Affinity Water

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Non-Technical Summary

Strategic Environmental Assessment (SEA) Environmental Report

Revised Draft Water Management Resources Plan 2020-2080

February 2019

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

Non-Technical Summary (NTS)

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Quality information

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	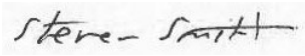	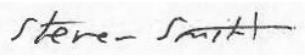
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Revision History

Revision	Revision date	Details	Name	Position
1.0	25 October 2017	Draft for internal review	Alastair Peattie	Principal Consultant
2.0	26 October 2017	Draft for client review	Alastair Peattie	Principal Consultant
3.0	02 November 2017	Revised Draft	Alastair Peattie	Principal Consultant
4.0	12 November 2017	Revised final draft following amendments to the dWRMP19	Alastair Peattie	Principal Consultant
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6.0	24 November 2017	Revised final for consultation alongside the dWRMP19	Alastair Peattie	Principal Consultant
7.0	26 February 2019	Revised to reflect legal review	Alastair Peattie	Associate Director

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1. Introduction

Affinity Water (as a Water Company) has a statutory duty to prepare and maintain a Water Resources Management Plan (WRMP) identifying how they intend to maintain the balance between water supply and demand over a minimum period of 25 years. Affinity Water's revised draft Water Resource Management Plan 2019 (rdWRMP19) will set out the preferred programme (comprising a range of options) to reduce any deficit through implementation of both supply and demand options.

AECOM was appointed by Affinity Water to assist in undertaking a Strategic Environmental Assessment (SEA) for the WRMP19. The purpose of SEA is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation of plans with a view to promoting sustainable development. It is a systematic assessment tool to support and inform decision-making.

The requirement to undertake a SEA arises from European Directive 2001/42/EC 'on the assessment of the effects of certain plans and programmes on the environment' (the 'SEA Directive'). The SEA Directive is transposed into English law through the Environmental Assessment of Plans and Programmes Regulations 2004 (the 'SEA Regulations'). The SEA Directive and associated regulations require a SEA to be undertaken for certain plans and programmes, which are likely to have significant effects on the environment.

There are two key procedural requirements of the SEA Directive, which are:

1. When deciding on 'the scope and level of detail of the information' to be presented in the assessment, the SEA consultation bodies[1] must be provided with the relevant information and given five weeks to comment on the proposed scope and the level of detail the assessment will enter into.
2. A report (the 'Environmental Report') is published for consultation alongside the draft plan - in this case the dWRMP19 - that presents an assessment of the plan as published (i.e. discusses 'likely significant effects' that would result from implementation of the dWRMP19) and any reasonable alternatives.

This is a Non-technical Summary (NTS) of the Environmental Report and supporting appendices for the rdWRMP19, which sets out the detailed method, findings and recommendations for the SEA process.

1.1 Other assessments

A number of other assessments have also been carried out and informed the development of the rdWRMP19. This includes a Habitats Regulations Assessment (HRA) and Water Framework Directive (WFD) assessment. The HRA considered the likelihood for options to have a significant effect on any internationally designated biodiversity (Special Areas of Conservation, Special Protection Areas and Ramsar sites). The WFD assessment identified any options that are likely to have an impact on the ecological and/ or chemical status of surface water or groundwater bodies. These assessments have informed the findings and recommendations of the SEA.

The SEA, HRA and WFD assessments have been undertaken in parallel to ensure an integrated approach to environmental assessment, such that environmental considerations are integral to the development of the rdWRMP19.

[1] In England these are the Environment Agency, Historic England and Natural England.

