2070) AFF-NGW-WRZ3-1068 (2035) AFF-RTR-WRZ3-1099 (2067) AFF-NGW-WRZ3-1053 (2040)	***Identifying sources:*** The strategic schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 (2059) and AFF-RTR-WRZ4-4011 (2047)) extend into the west and run adjacent to the Chilterns AONB (along the southern border of the AONB and outside of the WRZs). These schemes utilise the majority of the same routed pipeline, with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. Further to this, schemes in the north of the central area (AFF-RTR-WRZ1-1066 (2070), AFF-NGW-WRZ3-1068 (2035) and AFF-RTR-WRZ3-1099 (2067)) run in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2040) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The schemes south of the AONB (AFF-RTR-WRZ1-4010 (2059) and AFF-RTR-WRZ4-4011 (2047)) utilise the majority of the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. The main interactions between schemes occur in the area between Hemel Hempstead and Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be predominantly short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 (2040) is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[111] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
North Wessex Downs AONB	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047)	***Identifying sources:*** The strategic schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) will increase abstraction from the River Thames at Sunnymeads and create new transfers to Harefield Treatment Works, Harefield Reservoir, and Iver 2 WTW. The schemes also require a new South East Strategic Reservoir, new intake and booster pumps and a capacity upgrade at Harefield Reservoir. The schemes utilise the same routed pipeline that runs adjacent to the northern boundary of North Wessex Downs AONB (outside of the WRZs) up to a certain point, with AFF-RTR-WRZ1-4010 extending further north to Harefield Reservoir. As such, there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. ***Potential environmental change and predicted response to change:*** Schemes 4010 and 4011 utilise the majority of the same routed pipeline within the AONB and as such, are unlikely to lead to significant cumulative adverse effects on the AONB. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for any of the schemes then the findings of this assessment should be reviewed and updated. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works	**Low**

[110] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]
[111] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]

High value receptor	Scheme	Assessment of potential for cumulative effects	Risk rating (RAG)
		within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the North Wessex Downs AONB Management Plan.[112] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
South West London Waterbodies Ramsar and SPA.	AFF-RTR-WRZ1-4010 (2059) AFF-RTR-WRZ4-4011 (2047) AFF-NGW-WRZ4-0624 (2044) AFF-RES-WRZ4-0832 (2042) AFF-CTR-WRZ4-4001 (2022)	***Identifying sources:*** The schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) along with the abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the rdWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. For options 4010 and 4011 the HRA found that there is the potential for a likely significant effect in relation to the South West London Waterbodies SPA and Ramsar. Both options provide a pipeline that runs adjacent to the South West London Waterbodies SPA and Ramsar site which is also designated as Wraysbury No.1 Gravel Pit SSSI. The HRA proposed mitigation recommendations to ensure that there would be no adverse effects on the integrity of the SPA or Ramsar site. ***Uncertainty, mitigation and monitoring:*** The HRA recommends in relation to schemes 4010 and 4011 that the inclusion of these schemes is accompanied by an explicit commitment to ensure that the programming and construction processes for this scheme take into account the proximity of the SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA/Ramsar site are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. As a precaution, it is further recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Lower Thames Gravels Groundwater Body, the Thames (Cookham to Egham) Surface Water Body and the Colne (from confluence with Chess to River Thames) Surface Water Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended.

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

The assessment has also identified the potential for positive effects arising as a result of schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) interacting to improve habitats and improve low flows and chemistry within the Thames (Evenlode to Thame, Wallingford to Caversham, and Reading to Cookham) Surface Water Bodies.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, North Wessex Downs AONB and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan.

The HRA for the rdWRMP19 recommended a number of mitigation measures in relation to the schemes AFF-RTR-WRZ1-4010 (2059) and AFF-RTR-WRZ4-4011 (2047) which will need to be taken into consideration during construction and operation to minimise the risks associated with the European designated sites (South West London Waterbodies Ramsar and SPA). This mitigation includes an explicit commitment to ensure that the programming and construction processes for the schemes take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level.

Interactions with other WRMPs

[112] Landscapes for Life (2014) North Wessex Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://www.northwessexdowns.org.uk/uploads/File_Management/NWD_Docs/About_Us/Management_Plan/NWD_AONB_Management_Plan_2014-19.pdf [accessed 17/01/19]

The WRSE (updated 2018) study identified five schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes four schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

Three of the schemes AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908, and AFF-EGW-WRZ7-0629 involve no new infrastructure so will not interact with the other Affinity Water rdWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir. Given the scale of the scheme and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and as such it is considered unlikely that there will be any cumulative effects during construction.

AFF-RES-WRZ4-0832 (Brent Reservoir) is identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's rdWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

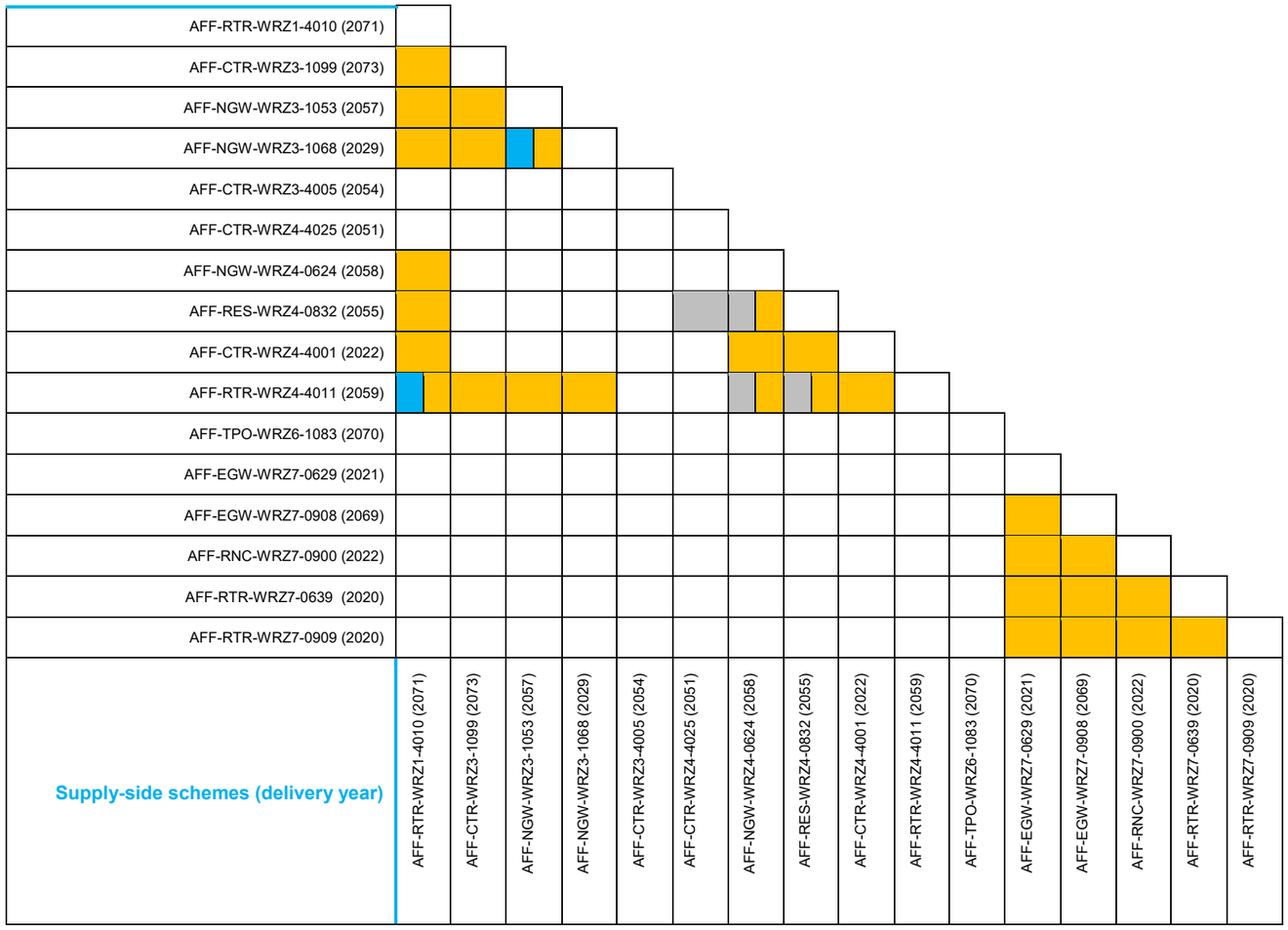
The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect in regards to the SEA topic water, are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_FIe (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_FIe (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

Aspirational Adaptive Run

Interactions between supply schemes

Table AVI.6: Aspirational Adaptive Run supply-side scheme interactions (adapted from UKWIR SEA guidance)



The initial screening identified the potential for:

- Four interactions relating to the potential for cumulative effects from construction;
- Two interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 29 interactions relating to the potential for cumulative effects on 4 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The four interactions identified at the screening stage translated to a total of four schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.7: Aspirational Adaptive Run construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-RTR-WRZ4-4011 (2059) AFF-NGW-WRZ4-0624 (2058) AFF-RES-WRZ4-0832 (2055)	Local population (Population and human health) Historic environment (cultural heritage, including architectural and archaeological heritage)	***Identifying sources:*** AFF-RTR-WRZ4-4011 (2059) is a strategic scheme to increase raw water abstraction from the River Thames at Sunnymeads and onwards transfer by a new main for treatment at Iver 2 WTW. The scheme requires a new South East Strategic Reservoir, four new intake pumps at Sunnymeads and the mains transfer. This strategic scheme interacts with both AFF-NGW-WRZ4-0624 (2058) and AFF-RES-WRZ4-0832 (2055). The former of these being a scheme to obtain supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area, pumping water via a new pipeline along the Grand Union Canal towpath for treatment at Iver 2 WTW. The latter is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at Iver 2 WTW, this scheme also includes upgraded storage at Harrow service reservoir. The schemes are predominantly linked by the connections to Iver 2 WTW which will bring construction works for all schemes in close proximity and within similar delivery timescales. The schemes also overlap at the Grand Union Canal, though the development of a new pipeline along the towpath and the proposed water import via the canal do not interact to lead to construction related cumulative effects. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around the existing Iver WTW when the mains intersect to deliver water for treatment. Iver Court Farmhouse is a Listed Building; however, this is located further north of the interaction point and surrounded by other built development. As such, it is not considered likely that the schemes will lead to significant adverse cumulative effects in regards to the historic environment. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**
AFF-RES-WRZ4-0832 (2055) AFF-CTR-WRZ4-4025 (2051) AFF-NGW-WRZ4-0624 (2058)	Local population (Population and human health) Historic environment (cultural heritage, including architectural and archaeological heritage)	***Identifying sources:*** AFF-RES-WRZ4-0832 (2055) is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at Iver 2 WTW, this scheme also includes upgraded storage at Harrow service reservoir. This scheme runs in close proximity to AFF-CTR-WRZ4-4025 (2051) and AFF-NGW+WRZ4-0624 (2058). AFF-CTR-WRZ4-4025 is a scheme involving the installation of a new booster pumping station (BPS) in the Hatton Cross area and new mains, as well as reinforcement of a section of trunk main between Egham reservoir and Ashford, to allow for the transfer of an existing potable water (no new supplies). AFF-NGW-WRZ4-0624 is a scheme to obtain supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area, pumping water via a new pipeline along the Grand Union Canal towpath for treatment at Iver 2 WTW. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as some distance is maintained between the schemes (although less than 5km). There are key interactions occurring at one location around the existing Iver WTW when the mains intersect to deliver water for treatment. Iver Court Farmhouse is a Listed Building; however, this is located further north of the interaction point and surrounded by other built development. As such, it is not considered likely that the schemes will lead to significant adverse cumulative effects with regards to the historic environment. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**

Potential effects on surface water or groundwater

Two interactions identified at the screening stage translated to a total of four schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.8: Aspirational Adaptive Run surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2057) AFF-NGW-WRZ3-1068 (2029)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2057) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2029) proposes new abstraction from an existing groundwater borehole. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on surface water (River Ivel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	**Medium**
Lower Thames Gravels Groundwater Body	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on groundwater and surface water which may affect the ecological and chemical status of the waterbody. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames (Cookham to Egham) Surface Water Body	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary impacts on habitat and fish communities that may lead to deterioration of the WFD ecological and physico-chemical status. The abstraction may also lead to changes in fluvial regimes and a reduction in energy in the river system. There is also a potential impact on water quality with lower water levels and flows. However, if managed under the LTOA abstraction regime and with flow augmentation from the South East Strategic Reservoir, abstraction will be supported by the upstream flow releases and impact on water quality is likely to be minor, temporary and localised. Overall, the WFD assessment does not anticipate a deterioration in status as a result of the interactions of these schemes. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Colne (from confluence with Chess to River Thames) Surface Water Body	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary localised impacts on habitats and fish communities and on the physio-chemical status of the water body; but no deterioration in status is anticipated. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames; (Evenlode to Thame) (Wallingford to Caversham) Reading to Cookham)	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential to improve flow rates, and may help improve habitats, improved low flows and chemistry which may positively impact the surface water bodies.	**N/A**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Surface Water Bodies.			

Potential effects on high value receptors

29 interactions identified at the screening stage translated to a total of 13 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.9: Aspirational Adaptive Run high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2069) AFF-RTR-WRZ7-0909 (2020)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RNC-WRZ7-0900 (2022) proposes physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[113] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Chilterns AONB	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059) AFF-NGW-WRZ3-1068 (2029) AFF-NGW-WRZ3-1053 (2057) AFF-CTR-WRZ3-1099 (2073)	***Identifying sources:*** The strategic schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 (2071) and AFF-RTR-WRZ4-4011 (2059)) extend into the west and run adjacent to the Chilterns AONB (along the southern border of the AONB and outside of the WRZs). The schemes utilise the majority of the same routed pipeline, with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. Further to this, schemes in the north of the central area (AFF-NGW-WRZ3-1068 (2029) and AFF-RTR-WRZ3-1099 (2073)) run in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2057) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The schemes south of the AONB (AFF-RTR-WRZ1-4010 (2071) and AFF-RTR-WRZ4-4011 (2059)) utilise the majority of the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. The main interactions between schemes occur in the area between Hemel Hempstead and Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be predominantly short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[114] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
North Wessex Downs AONB	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059)	***Identifying sources:*** The strategic schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) will increase abstraction from the River Thames at Sunnymeads and create new transfers to Harefield Treatment Works, Harefield Reservoir, and Iver 2 WTW. The schemes also require a new South East Strategic Reservoir, new intake and booster pumps and a capacity upgrade at Harefield Reservoir. The schemes utilise the majority of the same routed pipeline that runs adjacent to the northern boundary of North Wessex Downs AONB (outside of the WRZs), with AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir.	**Low**

[113] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]
[114] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Potential environmental change and predicted response to change: The schemes utilise the majority of same routed pipeline within the AONB and as such, are unlikely to lead to significant cumulative adverse effects on the AONB. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for any of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the North Wessex Downs AONB Management Plan.[115] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
South West London Waterbodies Ramsar and SPA.	AFF-RTR-WRZ1-4010 (2071) AFF-RTR-WRZ4-4011 (2059) AFF-NGW-WRZ4-0624 (2058) AFF-RES-WRZ4-0832 (2055) AFF-CTR-WRZ4-4001 (2022)	***Identifying sources:*** The schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) along with the abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the fWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. For options 4010 and 4011 the HRA found that there is the potential for a likely significant effect in relation to the South West London Waterbodies SPA and Ramsar site. Both options provide a pipeline that runs adjacent to the South West London Waterbodies SPA and Ramsar site which is also designated as Wraysbury No.1 Gravel Pit SSSI. The HRA proposed mitigation recommendations to ensure that there would be no adverse effects on the integrity of the SPA or Ramsar site. ***Uncertainty, mitigation and monitoring:*** The HRA recommends in relation to schemes 4010 and 4011 that the inclusion of these schemes is accompanied by an explicit commitment to ensure that the programming and construction processes for this scheme take into account the proximity of the SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. As a precaution, it is further recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Lower Thames Gravels Groundwater Body, the Thames (Cookham to Egham) Surface Water Body, and the Colne (from confluence with Chess to River Thames) Surface Water Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended.

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

The assessment has also identified the potential for positive effects arising as a result of schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) interacting to, improve habitats and improve low flows and chemistry within the Thames (Evenlode to Thame, Wallingford to Caversham, and Reading to Cookham) Surface Water Bodies.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, North Wessex Downs AONB, and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan. If impacts are identified to the AONBs as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Boards to assess any required mitigation measures.

[115] Landscapes for Life (2014) North Wessex Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://www.northwessexdowns.org.uk/uploads/File_Management/NWD_Docs/About_Us/Management_Plan/NWD_AONB_Management_Plan_2014-19.pdf [accessed 17/01/19]

The HRA for the fWRMP19 recommended a number of mitigation measures in relation to the schemes AFF-RTR-WRZ1-4010 (2071) and AFF-RTR-WRZ4-4011 (2059) which will need to be taken into consideration during construction and operation to minimise the risks associated with the European designated sites (South West London Waterbodies Ramsar and SPA). This mitigation includes an explicit commitment to ensure that the programming and construction processes for the schemes take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level.

Interactions with other WRMPs

The WRSE (updated 2018) study identified five schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes three schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

These schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water fWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

The WRSE work identifies that there is the potential for cumulative effects on three water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water, Southern Water and South East Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) is identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's fWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

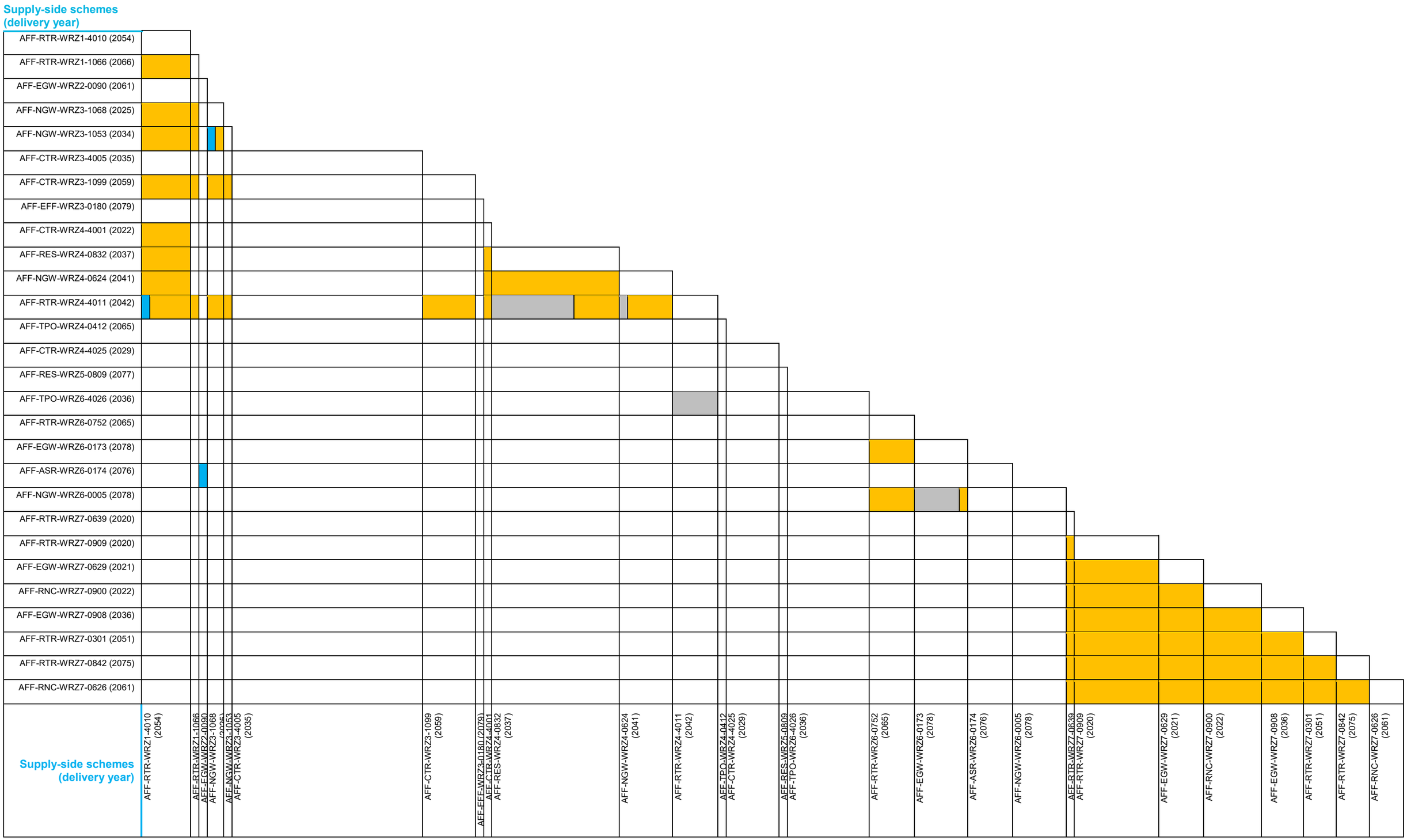
The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

Finally, AFF-NGW-WRZ4-0624 is also identified in the WRSE study as having the potential for cumulative effects on the Lower Thames Gravels and Twyford Tertiaries Groundwater Bodies as a result of interactions with the option ASR-4 being considered through the emerging WRMP19 for South East Water. The study concludes that as both schemes are within the confined chalk aquifer they are unlikely to impact on surface water features and habitats, with no further assessment required unless site specific hydrogeological information indicates otherwise.

Expected Future Adaptive Run

Interactions between supply schemes

Table AVI.10: Expected Future Adaptive Run supply-side scheme interactions (adapted from UKWIR SEA guidance)



The initial screening identified the potential for:

- Four interactions relating to the potential for cumulative effects from construction;
- Three interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 55 interactions relating to the potential for cumulative effects on 5 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The four interactions identified at the screening stage translated to a total of six schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.11: Expected Future Adaptive Run construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-RTR-WRZ4-4011 (2042) AFF-NGW-WRZ4-0624 (2041) AFF-RES-WRZ4-0832 (2037) AFF-TPO-WRZ6-4026 (2036)	Local population (Population and human health) Historic environment (cultural heritage, including architectural and archaeological heritage)	***Identifying sources:*** AFF-RTR-WRZ4-4011 (2042) is a strategic scheme to increase raw water abstraction from the River Thames at Sunnymeads and onwards transfer by a new main for treatment at Iver 2 WTW. The scheme requires a new South East Strategic Reservoir, four new intake pumps at Sunnymeads and the mains transfer. This strategic scheme interacts with three other schemes in this run being proposed within similar timescales. AFF-NGW-WRZ4-0624 (2041) is a scheme to obtain supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area, pumping water via a new pipeline along the Grand Union Canal towpath for treatment at Iver 2 WTW. AFF-RES-WRZ4-0832 (2037) is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at Iver 2 WTW, this scheme also includes upgraded storage at Harrow service reservoir. AFF-TPO-WRZ6-4026 (2036) is a scheme to trade 4 Ml/d from an existing abstraction licence on the River Thames which is currently owned by a third party who is capable of reducing the volume of consumptive water allowing Affinity the equivalent volume to be abstracted at the existing Egham WTW. The schemes are predominantly linked by the connections to Iver 2 WTW which will bring construction works for all schemes in closest proximity and within similar delivery timescales. The schemes also overlap at the Grand Union Canal, though the development of a new pipeline along the towpath and water import do not interact to lead to construction related cumulative effects. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around the existing Iver WTW when the mains intersect to deliver water for treatment. Iver Court Farmhouse is a Listed Building; however, this is located further north of the interaction point and surrounded by other built development. As such, it is not considered likely that the schemes will lead to significant adverse cumulative effects with regards to the historic environment. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**
AFF-NGW-WRZ6-0005 (2078) AFF-EGW-WRZ6-0173 (2078)	Local population (Population and human health)	***Identifying sources:*** AFF-NGW-WRZ6-0005 (2078) is an option to investigate the groundwater source at Horsley abstraction well which was last pumped in 1997, to confirm yields and upgrade treatment as necessary to overcome existing water quality issues. The scheme requires a new pump and power supply for the pump. AFF-EGW-WRZ6-0173 (2078) is a scheme to optimise the Clandon source through software changes to allow water level based control of the pump speed, allowing an increase in deployable output. This scheme does not propose the development of new infrastructure. ***Potential environmental change and predicted response to change:*** Whilst the schemes are located within 4km of each other and fall within similar timeframes, construction related cumulative effects are unlikely as only one of the schemes is proposing physical infrastructure development.	**Low**

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
		Uncertainty, mitigation and monitoring: If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Population and human health.	

Potential effects on surface water or groundwater

Three interactions identified at the screening stage translated to a total of six schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.12: Expected Future Adaptive Run surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2034) AFF-NGW-WRZ3-1068 (2025)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2034) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2025) proposes new abstraction from an existing groundwater borehole. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on surface water (River Ivel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	**Medium**
Lower Thames Gravels Groundwater Body	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on groundwater and surface water which may affect the ecological and chemical status of the waterbody. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames (Cookham to Egham) Surface Water Body	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary impacts on habitat and fish communities that may lead to deterioration of the WFD ecological and physico-chemical status. The abstraction may also lead to changes in fluvial regimes and a reduction in energy in the river system. There is also a potential impact on water quality with lower water levels and flows. However, if managed under the LTOA abstraction regime and with flow augmentation from the South East Strategic Reservoir, abstraction will be supported by the upstream flow releases and impact on water quality is likely to be minor, temporary and localised. Overall, the WFD assessment does not anticipate a deterioration in status as a result of the interactions of these schemes. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Colne (from confluence with Chess to River Thames) Surface Water Body	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads.	**Low**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Potential environmental change and predicted response to change: The WFD assessment identifies that the two schemes have the potential during construction for minor temporary localised impacts on habitats and fish communities and on the physio-chemical status of the water body; but no deterioration in status is anticipated. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	
Mid-Chilterns Chalk Groundwater Body	AFF-EGW-WRZ2-0090 (2061) AFF-ASR-WRZ6-0174 (2076)	***Identifying sources:*** AFF-EGW-WRZ2-0090 (2061) is a scheme to increase the deployable output of two boreholes at Stonecross chalk groundwater source to match the agreed licenced peak rate. The works involve an upgrade to the pumps, treatment works and network modification. AFF-ASR-WRZ6-0174 (2076) is a speculative scheme to inject winter excess water into the confined chalk or Lower Greensand for use in the summer peak demand period. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the increased abstraction under AFF-EGW-WRZ2-0090 (2061) may lead to temporary and localised minor impacts on the ecological quality of surface water bodies (Ver River). The assessment however identifies that the recharge of treated water within scheme AFF-ASR-WRZ6-0174 (2076) could mobilise poorer quality water, and new abstraction and recharge may impact on water balance in this Chalk. Overall the WFD assessment considers the schemes unlikely to impact on the unconfined Chalk but requires further information and investigation once abstraction and recharge rates are known. The schemes both have minor, localised and temporary impacts on different elements and are unlikely to have a significant cumulative effect. ***Uncertainty, mitigation and monitoring:*** The WFD Report identifies that there is a need for further information and investigation once abstraction and recharge rates are known to show no impact on water quality and water balance. The next steps would be to establish these rates and undertake a more comprehensive WFD assessment prior to the detailed design stage. This will allow appropriate mitigation to be incorporated within the detailed design. ***Overall rating of cumulative effects:*** While it is recognised that further investigation is needed, as the schemes are identified as having minor, local and temporary impacts on different elements it is considered unlikely that they would have a cumulative negative effect on the status of the groundwater body. Overall it is considered that there is a low risk of cumulative effects.	**Low**
Thames; (Evenlode to Thame) (Wallingford to Caversham) Reading to Cookham) Surface Water Bodies.	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential to improve flow rates, and may help improve habitats, improved low flows and chemistry which may positively impact the surface water bodies.	**N/A**