1.2 Structure of this NTS

This NTS has been prepared to meet the requirements of the SEA Regulations and to facilitate consultation with relevant stakeholders. The NTS is structured as follows:

- **Chapter 1** (this chapter) - sets out the need for an SEA and any other relevant assessments;
- **Chapter 2** - sets out the background to the WRMP;
- **Chapter 3** - provides a summary of the proposed SEA scope and sets out the key issues and SEA Framework;
- **Chapter 4** - sets out how options (supply and demand schemes) were developed, presents the method and findings of the assessment;
- **Chapter 5** - explains the programme appraisal stage, identifies reasonable alternative programmes and sets out the findings the assessment and outline reasons for the selection of the preferred programme and adaptive futures;
- **Chapter 6** - sets out the key findings for the rdWRMP19 and any additional schemes that have a reasonable prospect of coming forward under the adaptive futures;
- **Chapter 7** - sets out the findings of the cumulative effects assessment for the rdWRMP19 (and any additional schemes that have a reasonable prospect of coming forward under the adaptive futures) with other plans, programmes and projects;
- **Chapter 8** - sets out the mitigation identified for the rdWRMP19 (and any additional schemes that have a reasonable prospect of coming forward under the adaptive futures) along with areas for further investigation; and
- **Chapter 9** - sets out next steps along with proposed indicators for monitoring.

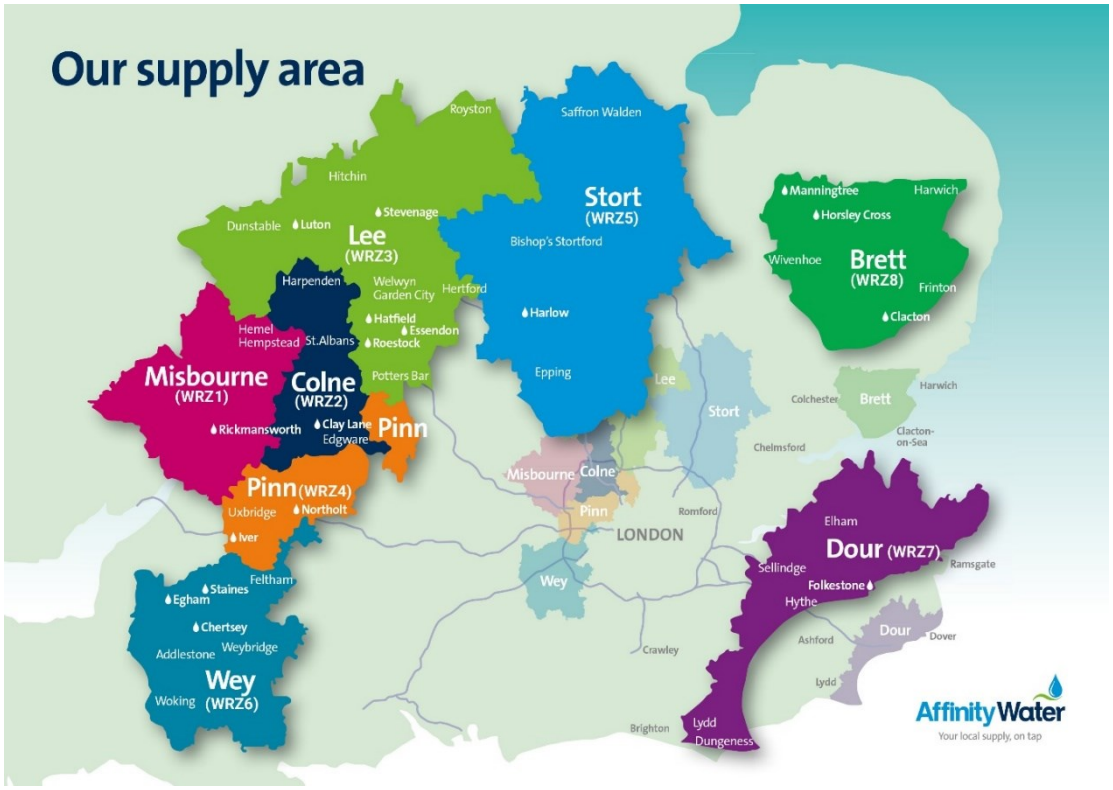
2. The Water Resource Management Plan

2.1 Introduction to Affinity Water

Affinity Water serves a population of over 3.6 million people in 1.4 million properties in the South East and East of England. This amounts to the provision of around 900 million litres of water every day through 16,500 km of water mains. Affinity Water currently has 130 groundwater sources and 96 Water Treatment Works with groundwater making up 65% of supply.

The Operating Area is split into three geographical regions: Central, East, and Southeast**.** These geographic regions are further subdivided into eight water resource zones (WRZs). WRZs are broadly integrated areas in which customers are supplied by a common pipe network from a number of local water sources. WRZs are created to facilitate assessment of the supply/ demand balance - see **Figure 1**.

Figure 1: Affinity Water communities and WRZs



2.1.1 Central region

The Central region is split into six WRZs and provides water to the north London boroughs. The region extends into rural parts of Essex, Hertfordshire and Buckinghamshire and supplies a population of about 3.3 million people.

The Central region obtains 60% of its supply from groundwater sources, with boreholes abstracting from chalk and gravel aquifers. The remaining 40% of the supply is from surface water sources, and imports from neighbouring water companies; Thames Water (including sewage), Anglian Water (including sewage) and Cambridge Water. Water is exported to South East Water and Cambridge Water.

2.1.2 Southeast region

The Southeast region provides water to the towns of Folkestone and Dover, together with surrounding rural areas including Romney Marsh and Dungeness. In the Southeast region, Affinity Water supplies a population of about 170,000 people. Water is imported into the Southeast region from two adjoining water companies: Southern Water and South East Water.

In the Southeast region Affinity Water abstracts 90% of its water from chalk and greensand groundwater boreholes, with a minor component from the Denge Gravels.

2.1.3 East region

In the East region Affinity Water provides water to north east Essex including Harwich and Clacton on Sea. Affinity Water supplies a population of approximately 156,000 people in this region. The East region is bordered by Anglian Water (including sewage) with which it shares a reservoir.

The Affinity Water East region normally takes 100% of its water supply from groundwater sources, but there is the flexibility to also import water from a nearby reservoir which is jointly owned with Anglian Water.

2.2 About the WRMP

Water companies in England and Wales are required by law (the Water Act 2003) to produce a WRMP every five years. The WRMP must set out how a water company intends to maintain the balance between water supply and demand over at least a 25-year period. The WRMP19 must be prepared in accordance with the Water Resources Planning Guideline (WRPG)[2] which was developed by government and water industry regulators. It must also take account of, and support, government policy and aspirations for providing secure, sustainable and affordable water supplies to customers.

The Affinity Water rdWRMP19 will set out the preferred programme (comprising a range of options) to reduce any deficit through implementation of both supply and demand options. The key challenges and issues are similar in nature to those experienced for the last plan (WRMP14) but Affinity Water's understanding of how they differ in scale and complexity has changed and are consistent with the feedback received in relation to the dWRMP19 consultation. These are illustrated in **Figure 2** below.

Figure 2: rdWRMP19 key themes for customers and stakeholders

[2] Environment Agency and Natural Resources Wales (2016) Final Water Resource Planning Guideline.

3. Scoping Information

3.1 Introduction

The first stage in the SEA process sets out the context for the assessment, which is commonly referred to as 'scoping'. A review of the baseline environment was carried out as well as a review of other plans and programmes that may have implications for the emerging dWRMP19 and the SEA. This allowed the identification of key environmental problems or issues within and surrounding Affinity Water's operating area. A number of SEA objectives and assessment questions were then developed to address those key issues and provide a methodological 'framework' for undertaking the assessment of the dWRMP19 and any reasonable alternatives. The SEA objectives and assessment questions are set out in **Table 1** below.

3.2 SEA Framework

This scoping information was presented in a SEA Scoping Report that was sent to key stakeholders (including the Environment Agency, Historic England and Natural England) in December 2017 for review and comment. Any representations received were taken into account as part of the iterative SEA process. The scoping information was updated to reflect these representations.