Potential effects on high value receptors

55 interactions identified at the screening stage translated to a total of 20 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.13: Expected Future Adaptive Run high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RTR-WRZ7-0301 (2051) AFF-RNC-WRZ7-0626 (2061) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2036) AFF-RTR-WRZ7-0909 (2020)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2051), AFF-RNC-WRZ7-0626 (2061), AFF-RNC-WRZ7-0900 (2022) and AFF-RTR-WRZ7-0842 (2075) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[116] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**

[116] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
	AFF-RTR-WRZ7-0842 (2075)		
Chilterns AONB	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042) AFF-RTR-WRZ1-1066 (2066) AFF-NGW-WRZ3-1068 (2025) AFF-RTR-WRZ3-1099 (2059) AFF-NGW-WRZ3-1053 (2034)	***Identifying sources:*** The strategic schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 (2054) and AFF-RTR-WRZ4-4011 (2042)) extend into the west and run adjacent to the Chilterns AONB (along the southern border of the AONB and outside of the WRZs). The schemes utilise the same routed pipeline. Further to this, schemes in the north of the central area (AFF-RTR-WRZ1-1066 (2066), AFF-NGW-WRZ3-1068 (2025) and AFF-RTR-WRZ3-1099 (2059)) run in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2034) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The schemes south of the AONB (AFF-RTR-WRZ1-4010 (2054) and AFF-RTR-WRZ4-4011 (2042)) utilise the majority of the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. The main interactions between schemes occur in the area between Hemel Hempstead and Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[117] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
Surrey Hills AONB	AFF-EGW-WRZ6-0173 (2078) AFF-RTR-WRZ6-0752 (2065) AFF-NGW-WRZ6-0005 (2078)	***Identifying sources:*** AFF-EGW-WRZ6-0173 (2078) seeks to optimize abstraction from the existing Clandon Source. Although located adjacent to the Surrey Hills AONB, the scheme does not require any significant infrastructure development. AFF-NGW-WRZ6-0005 (2078) seeks to recommission the Horsley abstraction well, which again, although located in close proximity to the Surrey Hills AONB does not require any significant infrastructure development (which is limited to treatment upgrades). The works proposed under these schemes are limited and contained within an existing site and considered unlikely to lead to any adverse cumulative effects on the AONB. AFF-RTR-WRZ6-0752 (2065) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new transfer between them. ***Potential environmental change and predicted response to change:*** The interactions are limited as only one of the schemes proposes physical infrastructure (AFF-RTR-WRZ6-0752) and as such cumulative effects on the Surrey Hills AONB are not considered likely. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[118] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
North Wessex Downs AONB	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042)	***Identifying sources:*** The strategic schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) will increase abstraction from the River Thames at Sunnymeads and create new transfers to Harefield Treatment Works, Harefield Reservoir, and Iver 2 WTW. The schemes also require a new South East Strategic Reservoir, new intake and booster pumps and a capacity upgrade at Harefield Reservoir. The schemes utilise the majority of the same routed pipeline that runs adjacent to the northern boundary of North Wessex Downs AONB (outside of the WRZs) with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. ***Potential environmental change and predicted response to change:*** The schemes south of the AONB (AFF-RTR-WRZ1-4010 (2054) and AFF-RTR-WRZ4-4011 (2042)) utilise the majority of the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. Potential effects on the AONB are likely to be predominantly short-term and temporary associated with traffic and access	**Low**

[117] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]
[118] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for any of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the North Wessex Downs AONB Management Plan.[119] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
South West London Waterbodies Ramsar and SPA.	AFF-RTR-WRZ1-4010 (2054) AFF-RTR-WRZ4-4011 (2042) AFF-NGW-WRZ4-0624 (2041) AFF-RES-WRZ4-0832 (2037) AFF-CTR-WRZ4-4001 (2022)	***Identifying sources:*** The schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) along with the abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the fWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. For options 4010 and 4011 the HRA found that there is the potential for a likely significant effect in relation to the South West London Waterbodies SPA and Ramsar. Both options provide a pipeline that runs adjacent to the South West London Waterbodies SPA and Ramsar site which is also designated as Wraysbury No.1 Gravel Pit SSSI. The HRA proposed mitigation recommendations to ensure that there would be no adverse effects on the integrity of the SPA or Ramsar site. ***Uncertainty, mitigation and monitoring:*** The HRA recommends in relation to schemes 4010 and 4011 that the inclusion of these schemes is accompanied by an explicit commitment to ensure that the programming and construction processes for this scheme take into account the proximity of the SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. As a precaution, it is further recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Lower Thames Gravels Groundwater Body, the Thames (Cookham to Egham) Surface Water Body, and the Colne (from confluence with Chess to River Thames) Surface Water Body, and the Mid-Chilterns Chalk Groundwater Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended. With respect to the Mid-Chilterns Chalk Groundwater Body, it is also recognised that further investigation once abstraction and recharge rates under schemes AFF-EGW-WRZ2-0090 and AFF-ASR-WRZ6-0174 are known will be required to confirm no impact on water quality and water balance.

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

The assessment has also identified the potential for positive effects arising as a result of schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) interacting to improve habitats and improve low flows and chemistry within the Thames (Evenlode to Thame, Wallingford to Caversham, and Reading to Cookham) Surface Water Bodies.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, Surrey Hills AONB, North Wessex Downs AONB and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan. If impacts are identified to the AONBs as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Boards to assess any required mitigation measures.

[119] Landscapes for Life (2014) North Wessex Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://www.northwessexdowns.org.uk/uploads/File_Management/NWD_Docs/About_Us/Management_Plan/NWD_AONB_Management_Plan_2014-19.pdf [accessed 17/01/19]

The HRA for the fWRMP19 recommended a number of mitigation measures in relation to the schemes AFF-RTR-WRZ1-4010 (2053) and AFF-RTR-WRZ4-4011 (2041) which will need to be taken into consideration during construction and operation to minimise the risks associated with the European designated sites (South West London Waterbodies Ramsar and SPA). This mitigation includes an explicit commitment to ensure that the programming and construction processes for the schemes take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level.

Interactions with other WRMPs

The WRSE (updated 2018) study identified ten schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes six schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)
- AFF-RTR-WRZ7-0842 (Aldington to Saltwood Import Increase by 3Mld)

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water fWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir and AFF-RTR-WRZ7-0842 proposes a small upgrade of the Saltwood Reservoir along with a new mains and pump station at the interconnection point. Given the scale of the schemes and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 and AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and has a delivery date of 2061. AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and has a delivery date of 2051. Taking the scale of infrastructure proposed and the delivery dates it is considered unlikely that there will be any cumulative effects during construction.

The WRSE work identifies that there is the potential for cumulative effects on four water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water, Southern Water, South East Water and SES Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) and AFF-RES-WR5-0809 (Birds Green Reservoir) are identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's fWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The WFD assessment found that AFF-RES-WR5-0809 has the potential to result in the deterioration in the status of the Lower and Upper Roding surface water bodies during operation. As a result, there is the potential for cumulative effects on the Thames (wider catchment). The WFD assessment recommends that further assessments and discussions with the EA are required to explore the need for and potential of compensatory flows. It is important to note that the delivery date for this scheme under this programme is 2077; it is therefore considered that there is ample time to undertake further investigations (including a more detailed WFD assessment) and identify specific mitigation measures to reduce the likelihood and significance of any residual cumulative effects.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

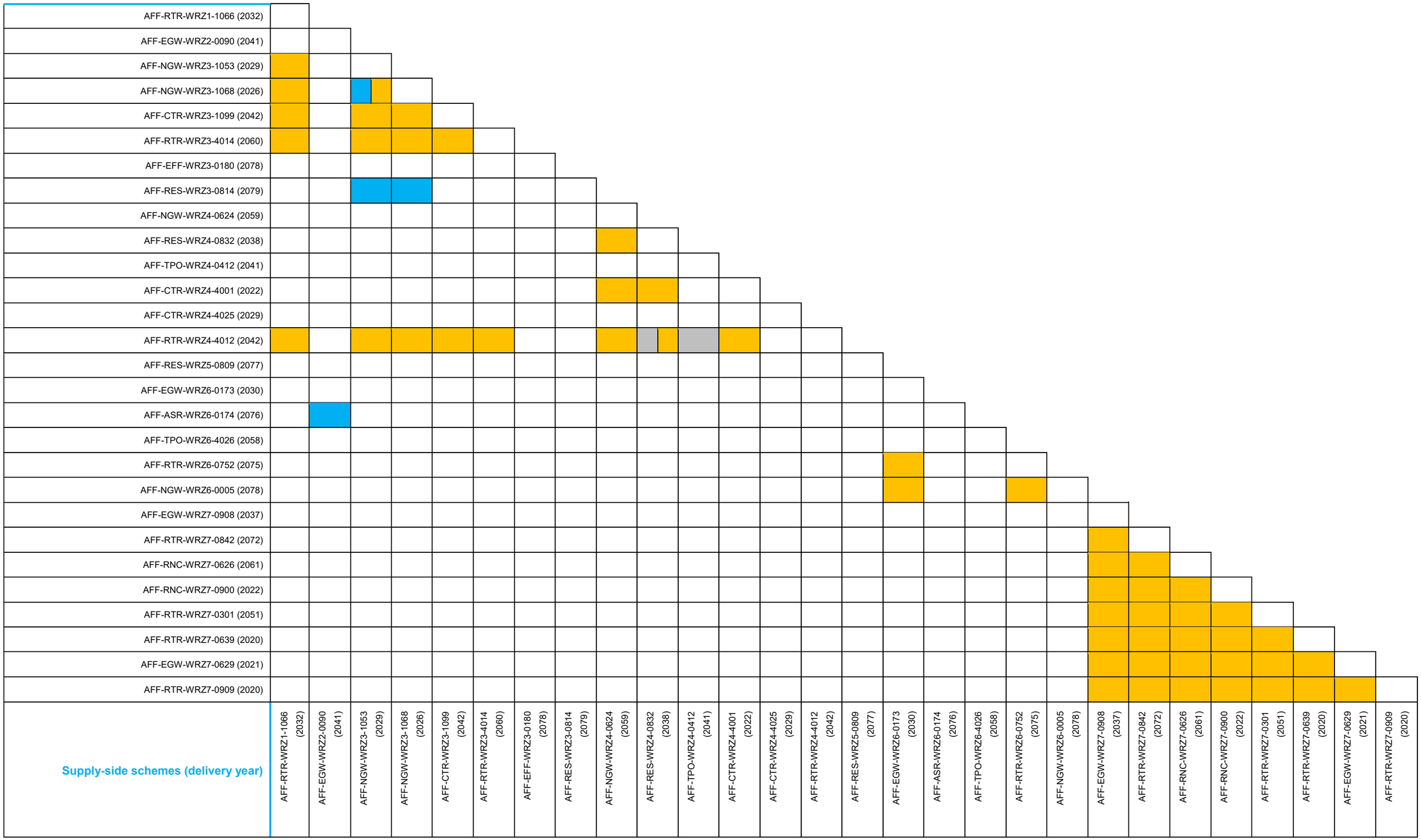
AFF-NGW-WRZ6-0005 is also identified in the WRSE study as having the potential for cumulative effects on the Effingham Tertiaries Groundwater Body as a result of interactions with options being considered through the emerging WRMP19 for SES Water, however hydrogeological conditions indicate that the options between the two water companies are unlikely to interact and the study identifies that no further assessment is required unless site specific hydrogeological information indicates otherwise.

Finally, AFF-NGW-WRZ4-0624 is also identified in the WRSE study as having the potential for cumulative effects on the Lower Thames Gravels and Twyford Tertiaries Groundwater Bodies as a result of interactions with the option ASR-4 being considered through the emerging WRMP19 for South East Water. The study concludes that as both schemes are within the confined chalk aquifer they are unlikely to impact on surface water features and habitats, with no further assessment required unless site specific hydrogeological information indicates otherwise.

High Growth Future Adaptive Plan

Interactions between supply schemes

Table AVI.14: High Growth Future Adaptive Plan supply-side scheme interactions (adapted from UKWIR SEA guidance)



The initial screening identified the potential for:

- Two interactions relating to the potential for cumulative effects from construction;
- Four interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 52 interactions relating to the potential for cumulative effects on 4 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The two interactions identified at the screening stage translated to a total of three schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.15: High Growth Future Adaptive Plan construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-RTR-WRZ4-4012 (2042) AFF-TPO-WRZ4-0412 (2041) AFF-RES-WRZ4-0832 (2038)	Local population (Population and human health) Historic environment (cultural heritage, including architectural and archaeological heritage)	***Identifying sources:*** AFF-RTR-WRZ4-4012 (2042) is a strategic scheme to increase raw water abstraction from the River Thames at Sunnymeads and onwards transfer by a new main for treatment at Iver 2 WTW. The scheme requires a new South East Strategic Reservoir, four new intake pumps at Sunnymeads and the mains transfer. This strategic scheme interacts with two other schemes in this run being proposed within similar timescales. AFF-TPO-WRZ4-0412 (2041) is a scheme to purchase or lease and then transfer any potential spare capacity from 3 boreholes owned by Hillingdon Hospital. AFF-RES-WRZ4-0832 (2038) is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at Iver 2 WTW, this scheme also includes upgraded storage at Harrow service reservoir. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around the existing Iver WTW when the mains intersect to deliver water for treatment. Iver Court Farmhouse is a Listed Building; however, this is located further north of the interaction point and surrounded by other built development. As such, it is not considered likely that the schemes will lead to significant adverse cumulative effects with regards to the historic environment. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**

Potential effects on surface water or groundwater

Four interactions identified at the screening stage translated to a total of five schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.16: High Growth Future Adaptive Plan surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2029) AFF-NGW-WRZ3-1068 (2026) AFF-RES-WRZ3-0814 (2079)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2029) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2026) proposes new abstraction from an existing groundwater borehole. AFF-RES-WRZ3-0814 (2079) is an augmentation scheme to help offset sustainability reductions and involves abstracting water from the River Ouzel, storing it at a new raw water reservoir at Honeywick Rye, and discharging flow to the Upper Lee River ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the schemes for their potential impact from abstraction on surface water (Rivers Ivel and Ouzel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in the schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.	**Medium**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Overall rating of cumulative effects: Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	
Mid-Chilterns Chalk Groundwater Body	AFF-EGW-WRZ2-0090 (2041) AFF-ASR-WRZ6-0174 (2076)	***Identifying sources:*** AFF-EGW-WRZ2-0090 (2041) is a scheme to increase the deployable output of two boreholes at Stonecross chalk groundwater source to match the agreed licenced peak rate. The works involve an upgrade to the pumps, treatment works and network modification. AFF-ASR-WRZ6-0174 (2076) is a speculative scheme to inject winter excess water into the confined chalk or Lower Greensand for use in the summer peak demand period. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the increased abstraction under AFF-EGW-WRZ2-0090 (2041) may lead to temporary and localised minor impacts on the ecological quality of surface water bodies (Ver River). The assessment however identifies that the recharge of treated water within scheme AFF-ASR-WRZ6-0174 (2076) could mobilise poorer quality water, and new abstraction and recharge may impact on water balance in this Chalk. Overall the WFD assessment considers the schemes unlikely to impact on the unconfined Chalk but requires further information and investigation once abstraction and recharge rates are known. The schemes both have minor, localised and temporary impacts on different elements and are unlikely to have a significant cumulative effect. ***Uncertainty, mitigation and monitoring:*** The WFD Report identifies that there is a need for further information and investigation once abstraction and recharge rates are known to show no impact on water quality and water balance. The next steps would be to establish these rates and undertake a more comprehensive WFD assessment prior to the detailed design stage. This will allow appropriate mitigation to be incorporated within the detailed design. ***Overall rating of cumulative effects:*** While it is recognised that further investigation is needed, as the schemes are identified as having minor, local and temporary impacts on different elements it is considered unlikely that they would have a cumulative negative effect on the status of the groundwater body. Overall it is considered that there is a low risk of cumulative effects.	**Low**

Potential effects on high value receptors

52 interactions identified at the screening stage translated to a total of 20 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.17: High Growth Future Adaptive Plan high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RTR-WRZ7-0301 (2051) AFF-RNC-WRZ7-0626 (2061) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2037) AFF-RTR-WRZ7-0909 (2020) AFF-RTR-WRZ7-0842 (2072)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2051), AFF-RNC-WRZ7-0626 (2061), AFF-RNC-WRZ7-0900 (2022) and AFF-RTR-WRZ7-0842 (2072) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[120] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Chilterns AONB	AFF-RTR-WRZ4-4012 (2042) AFF-NGW-WRZ3-1068 (2026) AFF-NGW-WRZ3-1053 (2029) AFF-RTR-WRZ1-1066 (2032)	***Identifying sources:*** The strategic scheme which increases abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ4-4012 (2042)) extends into the west and runs adjacent to the Chilterns AONB (along the southern border of the AONB and outside of the WRZs). Further to this, schemes in the north of the central area (AFF-RTR-WRZ1-1066 (2032), AFF-NGW-WRZ3-1068 (2026) and AFF-RTR-WRZ3-1099 (2042)) run in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north and north east of Luton, schemes AFF-NGW-WRZ3-1053 (2029) and AFF-RTR-WRZ3-4014 (2060) are also located within/ in close proximity to the northern extent of the AONB, with scheme AFF-RTR-WRZ3-4014 proposing a new Treatment Works at Sundon.	**Low**

[120] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
	AFF-CTR-WRZ3-1099 (2042) AFF-RTR-WRZ3-4014 (2060)	***Potential environmental change and predicted response to change:*** Only one scheme (AFF-RTR-WRZ4-4012 (2042)) is located south of the AONB and as such there are limited interactions with this scheme, which is considered unlikely to lead to cumulative adverse effects on the AONB. The main interactions between schemes occur around Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are predominantly likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[121] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
Surrey Hills AONB	AFF-EGW-WRZ6-0173 (2030) AFF-RTR-WRZ6-0752 (2075) AFF-NGW-WRZ6-0005 (2078)	***Identifying sources:*** AFF-EGW-WRZ6-0173 (2030) seeks to optimize abstraction from the existing Clandon Source. Although located adjacent to the Surrey Hills AONB, the scheme does not require any significant infrastructure development. AFF-NGW-WRZ6-0005 (2078) seeks to recommission the Horsley abstraction well, which again, although located in close proximity to the Surrey Hills AONB does not require any significant infrastructure development (which is limited to treatment upgrades). The works proposed under these schemes are limited and contained within an existing site and considered unlikely to lead to any adverse cumulative effects on the AONB. AFF-RTR-WRZ6-0752 (2075) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new transfer between them. ***Potential environmental change and predicted response to change:*** The interactions are limited as only one of the schemes proposes physical infrastructure (AFF-RTR-WRZ6-0752) and as such cumulative effects on the Surrey Hills AONB are not considered likely. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[122] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
South West London Waterbodies Ramsar and SPA.	AFF-RTR-WRZ4-4012 (2042) AFF-NGW-WRZ4-0624 (2059) AFF-RES-WRZ4-0832 (2038) AFF-CTR-WRZ4-4001 (2022)	***Identifying sources:*** AFF-RTR-WRZ4-4012 is a strategic scheme to increase abstraction from the River Thames at Sunnymeads, which along with the abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the fWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. For option 4012 the HRA found that there is the potential for a likely significant effect in relation to the South West London Waterbodies SPA and Ramsar. The option provides a pipeline that runs adjacent to the South West London Waterbodies SPA and Ramsar site which is also designated as Wraysbury No.1 Gravel Pit SSSI. The HRA proposed mitigation recommendations to ensure that there would be no adverse effects on the integrity of the SPA or Ramsar site. ***Uncertainty, mitigation and monitoring:*** The HRA recommends in relation to scheme 4012 that its inclusion is accompanied by an explicit commitment to ensure that the programming and construction processes for this scheme take into account the proximity of the SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. As a precaution, it is further recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

[121] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]
[122] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Mid-Chilterns Chalk Groundwater Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended. It is also recognised that further investigation once abstraction and recharge rates under schemes AFF-EGW-WRZ2-0090 and AFF-ASR-WRZ6-0174 are known will be required to confirm no impact on water quality and water balance.

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, Surrey Hills AONB and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan. If impacts are identified to the AONBs as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Boards to assess any required mitigation measures.

The HRA for the fWRMP19 recommended a number of mitigation measures in relation to the scheme AFF-RTR-WRZ4-4012 (2042) which will need to be taken into consideration during construction and operation to minimise the risks associated with the European designated sites (South West London Waterbodies Ramsar and SPA). This mitigation includes an explicit commitment to ensure that the programming and construction processes for the schemes take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level.

Interactions with other WRMPs

The WRSE (updated 2018) study identified ten schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes six schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)
- AFF-RTR-WRZ7-0842 (Aldington to Saltwood Import Increase by 3Mld)

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water fWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir and AFF-RTR-WRZ7-0842 proposes a small upgrade of the Saltwood Reservoir along with a new mains and pump station at the interconnection point. Given the scale of the schemes and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 and AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and has a delivery date of 2061. AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and has a delivery date of 2051. Taking the scale of infrastructure proposed and the delivery dates it is considered unlikely that there will be any cumulative effects during construction.

The WRSE work identifies that there is the potential for cumulative effects on four water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water, Southern Water, South East Water and SES Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) and AFF-RES-WR5-0809 (Birds Green Reservoir) are identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's fWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The WFD assessment found that AFF-RES-WR5-0809 has the potential to result in the deterioration in the status of the Lower and Upper Roding surface water bodies during operation. As a result, there is the potential for cumulative effects on the Thames (wider catchment). The WFD assessment recommends that further assessments and discussions with the EA are required to explore the need for and potential of compensatory flows. It is important to note that the delivery date for this scheme under this programme is 2077; it is therefore considered that there is ample time to undertake further investigations (including a more detailed WFD assessment) and identify specific mitigation measures to reduce the likelihood and significance of any residual cumulative effects.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

AFF-NGW-WRZ6-0005 is also identified in the WRSE study as having the potential for cumulative effects on the Effingham Tertiaries Groundwater Body as a result of interactions with options being considered through the emerging WRMP19 for SES Water, however hydrogeological conditions indicate that the options between the two water companies are unlikely to interact and the study identifies that no further assessment is required unless site specific hydrogeological information indicates otherwise.

Finally, AFF-NGW-WRZ4-0624 is also identified in the WRSE study as having the potential for cumulative effects on the Lower Thames Gravels and Twyford Tertiaries Groundwater Bodies as a result of interactions with the option ASR-4 being considered through the emerging WRMP19 for South East Water. The study concludes that as both schemes are within the confined chalk aquifer they are unlikely to impact on surface water features and habitats, with no further assessment required unless site specific hydrogeological information indicates otherwise.

AD_2

Interactions between supply schemes

Table AVI.18: AD_2 supply-side scheme interactions (adapted from UKWIR SEA guidance)

Supply-side schemes (delivery year)	AFF-EGW-WRZ2-0090 (2071)	AFF-EFF-WRZ3-0180 (2075)	AFF-NGW-WRZ3-1053 (2030).	AFF-NGW-WRZ3-1068 (2025)	AFF-RES-WRZ3-0814 (2077)	AFF-RTR-WRZ3-4016 (2042)	AFF-NGW-WRZ4-0624 (2040)	AFF-RES-WRZ4-0832 (2031)	AFF-TPO-WRZ4-0412 (2041)	AFF-CTR-WRZ4-4001 (2022)	AFF-RES-WRZ5-0809 (2072)	AFF-EGW-WRZ6-0173 (2076)	AFF-RTR-WRZ6-0752 (2076)	AFF-TPO-WRZ6-1083 (2074)	AFF-EGW-WRZ7-0629 (2021)	AFF-EGW-WRZ7-0908 (2044)	AFF-RNC-WRZ7-0626 (2057)	AFF-RNC-WRZ7-0900 (2022)	AFF-RTR-WRZ7-0301 (2068)	AFF-RTR-WRZ7-0639 (2020)	AFF-RTR-WRZ7-0909 (2020)
AFF-EGW-WRZ2-0090 (2071)																					
AFF-EFF-WRZ3-0180 (2075)																					
AFF-NGW-WRZ3-1053 (2030)																					
AFF-NGW-WRZ3-1068 (2025)																					
AFF-RES-WRZ3-0814 (2077)																					
AFF-RTR-WRZ3-4016 (2042)																					
AFF-NGW-WRZ4-0624 (2040)																					
AFF-RES-WRZ4-0832 (2031)																					
AFF-TPO-WRZ4-0412 (2041)																					
AFF-CTR-WRZ4-4001 (2022)																					
AFF-RES-WRZ5-0809 (2072)																					
AFF-EGW-WRZ6-0173 (2076)																					
AFF-RTR-WRZ6-0752 (2076)																					
AFF-TPO-WRZ6-1083 (2074)																					
AFF-EGW-WRZ7-0629 (2021)																					
AFF-EGW-WRZ7-0908 (2044)																					
AFF-RNC-WRZ7-0626 (2057)																					
AFF-RNC-WRZ7-0900 (2022)																					
AFF-RTR-WRZ7-0301 (2068)																					
AFF-RTR-WRZ7-0639 (2020)																					
AFF-RTR-WRZ7-0909 (2020)																					

The initial screening identified the potential for:

- Two interactions relating to the potential for cumulative effects from construction;
- Three interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 30 interactions relating to the potential for cumulative effects on 4 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The two interactions identified at the screening stage translated to a total of two schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.19: AD_2 construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-TPO-WRZ6-0752 (2076) AFF-NGW-WRZ6-1083 (2074)	Local population (Population and human health)	***Identifying sources:*** AFF-TPO-WRZ6-0752 (2076) will import treated water from Thames Water via Ladymead Interconnection Point for transfer to Park Barn Drive Reservoir. AFF-NGW-WRZ6-1083 (2074) is a third party scheme to obtain a supply from the Surrey University site in Guildford. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around Park Barn Drive Reservoir – the schemes divert in different directions from this location. Interactions between a small proportion of the pipeline and the Reservoir could occur during construction and this is likely to be focused around Woodside Road. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**
AFF-TPO-WRZ4-0412 (2041) AFF-NGW-WRZ4-0624 (2040)	Local population (Population and human health)	***Identifying sources:*** AFF-TPO-WRZ4-0412 (2041) proposes to purchase or lease and then transfer any potential spare capacity from 3 existing boreholes owned by Hillingdon Hospital. AFF-NGW-WRZ4-0624 (2040) proposes obtaining supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area. The water is to be pumped via a new pipeline along the Grand Union Canal towpath for treatment at a new Iver 2 WTW location. A new pipeline will then take the water to existing Iver for onward transfer to an upgraded Harrow Service Reservoir. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as there are no direct interactions between the schemes; the construction locations however are located within 3km of each other and fall within similar timeframes. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**