Table 1: SEA Framework

SEA Objective	Assessment questions (would the options / programme…?)
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?
	1.b. Ensure that customers are not disproportionality affected by cost?
	1.c. Enable the growth ambitions of the study area to be realised?
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?
	2.b. Alter water levels that affect water-based recreation assets?
	2.b. Sever public rights of way or the enjoyment of other land-based recreation or amenity assets?
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?
	3.b. Impact on critical services and industries e.g. energy productions and hospitals?
4. Reduce material consumption and the generation of waste?	4.a. Require significant new construction or demolition of existing assets?
	4.b. Result in higher levels of reuse of waste?
5. Protect and enhance biodiversity including designated and other important habitats and species?	5.a. Impact on European sites?
	5.b. Lead to the loss or degradation of priority habitats / species or lead to the creation of new priority habitats?
	5.c. Impact on non-native species?
	5.d. Affect the condition of SSSIs, particularly those that have a trend of declining condition?
	5.e. Provide opportunities for biodiversity enhancement?
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?
	6.b. Provide opportunities for landscape enhancement?
7. Minimise the effects of the option / plan on air quality and noise?	7.a. Impact an AQMA?
8. Minimise the carbon footprint of the Company?	8.a. Reduce / increase predicted carbon footprint?
	8.b. Maximise the company'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?
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?

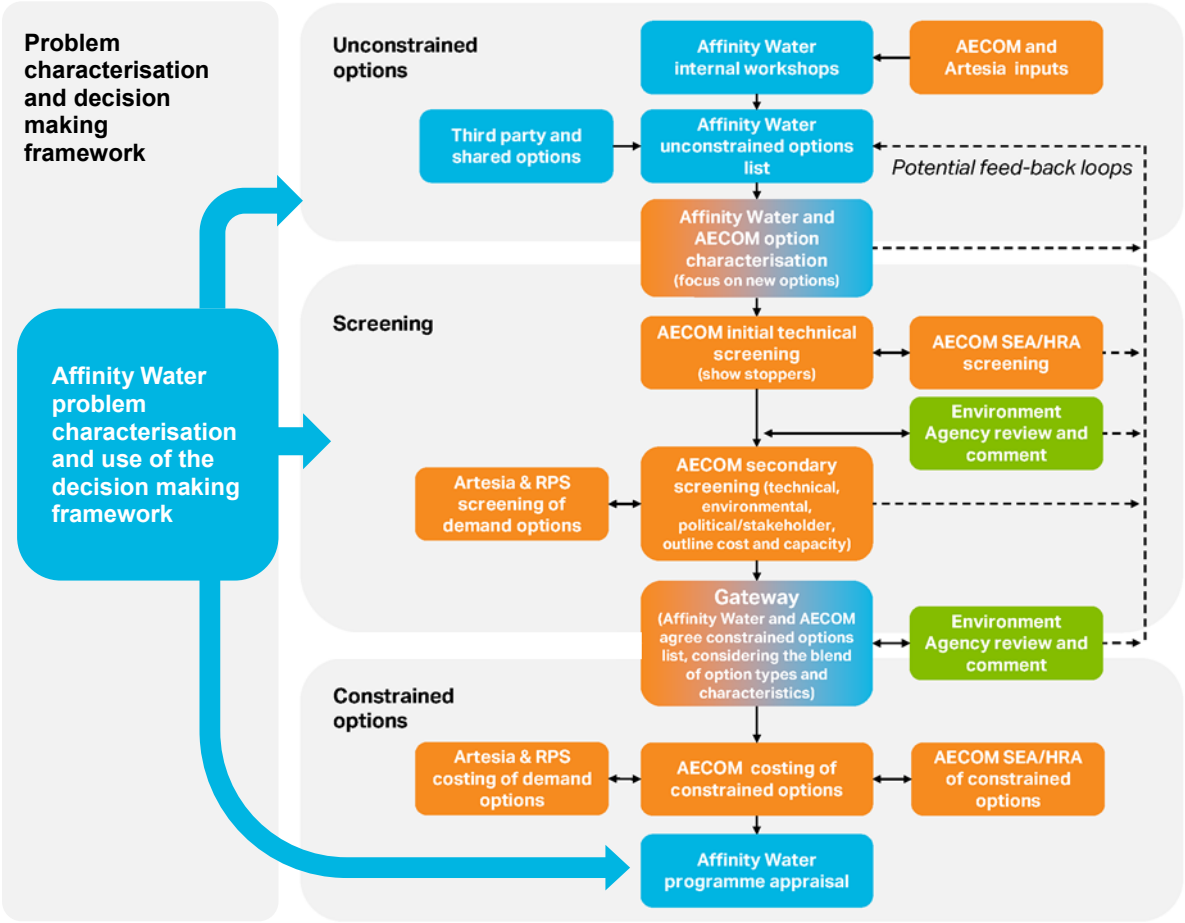
SEA Objective	Assessment questions (would the options / programme…?)
	10.b. Improve water treatment and water quality before it returns to surface water bodies?
	10.c. Alter water table levels and amount of water within aquifers?
	10.d. Increase the risk of saline intrusion or other pollution risks to the aquifers?
11. Avoid adverse impact on surface and groundwater levels and flows?	11.a. Protect or restore adequate levels of flow in rivers and streams?
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)?
13. Conserve and enhance the historic environment, heritage assets and their settings?	13.a. Conserve and/or enhance heritage assets and the historic environment?
	13.b. Alter the hydrological conditions of water-dependent heritage assets, including paleo-environmental deposits?
14. Minimise loss of soil quality and sterilisation of mineral resources?	14.a. Impact upon best and most versatile agricultural land (agricultural land classification grades 1 – 2)?