Potential effects on surface water or groundwater

Three interactions identified at the screening stage translated to a total of three schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.20: AD_2 surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2051) AFF-NGW-WRZ3-1068 (2046) AFF-RES-WRZ3-0814 (2077)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2051) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2046) proposes new abstraction from an existing groundwater borehole. AFF-RES-WRZ3-0814 (2077) is an augmentation scheme to help offset sustainability reductions and involves abstracting water from the River Ouzel, storing it at a new raw water reservoir at Honeywick Rye, and discharging flow to the Upper Lee River ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the schemes for their potential impact from abstraction on surface water (Rivers Ivel and Ouzel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in the schemes no significant residual impacts are predicted.	**Medium**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Uncertainty, mitigation and monitoring: The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	

Potential effects on high value receptors

30 interactions identified at the screening stage translated to a total of 16 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.21: AD_2 high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RTR-WRZ7-0301 (2068) AFF-RNC-WRZ7-0626 (2057) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2044) AFF-RTR-WRZ7-0909 (2020)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2057), AFF-RNC-WRZ7-0626 (2066) and AFF-RNC-WRZ7-0900 (2022) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[123] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Chilterns AONB	AFF-NGW-WRZ3-1068 (2025) AFF-NGW-WRZ3-1053 (2030) AFF-RTR-WRZ3-4016 (2042)	***Identifying sources:*** AFF-RTR-WRZ3-4016 (2051) extends into the northern extent of the Chilterns AONB. AFF-NGW-WRZ3-1068 (2025) runs in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2030) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The interactions between the schemes occur around Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[124] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
Surrey Hills AONB	AFF-EGW-WRZ6-0173 (2076) AFF-RTR-WRZ6-0752 (2076)	***Identifying sources:*** AFF-EGW-WRZ6-0173 (2076) seeks to optimize abstraction from the existing Clandon Source. Although located adjacent to the Surrey Hills AONB, the scheme does not require any significant infrastructure development. AFF-RTR-WRZ6-0752 (2076) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new	**Low**

[123] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]
[124] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
	AFF-TPO-WRZ6-1083 (2074)	transfer between them. This scheme interacts with scheme AFF-TPO-WRZ6-1083 (2074) which obtains supply from an existing borehole at the Surrey University site in Guildford and requires new pipework to connect to the existing Affinity Water network. ***Potential environmental change and predicted response to change:*** The interaction occurs around the existing Park Drive Barn Reservoir, located around 1.8km north of the Surrey Hills AONB. The schemes are contained within the settlement area of Guildford and as such are unlikely to lead to significant cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[125] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
South West London Waterbodies Ramsar and SPA.	AFF-NGW-WRZ4-0624 (2040) AFF-RES-WRZ4-0832 (2031) AFF-CTR-WRZ4-4001 (2022)	***Identifying sources:*** The abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the rdWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, Surrey Hills AONB, and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan. If impacts are identified to the AONBs as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONBs Board to assess any required mitigation measures.

The HRA for the rdWRMP19 found that the schemes with the potential to cumulatively affect the South West London Waterbodies Ramsar and SPA are not likely to have significant effects on the European designated sites as there are no identified impact pathways.

Interactions with other WRMPs

The WRSE (updated 2018) study identified seven schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes five schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)

[125] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]

- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water rdWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir. Given the scale of the scheme and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 and AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and has a delivery date of 2066. AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and has a delivery date of 2057. Taking the scale of infrastructure proposed and the delivery dates it is considered unlikely that there will be any cumulative effects during construction.

The WRSE work identifies that there is the potential for cumulative effects on two water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water and Southern Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) and AFF-RES-WR5-0809 (Birds Green Reservoir) are identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's rdWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The WFD assessment found that AFF-RES-WR5-0809 has the potential to result in the deterioration in the status of the Lower and Upper Roding surface water bodies during operation. As a result, there is the potential for cumulative effects on the Thames (wider catchment). The WFD assessment recommends that further assessments and discussions with the EA are required to explore the need for and potential of compensatory flows. It is important to note that the delivery date for this scheme under this programme is 2072; it is therefore considered that there is ample time to undertake further investigations (including a more detailed WFD assessment) and identify specific mitigation measures to reduce the likelihood and significance of any residual cumulative effects.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

AD_3

Interactions between supply schemes

Table AVI.22: AD_3 supply-side scheme interactions (adapted from UKWIR SEA guidance)

Supply-side schemes (delivery year)	AFF-EGW-WRZ2-0090 (2071)	AFF-EFF-WRZ3-0180 (2075)	AFF-NGW-WRZ3-1053 (2031)	AFF-NGW-WRZ3-1068 (2026)	AFF-RES-WRZ3-0814 (2077)	AFF-RTR-WRZ3-4016 (2040)	AFF-NGW-WRZ4-0624 (2037)	AFF-RES-WRZ4-0832 (2033)	AFF-TPO-WRZ4-0412 (2071)	AFF-CTR-WRZ4-4001 (2022)	AFF-RES-WRZ5-0809 (2072)	AFF-NGW-WRZ6-0005 (2079)	AFF-ASR-WRZ6-0174 (2074)	AFF-EGW-WRZ6-0173 (2070)	AFF-RTR-WRZ6-0752 (2070)	AFF-TPO-WRZ6-1083 (2069)	AFF-EGW-WRZ7-0629 (2021)	AFF-EGW-WRZ7-0908 (2041)	AFF-RNC-WRZ7-0626 (2066)	AFF-RNC-WRZ7-0900 (2022)	AFF-RTR-WRZ7-0301 (2057)	AFF-RTR-WRZ7-0639 (2020)	AFF-RTR-WRZ7-0909 (2020)
AFF-EGW-WRZ6-0173 (2070)																								
AFF-RTR-WRZ6-0752 (2070)																								
AFF-TPO-WRZ6-1083 (2069)																								
AFF-EGW-WRZ7-0629 (2021)																								
AFF-EGW-WRZ7-0908 (2041)																								
AFF-RNC-WRZ7-0626 (2066)																								
AFF-RNC-WRZ7-0900 (2022)																								
AFF-RTR-WRZ7-0301 (2057)																								
AFF-RTR-WRZ7-0639 (2020)																								
AFF-RTR-WRZ7-0909 (2020)																								

The initial screening identified the potential for:

- One interaction relating to the potential for cumulative effects from construction;
- Four interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 33 interactions relating to the potential for cumulative effects on 4 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The one interaction identified at the screening stage translated to a total of two schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.23: AD_3 construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-TPO-WRZ6-0752 (2070) AFF-NGW-WRZ6-1083 (2069)	Local population (Population and human health)	***Identifying sources:*** AFF-TPO-WRZ6-0752 (2070) will import treated water from Thames Water via Ladymead Interconnection Point for transfer to Park Barn Drive Reservoir. AFF-NGW-WRZ6-1083 (2069) is a third party scheme to obtain a supply from the Surrey University site in Guildford. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around Park Barn Drive Reservoir – the schemes divert in different directions from this location. Interactions between a small proportion of the pipeline and the Reservoir could occur during construction and this is likely to be focused around Woodside Road. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**

Potential effects on surface water or groundwater

Four interactions identified at the screening stage translated to a total of five schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.24: AD_3 surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2051) AFF-NGW-WRZ3-1068 (2046) AFF-RES-WRZ3-0814 (2077)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2051) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2046) proposes new abstraction from an existing groundwater borehole. AFF-RES-WRZ3-0814 (2077) is an augmentation scheme to help offset sustainability reductions and involves abstracting water from the River Ouzel, storing it at a new raw water reservoir at Honeywick Rye, and discharging flow to the Upper Lee River. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the schemes for their potential impact from abstraction on surface water (Rivers Ivel and Ouzel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in the schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	**Medium**
Mid-Chilterns Chalk Groundwater Body	AFF-EGW-WRZ2-0090 (2071)	***Identifying sources:*** AFF-EGW-WRZ2-0090 (2071) is a scheme to increase the deployable output of two boreholes at Stonecross chalk groundwater source to match the agreed licenced peak rate. The works involve an upgrade to the pumps, treatment works and network modification. AFF-ASR-	**Low**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
	AFF-ASR-WRZ6-0174 (2074)	WRZ6-0174 (2074) is a speculative scheme to inject winter excess water into the confined chalk or Lower Greensand for use in the summer peak demand period. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the increased abstraction under AFF-EGW-WRZ2-0090 (2071) may lead to temporary and localised minor impacts on the ecological quality of surface water bodies (Ver River). The assessment however identifies that the recharge of treated water within scheme AFF-ASR-WRZ6-0174 (2074) could mobilise poorer quality water, and new abstraction and recharge may impact on water balance in this Chalk. Overall the WFD assessment considers the schemes unlikely to impact on the unconfined Chalk but requires further information and investigation once abstraction and recharge rates are known. The schemes both have minor, localised and temporary impacts on different elements and are unlikely to have a significant cumulative effect. ***Uncertainty, mitigation and monitoring:*** The WFD Report identifies that there is a need for further information and investigation once abstraction and recharge rates are known to show no impact on water quality and water balance. The next steps would be to establish these rates and undertake a more comprehensive WFD assessment prior to the detailed design stage. This will allow appropriate mitigation to be incorporated within the detailed design. ***Overall rating of cumulative effects:*** While it is recognised that further investigation is needed, as the schemes are identified as having minor, local and temporary impacts on different elements it is considered unlikely that they would have a cumulative negative effect on the status of the groundwater body. Overall it is considered that there is a low risk of cumulative effects.	

Potential effects on high value receptors

33 interactions identified at the screening stage translated to a total of 15 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.25: AD_3 high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RTR-WRZ7-0301 (2057) AFF-RNC-WRZ7-0626 (2066) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2041) AFF-RTR-WRZ7-0909 (2020)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2057), AFF-RNC-WRZ7-0626 (2066) and AFF-RNC-WRZ7-0900 (2022) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[126] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Chilterns AONB	AFF-NGW-WRZ3-1068 (2026) AFF-NGW-WRZ3-1053 (2031) AFF-RTR-WRZ3-4016 (2040)	***Identifying sources:*** AFF-RTR-WRZ3-4016 (2051) extends into the northern extent of the Chilterns AONB. AFF-NGW-WRZ3-1068 (2026) runs in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2031) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The interactions between the schemes occur around Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB.	**Low**

[126] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Uncertainty, mitigation and monitoring: Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[127] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
Surrey Hills AONB	AFF-EGW-WRZ6-0173 (2070) AFF-RTR-WRZ6-0752 (2070) AFF-TPO-WRZ6-1083 (2069) AFF-NGW-WRZ6-0005 (2079)	***Identifying sources:*** AFF-EGW-WRZ6-0173 (2070) seeks to optimize abstraction from the existing Clandon Source. Although located adjacent to the Surrey Hills AONB, the scheme does not require any significant infrastructure development. AFF-NGW-WRZ6-0005 (2079) seeks to recommission the Horsley abstraction well, which again, although located in close proximity to the Surrey Hills AONB does not require any significant infrastructure development (which is limited to treatment upgrades). The works proposed under these schemes are limited and contained within an existing site and considered unlikely to lead to any adverse cumulative effects on the AONB. AFF-RTR-WRZ6-0752 (2070) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new transfer between them. This scheme interacts with scheme AFF-TPO-WRZ6-1083 (2069) which obtains supply from an existing borehole at the Surrey University site in Guildford and requires new pipework to connect to the existing Affinity Water network. ***Potential environmental change and predicted response to change:*** The interaction occurs around the existing Park Drive Barn Reservoir, located around 1.8km north of the Surrey Hills AONB. The schemes are contained within the settlement area of Guildford and as such are unlikely to lead to significant cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[128] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
South West London Waterbodies Ramsar and SPA.	AFF-NGW-WRZ4-0624 (2037) AFF-RES-WRZ4-0832 (2033) AFF-CTR-WRZ4-4001 (2022)	***Identifying sources:*** The abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the rdWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Mid-Chilterns Chalk Groundwater Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended.

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, Surrey Hills AONB, and South West London Waterbodies Ramsar and SPA.

[127] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]

[128] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan.

The HRA for the rdWRMP19 found that the schemes with the potential to cumulatively affect the South West London Waterbodies Ramsar and SPA are not likely to have significant effects on the European designated sites as there are no identified impact pathways.

Interactions with other WRMPs

The WRSE (updated 2018) study identified eight schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes five schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water rdWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir. Given the scale of the scheme and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONBs as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONBs Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 and AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and has a delivery date of 2066. AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and has a delivery date of 2057. Taking the scale of infrastructure proposed and the delivery dates it is considered unlikely that there will be any cumulative effects during construction.

The WRSE work identifies that there is the potential for cumulative effects on three water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water, Southern Water and SES Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) and AFF-RES-WR5-0809 (Birds Green Reservoir) are identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The preliminary WFD assessment for Affinity Water's rdWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The WFD assessment found that AFF-RES-WR5-0809 has the potential to result in the deterioration in the status of the Lower and Upper Roding surface water bodies during operation. As a result, there is the potential for cumulative effects on the Thames (wider catchment). The WFD assessment recommends that further assessments and discussions with the EA are required to explore the need for and potential of compensatory flows. It is important to note that the delivery date for this scheme under this programme is 2072; it is therefore considered that there is ample time to undertake further investigations (including a more detailed WFD assessment) and identify specific mitigation measures to reduce the likelihood and significance of any residual cumulative effects.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

AFF-NGW-WRZ6-0005 is also identified in the WRSE study as having the potential for cumulative effects on the Effingham Tertiaries Groundwater Body as a result of interactions with options being considered through the emerging WRMP19 for SES Water, however hydrogeological conditions indicate that the options between the two water companies are unlikely to interact and the study identifies that no further assessment is required unless site specific hydrogeological information indicates otherwise.

Supply-side Challenging Future Adaptive Run

Interactions between supply schemes

Table AVI.26: Supply-side Challenging Future Adaptive Run supply-side scheme interactions (adapted from UKWIR SEA guidance)

Supply-side schemes (delivery year)	AFF-RTR-WRZ1-1066 (2051)	AFF-RTR-WRZ1-4010 (2063)	AFF-CTR-WRZ3-1099 (2059)	AFF-NGW-WRZ3-1053 (2029)	AFF-NGW-WRZ3-1068 (2024)	AFF-CTR-WRZ3-4005 (2035)	AFF-NGW-WRZ4-0624 (2026)	AFF-TPO-WRZ4-0412 (2079)	AFF-CTR-WRZ4-4001 (2022)	AFF-RTR-WRZ4-4011 (2035)	AFF-CTR-WRZ4-4025 (2029)	AFF-RES-WRZ4-0832 (2077)	AFF-RES-WRZ5-0809 (2078)	AFF-RTR-WRZ6-0752 (2077)	AFF-EGW-WRZ6-0173 (2034)	AFF-TPO-WRZ6-4026 (2050)	AFF-EGW-WRZ7-0629 (2021)	AFF-EGW-WRZ7-0908 (2041)	AFF-RNC-WRZ7-0626 (2065)	AFF-RNC-WRZ7-0900 (2022)	AFF-RTR-WRZ7-0301 (2056)	AFF-RTR-WRZ7-0639 (2020)	AFF-RTR-WRZ7-0909 (2020)
AFF-RTR-WRZ1-1066 (2051)																							
AFF-RTR-WRZ1-4010 (2063)																							
AFF-CTR-WRZ3-1099 (2059)																							
AFF-NGW-WRZ3-1053 (2029)																							
AFF-NGW-WRZ3-1068 (2024)																							
AFF-CTR-WRZ3-4005 (2035)																							
AFF-NGW-WRZ4-0624 (2026)																							
AFF-TPO-WRZ4-0412 (2079)																							
AFF-CTR-WRZ4-4001 (2022)																							
AFF-RTR-WRZ4-4011 (2035)																							
AFF-CTR-WRZ4-4025 (2029)																							
AFF-RES-WRZ4-0832 (2077)																							
AFF-RES-WRZ5-0809 (2078)																							
AFF-RTR-WRZ6-0752 (2077)																							
AFF-EGW-WRZ6-0173 (2034)																							
AFF-TPO-WRZ6-4026 (2050)																							
AFF-EGW-WRZ7-0629 (2021)																							
AFF-EGW-WRZ7-0908 (2041)																							
AFF-RNC-WRZ7-0626 (2065)																							
AFF-RNC-WRZ7-0900 (2022)																							
AFF-RTR-WRZ7-0301 (2056)																							
AFF-RTR-WRZ7-0639 (2020)																							
AFF-RTR-WRZ7-0909 (2020)																							

The initial screening identified the potential for:

- One interaction relating to the potential for cumulative effects from construction;
- Two interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 46 interactions relating to the potential for cumulative effects on 5 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The one interaction identified at the screening stage translated to a total of two schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.27: Supply-side Challenging Future Adaptive Run construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-TPO-WRZ4-0412 (2079) AFF-RES-WRZ4-0832 (2077)	Local population (Population and human health)	***Identifying sources:*** AFF-TPO-WRZ4-0412 (2079) is a scheme to purchase or lease and then transfer any potential spare capacity from 3 boreholes owned by Hillingdon Hospital. AFF-RES-WRZ4-0832 (2077) is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at Iver 2 WTW, this scheme also includes upgraded storage at Harrow service reservoir. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as there are no direct interactions between the schemes; the construction locations however are located within 1.5km of each other and fall within similar timeframes. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Population and human health.	**Low**

Potential effects on surface water or groundwater

Two interactions identified at the screening stage translated to a total of four schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI.28: Supply-side Challenging Future Adaptive Run surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2029) AFF-NGW-WRZ3-1068 (2024)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2029) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2024) proposes new abstraction from an existing groundwater borehole. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on surface water (River Ivel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	**Medium**
Lower Thames Gravels Groundwater Body	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads.	**Low**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Potential environmental change and predicted response to change: The WFD assessment identifies the two schemes for their potential impact from abstraction on groundwater and surface water which may affect the ecological and chemical status of the waterbody. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	
Thames (Cookham to Egham) Surface Water Body	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary impacts on habitat and fish communities that may lead to deterioration of the WFD ecological and physico-chemical status. The abstraction may also lead to changes in fluvial regimes and a reduction in energy in the river system. There is also a potential impact on water quality with lower water levels and flows. However, if managed under the LTOA abstraction regime and with flow augmentation from the South East Strategic Reservoir, abstraction will be supported by the upstream flow releases and impact on water quality is likely to be minor, temporary and localised. Overall, the WFD assessment does not anticipate a deterioration in status as a result of the interactions of these schemes. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Colne (from confluence with Chess to River Thames) Surface Water Body	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary localised impacts on habitats and fish communities and on the physio-chemical status of the water body; but no deterioration in status is anticipated. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames; (Evenlode to Thame) (Wallingford to Caversham) Reading to Cookham) Surface Water Bodies.	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential to improve flow rates, and may help improve habitats, improved low flows and chemistry which may positively impact the surface water bodies.	**N/A**

Potential effects on high value receptors

46 interactions identified at the screening stage translated to a total of 18 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.29: Supply-side Challenging Future Adaptive Run high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RTR-WRZ7-0301 (2056) AFF-RNC-WRZ7-0626 (2065) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2056), AFF-RNC-WRZ7-0626 (2065) and AFF-RNC-WRZ7-0900 (2022) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting.	**Low**

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
	AFF-EGW-WRZ7-0908 (2041) AFF-RTR-WRZ7-0909 (2020)	***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[129] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	
Chilterns AONB	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035) AFF-RTR-WRZ1-1066 (2051) AFF-NGW-WRZ3-1068 (2024) AFF-RTR-WRZ3-1099 (2059) AFF-NGW-WRZ3-1053 (2029)	***Identifying sources:*** The strategic schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 (2063) and AFF-RTR-WRZ4-4011 (2035)) extend into the west and run adjacent to the Chilterns AONB (along the southern border of the AONB and outside of the WRZs). The schemes utilise the majority of the same routed pipeline, with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. Further to this, schemes in the north of the central area (AFF-RTR-WRZ1-1066 (2051), AFF-NGW-WRZ3-1068 (2024) and AFF-RTR-WRZ3-1099 (2059)) run in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2029) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The schemes south of the AONB (AFF-RTR-WRZ1-4010 (2063) and AFF-RTR-WRZ4-4011 (2035)) utilise the majority of the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. The main interactions between schemes occur in the area between Hemel Hempstead and Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be predominantly short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[130] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
Surrey Hills AONB	AFF-RTR-WRZ6-0752 (2077) AFF-EGW-WRZ6-0173 (2034)	***Identifying sources:*** AFF-RTR-WRZ6-0752 (2077) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new transfer between them. AFF-EGW-WRZ6-0173 (2034) seeks to optimize abstraction from the existing Clandon Source. Although located adjacent to the Surrey Hills AONB, the scheme does not require any significant infrastructure development. ***Potential environmental change and predicted response to change:*** The interactions are limited as only one of the schemes proposes physical infrastructure (AFF-RTR-WRZ6-0752) and as such cumulative effects on the Surrey Hills AONB are not considered likely. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[131] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
North Wessex Downs AONB	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035)	***Identifying sources:*** The strategic schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) will increase abstraction from the River Thames at Sunnymeads and create new transfers to Harefield Treatment Works, Harefield Reservoir, and Iver 2 WTW. The schemes also require a new South East Strategic Reservoir, new intake and booster pumps and a capacity upgrade at Harefield Reservoir. The schemes utilise the majority of the same routed pipeline that runs adjacent to the northern boundary of North Wessex Downs AONB (outside of the WRZs) with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. ***Potential environmental change and predicted response to change:*** Schemes 4010 and 4011 utilise the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting	**Low**

[129] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]
[130] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]
[131] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for any of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the North Wessex Downs AONB Management Plan.[132] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
South West London Waterbodies Ramsar and SPA.	AFF-RTR-WRZ1-4010 (2063) AFF-RTR-WRZ4-4011 (2035) AFF-NGW-WRZ4-0624 (2026) AFF-CTR-WRZ4-4001 (2022) AFF-RES-WRZ4-0832 (2077)	***Identifying sources:*** The schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) along with the abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the fWRMP19 found that schemes 0624 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. For options 4010 and 4011 the HRA found that there is the potential for a likely significant effect in relation to the South West London Waterbodies SPA and Ramsar. Both options provide a pipeline that runs adjacent to the South West London Waterbodies SPA and Ramsar site which is also designated as Wraysbury No.1 Gravel Pit SSSI. The HRA proposed mitigation recommendations to ensure that there would be no adverse effects on the integrity of the SPA or Ramsar site. ***Uncertainty, mitigation and monitoring:*** The HRA recommends in relation to schemes 4010 and 4011 that the inclusion of these schemes is accompanied by an explicit commitment to ensure that the programming and construction processes for this scheme take into account the proximity of the SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA/Ramsar site are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. As a precaution, it is further recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Lower Thames Gravels Groundwater Body, the Thames (Cookham to Egham) Surface Water Body, and the Colne (from confluence with Chess to River Thames) Surface Water Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended.

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

The assessment has also identified the potential for positive effects arising as a result of schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) interacting to improve habitats and improve low flows and chemistry within the Thames (Evenlode to Thame, Wallingford to Caversham, and Reading to Cookham) Surface Water Bodies.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, Surrey Hills AONB, North Wessex Downs AONB and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan.

The HRA for the fWRMP19 recommended a number of mitigation measures in relation to the schemes AFF-RTR-WRZ1-4010 (2063) and AFF-RTR-WRZ4-4011 (2035) which will need to be taken into consideration during construction and operation to minimise the risks associated with the European designated sites (South West London Waterbodies Ramsar and SPA). This mitigation includes an explicit commitment to ensure that the programming and construction processes for

[132] Landscapes for Life (2014) North Wessex Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://www.northwessexdowns.org.uk/uploads/File_Management/NWD_Docs/About_Us/Management_Plan/NWD_AONB_Management_Plan_2014-19.pdf [accessed 17/01/19]

the schemes take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level.

Interactions with other WRMPs

The WRSE (updated 2018) study identified eight schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes five schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water fWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir. Given the scale of the scheme and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 and AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and has a delivery date of 2065. AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and has a delivery date of 2056. Taking the scale of infrastructure proposed and the delivery dates it is considered unlikely that there will be any cumulative effects during construction.

The WRSE work identifies that there is the potential for cumulative effects on three water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water, Southern Water and South East Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) and AFF-RES-WR5-0809 (Birds Green Reservoir) are identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's fWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The WFD assessment found that AFF-RES-WR5-0809 has the potential to result in the deterioration in the status of the Lower and Upper Roding surface water bodies during operation. As a result, there is the potential for cumulative effects on the Thames (wider catchment). The WFD assessment recommends that further assessments and discussions with the EA are required to explore the need for and potential of compensatory flows. It is important to note that the delivery date for this scheme under this programme is 2078; it is therefore considered that there is ample time to undertake further investigations (including a more detailed WFD assessment) and identify specific mitigation measures to reduce the likelihood and significance of any residual cumulative effects.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

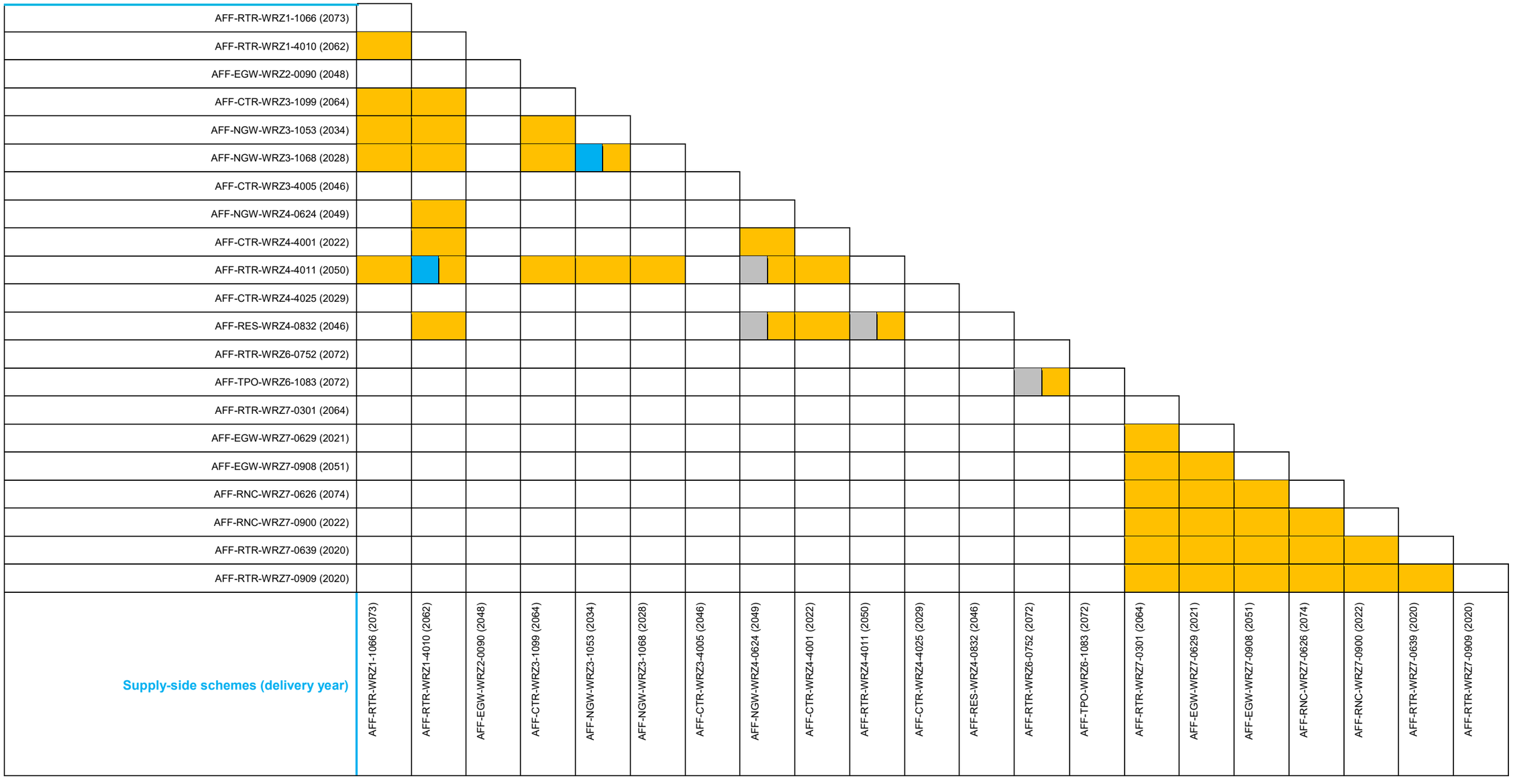
The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

Finally, AFF-NGW-WRZ4-0624 is also identified in the WRSE study as having the potential for cumulative effects on the Lower Thames Gravels and Twyford Tertiaries Groundwater Bodies as a result of interactions with the option ASR-4 being considered through the emerging WRMP19 for South East Water. The study concludes that as both schemes are within the confined chalk aquifer they are unlikely to impact on surface water features and habitats, with no further assessment required unless site specific hydrogeological information indicates otherwise.

Optimistic Adaptive Run

Interactions between supply schemes

Table AVI.30: Optimistic Adaptive Run supply-side scheme interactions (adapted from UKWIR SEA guidance)



The initial screening identified the potential for:

- Four interactions relating to the potential for cumulative effects from construction;
- Two interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and

- 46 interactions relating to the potential for cumulative effects on 5 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects related to construction

The four interactions identified at the screening stage translated to a total of five schemes being reviewed regarding the potential for cumulative effects in terms of construction. The findings of this work are set out below.

Table AVI.31: Optimistic Adaptive Run construction related CEA

Scheme (and Delivery Date)	Receptor / SEA Topic	Assessment of potential for cumulative effects	Risk rating (RAG)
AFF-NGW-WRZ4-0624 (2049) AFF-RTR-WRZ4-4011 (2050) AFF-RES-WRZ4-0832 (2046)	Local population (Population and human health) Historic environment (cultural heritage, including architectural and archaeological heritage)	***Identifying sources:*** AFF-NGW-WRZ4-0624 (2049) proposes obtaining supplies from existing Lower Greensand boreholes that are currently owned by third parties in the Slough area. The water is to be pumped via a new pipeline along the Grand Union Canal towpath for treatment at a new Iver 2 WTW location. A new pipeline will then take the water to existing Iver for onward transfer to an upgraded Harrow Service Reservoir. AFF-RTR-WRZ4-4011 (2050) is a strategic scheme to increase raw water abstraction from the River Thames at Sunnymeads and onwards transfer by a new main for treatment at Iver 2 WTW. The scheme requires a new South East Strategic Reservoir, four new intake pumps at Sunnymeads and the mains transfer. AFF-RES-WRZ4-0832 (2046) is a scheme to import water from the Brent Reservoir via the River Brent and Grand Union Canal for abstraction at the existing Iver WTW and treatment at Iver 2 WTW, this scheme also includes upgraded storage at Harrow service reservoir. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around the existing Iver WTW when the mains intersect to deliver water for treatment. Iver Court Farmhouse is a Listed Building; however, this is located further north of the interaction point and surrounded by other built development. As such, it is not considered likely that the schemes will lead to significant adverse cumulative effects in regards to the historic environment. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topics Population and human health and Historic environment.	**Low**
AFF-TPO-WRZ6-1083 (2072) AFF-RTR-WRZ6-0752 (2072)	Local population (Population and human health)	***Identifying sources:*** AFF-RTR-WRZ6-0752 (2072) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new transfer between them. This is linked to AFF-TPO-WRZ6-1083 (2072) which obtains supply from an existing borehole at the Surrey University site in Guildford and requires new pipework to connect to the existing Affinity Water network. ***Potential environmental change and predicted response to change:*** Construction related cumulative effects are limited as the interactions between the schemes occur at one location around Park Barn Drive Reservoir, where both schemes create new transfer connections to an upgraded reservoir. The construction of these options during a similar timeframe has the potential for short term temporary cumulative effects in the local area that relate to traffic disruption, disruption to public rights of way, noise, disturbance and nuisance effects. These effects relate to the SEA topic Population and human health. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Population and human health.	**Low**

Potential effects on surface water or groundwater

Two interactions identified at the screening stage translated to a total of four schemes being considered in more detail with regard to cumulative effects on surface and/ or groundwater bodies. The findings of this work are set out below.

Table AVI:32: Optimistic Adaptive Plan surface water and groundwater CEA

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Upper Bedford Ouse Woburn Sands Groundwater Body	AFF-NGW-WRZ3-1053 (2034) AFF-NGW-WRZ3-1068 (2028)	***Identifying sources:*** AFF-NGW-WRZ3-1053 (2034) proposes a new groundwater abstraction borehole and AFF-NGW-WRZ3-1068 (2028) proposes new abstraction from an existing groundwater borehole.	**Medium**

Water body	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Potential environmental change and predicted response to change: The WFD assessment identifies the two schemes for their potential impact from abstraction on surface water (River Ivel) if abstraction from confined Lower Greensand affects Woburn Sands groundwater body input to surface water. Abstraction may impact Restoring Sustainable Abstraction (RSA) programme. There is also the potential for deterioration of current Poor water balance from abstraction depending on extent of confined Lower Greensand abstraction influence. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. Monitor water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body. Mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level. ***Overall rating of cumulative effects:*** Until further hydrogeological assessments are carried out it is considered that there is an overall medium risk of cumulative adverse effects regarding groundwater and the SEA water topic.	
Lower Thames Gravels Groundwater Body	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies the two schemes for their potential impact from abstraction on groundwater and surface water which may affect the ecological and chemical status of the waterbody. The risk screening of potential to cause deterioration of current WFD status identifies that in both schemes no significant residual impacts are predicted. ***Uncertainty, mitigation and monitoring:*** Natural attenuation will reduce any turbidity resulting from drilling. CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames (Cookham to Egham) Surface Water Body	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary impacts on habitat and fish communities that may lead to deterioration of the WFD ecological and physico-chemical status. The abstraction may also lead to changes in fluvial regimes and a reduction in energy in the river system. There is also a potential impact on water quality with lower water levels and flows. However, if managed under the LTOA abstraction regime and with flow augmentation from the South East Strategic Reservoir, abstraction will be supported by the upstream flow releases and impact on water quality is likely to be minor, temporary and localised. Overall, the WFD assessment does not anticipate a deterioration in status as a result of the interactions of these schemes. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Colne (from confluence with Chess to River Thames) Surface Water Body	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential during construction for minor temporary localised impacts on habitats and fish communities and on the physio-chemical status of the water body; but no deterioration in status is anticipated. ***Uncertainty, mitigation and monitoring:*** CoPC and best practice for design, construction and operations reduce risks to water quality. If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA water topic.	**Low**
Thames; (Evenlode to Thame) (Wallingford to Caversham) Reading to Cookham) Surface Water Bodies.	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050)	***Identifying sources:*** The strategic schemes will increase abstraction from the River Thames at Sunnymeads. ***Potential environmental change and predicted response to change:*** The WFD assessment identifies that the two schemes have the potential to improve flow rates, and may help improve habitats, improved low flows and chemistry which may positively impact the surface water bodies.	**N/A**

Potential effects on high value receptors

46 interactions identified at the screening stage translated to a total of 18 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.33: Optimistic Adaptive Run high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RNC-WRZ7-0626 (2074) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2051) AFF-RTR-WRZ7-0909 (2020) AFF-RTR-WRZ7-0301 (2064)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RTR-WRZ7-0301 (2064), AFF-RNC-WRZ7-0626 (2074) and AFF-RNC-WRZ7-0900 (2022) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[133] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Chilterns AONB	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050) AFF-RTR-WRZ1-1066 (2073) AFF-NGW-WRZ3-1068 (2028) AFF-RTR-WRZ3-1099 (2064) AFF-NGW-WRZ3-1053 (2034)	***Identifying sources:*** The strategic schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 (2062) and AFF-RTR-WRZ4-4011 (2050)) extend into the west and run adjacent to the Chilterns AONB (along the southern border of the AONB and outside of the WRZs). The schemes utilise the majority of the same routed pipeline with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. Further to this, schemes in the north of the central area (AFF-RTR-WRZ1-1066 (2073), AFF-NGW-WRZ3-1068 (2028) and AFF-RTR-WRZ3-1099 (2064)) run in close proximity to the Chilterns AONB between Hemel Hempstead and Luton. In the north east of Luton, scheme AFF-NGW-WRZ3-1053 (2034) is also located in close proximity to the northern extent of the AONB. ***Potential environmental change and predicted response to change:*** The schemes south of the AONB (AFF-RTR-WRZ1-4010 (2062) and AFF-RTR-WRZ4-4011 (2050)) utilise the majority of the same routed pipeline, with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. The main interactions between schemes occur in the area between Hemel Hempstead and Luton; however, the planned timeframes for the work reduce the potential cumulative impacts of these schemes. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Longer term impacts are likely to be minor and relate to visible new infrastructure affecting the AONB and its setting. AFF-NGW-WRZ3-1053 is located further from the other schemes identified and further from the AONB and as such the interactions are limited. The works proposed under this scheme are limited and contained within an existing site and the scheme is considered unlikely to lead to any adverse cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the Chilterns AONB Management Plan.[134] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
Surrey Hills AONB	AFF-TPO-WRZ6-1083 (2072) AFF-RTR-WRZ6-0752 (2072)	***Identifying sources:*** AFF-RTR-WRZ6-0752 (2072) proposes an import of treated water from Thames Water via Ladymede Interconnection Point for transfer to Park Barn Drive Reservoir. The scheme requires an upgrade at Park Barn Drive Reservoir, a new pumping station at Ladymede Interconnection Point and a new transfer between them. This scheme interacts with scheme AFF-TPO-WRZ6-1083 (2072) which obtains supply from an existing borehole at the Surrey University site in Guildford and requires new pipework to connect to the existing Affinity Water network. ***Potential environmental change and predicted response to change:*** The interaction occurs around the existing Park Drive Barn Reservoir, located around 1.8km north of the Surrey Hills AONB. The schemes are contained within the settlement area of Guildford and as such are unlikely to lead to significant cumulative effects on the AONB.	**Low**

[133] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]
[134] The Chilterns Conservation Board (2014) Chilterns Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://chilternsaonb.org/uploads/files/ConservationBoard/ManagementPlan/Management%20Plan%202014-19/chilterns_management_plan_2014-19_final.pdf [accessed 17/01/19]

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
		Uncertainty, mitigation and monitoring: If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[135] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	
North Wessex Downs AONB	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050)	***Identifying sources:*** The strategic schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) will increase abstraction from the River Thames at Sunnymeads and create new transfers to Harefield Treatment Works, Harefield Reservoir, and Iver 2 WTW. The schemes also require a new South East Strategic Reservoir, new intake and booster pumps and a capacity upgrade at Harefield Reservoir. The schemes utilise the same routed pipeline that runs adjacent to the northern boundary of North Wessex Downs AONB (outside of the WRZs) with AFF-RTR-WRZ1-4010 extending the pipeline north to Harefield Reservoir. ***Potential environmental change and predicted response to change:*** Schemes 4010 and 4011 utilise the majority of the same routed pipeline to a certain point, with scheme AFF-RTR-WRZ1-4010 extending the pipeline further north to Harefield Reservoir. As such there are limited interactions between the schemes which are considered unlikely to lead to cumulative adverse effects on the AONB. Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for any of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the North Wessex Downs AONB Management Plan.[136] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**
South West London Waterbodies Ramsar and SPA.	AFF-RTR-WRZ1-4010 (2062) AFF-RTR-WRZ4-4011 (2050) AFF-NGW-WRZ4-0624 (2049) AFF-CTR-WRZ4-4001 (2022) AFF-RES-WRZ4-0832 (2046)	***Identifying sources:*** The schemes which increase abstraction from the River Thames at Sunnymeads (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) along with the abstraction and transfer scheme in Slough (AFF-NGW-WRZ4-0624) and transfer schemes AFF-RES-WRZ4-0832 and AFF-CTR-WRZ4-4001 all intersect around the existing Iver Treatment Works. ***Potential environmental change and predicted response to change:*** The HRA for the fWRMP19 found that schemes 0624, 0832 and 4001 are not likely to have significant effects on any European sites as there are no identified impact pathways. For options 4010 and 4011 the HRA found that there is the potential for a likely significant effect in relation to the South West London Waterbodies SPA and Ramsar. Both options provide a pipeline that runs adjacent to the South West London Waterbodies SPA and Ramsar site which is also designated as Wraysbury No.1 Gravel Pit SSSI. The HRA proposed mitigation recommendations to ensure that there would be no adverse effects on the integrity of the SPA or Ramsar site. ***Uncertainty, mitigation and monitoring:*** The HRA recommends in relation to schemes 4010 and 4011 that the inclusion of these schemes is accompanied by an explicit commitment to ensure that the programming and construction processes for this scheme take into account the proximity of the SPA/Ramsar site and that construction works on the short section of pipeline adjacent to the SPA/Ramsar site are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level. As a precaution, it is further recommended that the inclusion of this option within the WRMP is accompanied by an explicit commitment to carefully design the pipeline, informed by geotechnical and hydrogeological investigations as necessary, to ensure that there is no requirement for dewatering of the excavation, or that any dewatering that is required is returned immediately to ground. These would enable the pipeline to be installed at a suitable depth and in a suitable manner that groundwater continuity to the gravel pits would not be disrupted and groundwater quality would be protected. ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity given the findings of the HRA process.	**Low**

Summary of cumulative effects

Overall the assessment has found that there is a low risk arising during construction of cumulative adverse effects regarding the SEA topic of population and human health. Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise the potential cumulative effects identified.

Regarding the SEA water topic, the assessment has identified a low risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Lower Thames Gravels Groundwater Body, the Thames (Cookham to Egham) Surface Water Body, and the Colne (from confluence with Chess to River Thames) Surface Water Body; where mitigation, including CoPC and best practice for design, construction and operations is recommended.

[135] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]
[136] Landscapes for Life (2014) North Wessex Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: http://www.northwessexdowns.org.uk/uploads/File_Management/NWD_Docs/About_Us/Management_Plan/NWD_AONB_Management_Plan_2014-19.pdf [accessed 17/01/19]

The assessment has also identified a medium risk of cumulative adverse effects as a result of schemes interacting with the potential to affect the Upper Bedford Ouse Woburn Sands Groundwater Body. The WFD assessment identifies that further hydrogeological assessment to consider linkage between deep Lower Greensand aquifer and Upper Bedford Ouse Woburn Sands is required. It is also recommended that water levels/flows in the Upper Bedford Ouse Woburn Sands Groundwater Body are monitored and mitigation could include a hands-off flow condition to prevent abstraction if water levels/ flows drop below a certain level.

The assessment has also identified the potential for positive effects arising as a result of schemes (AFF-RTR-WRZ1-4010 and AFF-RTR-WRZ4-4011) interacting to improve water levels and flow rates, improve habitats and improve low flows and chemistry within the Thames (Evenlode to Thame, Wallingford to Caversham, and Reading to Cookham) Surface Water Bodies.

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topics relating to biodiversity and landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB, Chilterns AONB, Surrey Hills AONB, North Wessex Downs AONB and South West London Waterbodies Ramsar and SPA.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan.

The HRA for the fWRMP19 recommended a number of mitigation measures in relation to the schemes AFF-RTR-WRZ1-4010 (2062) and AFF-RTR-WRZ4-4011 (2050) which will need to be taken into consideration during construction and operation to minimise the risks associated with the European designated sites (South West London Waterbodies Ramsar and SPA). This mitigation includes an explicit commitment to ensure that the programming and construction processes for the schemes take into account the proximity of the SPA and that construction works on the short section of pipeline adjacent to the SPA are programmed to avoid the winter (October to March) period entirely or are accompanied by an impact assessment including noise modelling and mitigation in line with British Standard BS5228 as required in order to ensure that noise levels can be maintained at an acceptable level.

Interactions with other WRMPs

The WRSE (updated 2018) study identified seven schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

This includes five schemes located within the Southeast Region (WRZ 7 - Dour) which are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0301 (Barham Import Increase (of 2Ml/d) to 4Ml/d)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water fWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0301 proposes a small upgrade of the Chalksole Service Reservoir. Given the scale of the scheme and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RTR-WRZ7-0301 and AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and has a delivery date of 2074. AFF-RTR-WRZ7-0301 does not propose any significant new infrastructure and has a delivery date of 2064. Taking the scale of infrastructure proposed and the delivery dates it is considered unlikely that there will be any cumulative effects during construction.

The WRSE work identifies that there is the potential for cumulative effects on three water bodies as a result of interactions with schemes being considered in the WRMPs19 for Thames Water, Southern Water and South East Water.

AFF-RES-WRZ4-0832 (Brent Reservoir) is identified in the WRSE study as having the potential for cumulative effects on the Thames (wider catchment) as a result of interactions with options being considered through the emerging WRMP19 for Thames Water. The WFD assessment for Affinity Water's fWRMP19 found that AFF-RES-WRZ4-0832 would interact with the Lower Brent surface water body and would have no measurable or significant impact on the surface water body in terms of changes in flow velocity and volume from abstraction or any changes to hydromorphology during operation.

The other schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

Finally, AFF-NGW-WRZ4-0624 is also identified in the WRSE study as having the potential for cumulative effects on the Lower Thames Gravels and Twyford Tertiaries Groundwater Bodies as a result of interactions with the option ASR-4 being considered through the emerging WRMP19 for South East Water. The study concludes that as both schemes are within the confined chalk aquifer they are unlikely to impact on surface water features and habitats, with no further assessment required unless site specific hydrogeological information indicates otherwise.

Environmental Adaptive Run

Interactions between supply schemes

Table AVI.34: Environmental Adaptive Run supply-side scheme interactions (adapted from UKWIR SEA guidance)

Supply-side schemes (delivery year)	AFF-EGW-WRZ2-0090 (2069)	AFF-RTR-WRZ3-4016 (2034)	AFF-CTR-WRZ4-4001 (2022)	AFF-TPO-WRZ4-0412 (2058)	AFF-TPO-WRZ6-1083 (2076)	AFF-EGW-WRZ6-0173 (2076)	AFF-EGW-WRZ7-0629 (2021)	AFF-EGW-WRZ7-0908 (2048)	AFF-RTR-WRZ7-0639 (2020)	AFF-RTR-WRZ7-0842 (2072)	AFF-RTR-WRZ7-0909 (2020)	AFF-RNC-WRZ7-0626 (2058)	AFF-RNC-WRZ7-0900 (2022)
AFF-EGW-WRZ2-0090 (2069)													
AFF-RTR-WRZ3-4016 (2034)													
AFF-CTR-WRZ4-4001 (2022)													
AFF-TPO-WRZ4-0412 (2058)													
AFF-TPO-WRZ6-1083 (2076)													
AFF-EGW-WRZ6-0173 (2076)													
AFF-EGW-WRZ7-0629 (2021)													
AFF-EGW-WRZ7-0908 (2048)													
AFF-RTR-WRZ7-0639 (2020)													
AFF-RTR-WRZ7-0842 (2072)													
AFF-RTR-WRZ7-0909 (2020)													
AFF-RNC-WRZ7-0626 (2058)													
AFF-RNC-WRZ7-0900 (2022)													

The initial screening identified the potential for:

- No interactions relating to the potential for cumulative effects from construction;
- No interactions relating to the potential for cumulative effects on the same WFD surface or groundwater body; and
- 22 interactions relating to the potential for cumulative effects on 2 different sensitive receptors.

The options and interactions highlighted through the initial screening process were reviewed in further detail to assess the potential for cumulative effects and level of risk (Red, Amber or Green (RAG)).

Potential effects on high value receptors

22 interactions identified at the screening stage translated to a total of 9 schemes being considered in more detail with regard to cumulative effects on high value receptors. The findings of this work are set out below.

Table AVI.35: Environmental Adaptive Run high value receptors CEA

High value receptor	Scheme (and Delivery Date)	Assessment of potential for cumulative effects	Risk rating (RAG)
Kent Downs AONB	AFF-RNC-WRZ7-0626 (2058) AFF-EGW-WRZ7-0629 (2021) AFF-RTR-WRZ7-0639 (2020) AFF-RNC-WRZ7-0900 (2022) AFF-EGW-WRZ7-0908 (2048) AFF-RTR-WRZ7-0909 (2020) AFF-RTR-WRZ7-0842 (2072)	***Identifying sources:*** All of the schemes are located within the Kent Downs AONB, apart from AFF-RNC-WRZ7-0900 which is adjacent to the AONB. However, only AFF-RNC-WRZ7-0626 (2058), AFF-RNC-WRZ7-0900 (2022) and AFF-RTR-WRZ7-0842 (2072) propose physical infrastructure development that may affect the AONB. ***Potential environmental change and predicted response to change:*** Potential effects on the AONB are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term) and temporary visual intrusions predominantly during construction. Longer term impacts are likely to be minor and relate to visible new infrastructure (which is limited within the schemes) affecting the AONB and its setting. ***Uncertainty, mitigation and monitoring:*** Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimize potential cumulative effects identified. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Kent Downs AONB Management Plan.[137] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.	**Low**
Surrey Hills AONB	AFF-EGW-WRZ6-0173 (2076) AFF-TPO-WRZ6-1083 (2076)	***Identifying sources:*** AFF-EGW-WRZ6-0173 (2076) seeks to optimize abstraction from the existing Clandon Source. Although located adjacent to the Surrey Hills AONB, the scheme does not require any significant infrastructure development. AFF-TPO-WRZ6-1083 (2076) is a scheme to obtain supply from an existing borehole at the Surrey University site in Guildford and requires new pipework to connect to the existing Affinity Water network. ***Potential environmental change and predicted response to change:*** There are no interactions between the schemes as only the one scheme proposes infrastructure development that could affect the AONB and/ or its setting. The schemes are also contained within the settlement area of Guildford and as such are unlikely to lead to significant cumulative effects on the AONB. ***Uncertainty, mitigation and monitoring:*** If the infrastructure requirements change for either of the schemes then the findings of this assessment should be reviewed and updated. Any visible new infrastructure should be sensitively designed and adhere to the aims and policies of the Surrey Hills AONB Management Plan.[138] ***Overall rating of cumulative effects:*** Overall there is a low risk of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity.	**Low**

Summary of cumulative effects

Overall the assessment has also found that there are low risks arising (predominantly through construction phases), of cumulative adverse effects regarding the SEA topic relating to landscape and visual amenity. Sensitive receptors found to be at low risk are the Kent Downs AONB and Surrey Hills AONB.

The identified effects in relation to the AONBs are likely to be short-term and temporary associated with traffic and access disruption - including disruption to public rights of way, noise and disturbance (potentially affecting tranquillity and landscape character in the short term). Extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times are considered likely to minimise the potential cumulative effects identified. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan.

Interactions with other WRMPs

The WRSE (updated 2018) study identified five schemes proposed under this programme that could interact with schemes proposed in other WRMPs to have a cumulative effect.

All of the schemes are located within the Southeast Region (WRZ 7 - Dour) and are identified as having the potential to have cumulative effects on the Kent Downs AONB as a result of interactions with options being considered through the emerging WRMP19 for Southern Water (BS_Win, IZT_Sel, and BR_Lug):

- AFF-RNC-WRZ7-0626 (Broome Network Improvement)
- AFF-RTR-WRZ7-0909 (Barham Continuation (After 2019/20))
- AFF-RTR-WRZ7-0842 (Aldington to Saltwood Import Increase by 3Mld)
- AFF-EGW-WRZ7-0908 (Tappington South Licence Variation)
- AFF-EGW-WRZ7-0629 (Lye Oak Licence Variation)

[137] Landscapes for Life (2014) Kent Downs Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18113849/KDAONB-Management-Plan.pdf [accessed 17/01/19]
[138] SurreyHills Board (2014) Surrey Hills Area of Outstanding Natural Beauty Management Plan 2014-2019 [online] available at: https://www.surreyhills.org/wp-content/uploads/2014/12/Surrey-Hills-Management-Plan-17b-SP.pdf [accessed 17/01/19]

Three of the schemes (AFF-RTR-WRZ7-0909, AFF-EGW-WRZ7-0908 and AFF-EGW-WRZ7-0629) involve no new infrastructure so will not interact with the other Affinity Water rdWRMP19 schemes or the Southern Water schemes to have cumulative effects on the AONB. AFF-RNC-WRZ7-0626 proposes minimal new infrastructure and the risk of cumulative effects on the AONB is therefore low.

AFF-RTR-WRZ7-0842 proposes a small upgrade of the Saltwood Reservoir along with a new mains and pump station at the interconnection point. Given the scale of the scheme and potential mitigation available, including screening/ planting, it is considered unlikely that there will be any significant cumulative effects with options being proposed through Southern Water's WRMP19 on the AONB. Any schemes that propose new infrastructure should ensure that it is sensitively designed and is in conformity with the Kent Downs AONB Management and Local Plans. If impacts are identified to the AONB as a result of any landscape scale assessment carried out by WRSE, then Affinity Water will work with other water companies, Natural England and the AONB Board to assess any required mitigation measures.

It is noted that the WRSE work identifies that a Southern Water option BS_Win is within 5km of option AFF-RNC-WRZ7-0626 so there is the potential for wider construction related impacts. As previously mentioned, AFF-RNC-WRZ7-0626 involves minimal new infrastructure and it is considered unlikely that there will be any cumulative effects during construction.

Also, the schemes proposed within this programme and identified through the WRSE study as having the potential for a cumulative effect are AFF-EGW-WRZ7-0629 (Lye Oak (LYEO) Licence Variation) and AFF-EGW-WRZ7-0908 (Tappington South (TAPS) Licence Variation) in WRZ 7. The study identified that these two schemes could interact with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) to have a cumulative effect on the East Kent Chalk - Stour groundwater body.

The preliminary WFD assessment concluded that AFF-EGW-WRZ7-0629 (LYEO Licence Variation) would not pose a significant risk to deterioration and that any impacts would be localised or temporary and not affect the overall status of the groundwater body. The AFF-EGW-WRZ7-0908 scheme involves TAPS, an existing (but disused) groundwater source within an existing licence group. There is a sequence of boreholes connected by an existing raw water main to the treatment works; DENT; TAPN; and RAKN. TAPS is not within this sequence currently and the option is to re-commission the borehole to provide resilience for the licence group (the group output is limited by licence/ treatment works). This scheme was scoped out of the preliminary WFD assessment as there would be no overall increase in abstracted volumes. As a result of the findings of the WFD assessment, it is considered that there is a low risk of cumulative effects arising as a result of interactions with Southern Water option GWA_Fle (Flemings and Woodnesborough WSW licence variation) on the East Kent Chalk - Stour groundwater body.

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