4. SEA of Options

4.1 Introduction

As part of the WRMP19 process, Affinity Water must identify and assess all realistic demand management and supply-side options that could help to meet predicted demands during the planning period. Affinity Water's option appraisal process for the rdWRMP19 is summarised in **Figure 2** below.

Figure 2: Affinity Water options appraisal process



The SEA has informed decision-making at each key stage in the Affinity Water options appraisal process. The key stages are briefly explained below.

4.2 Unconstrained options

The first stage in Affinity Water's options appraisal process was to identify a long list of supply and demand management options to help meet future demands over the planning horizon. These are options yet to be constrained by factors such as environmental or planning restrictions, health and safety regulations, legal restrictions, promotability or risk. Referred to as 'unconstrained options', they were subjected to a two stage screening assessment (which included SEA criteria) to determine if they were technically feasible and therefore suitable to progress to the next stage of Affinity Water's options appraisal process further consideration.

4.3 Constrained options

Each constrained option was assessed against the full SEA Framework of objectives and assessment questions established during scoping. The SEA found that the demand options were not site-specific and generally involve reducing water use and loss through water efficiency measures, metering, reuse and leakage control. It was concluded that there are no significant differences between the options in terms of the SEA objectives and that none are likely to arise in a significant effect.

A range of different supply-side option types were considered through the SEA process, which included options for the abstraction of water from surface and groundwater bodies as well as new pipelines to transfer water within and outside Affinity Water's operating area. The SEA found that while there is the potential for significant negative effects for some options during construction and operation, it is highly likely that the significance of these effects can be reduced during detailed planning and design of schemes. The assessment found that negative effects during construction primarily arise as a result of the requirement for new infrastructure and the significance of this effect is dependent on the presence of, or pathways to, sensitive receptors. Negative effects during operation generally relate to potential changes in water levels/ flows as a result of increased abstraction and indirect effects on biodiversity.

The drought options are essentially groundwater options that involve increasing peak (and in the case of prolonged drought, average) abstraction above existing licensed volumes or drought related environmental (river flow or groundwater level) constraints. The assessment found that there are no significant effects likely to arise as a result of the drought options as they would be temporary in nature, and are predicted to only have small impacts compared to natural drought impacts.

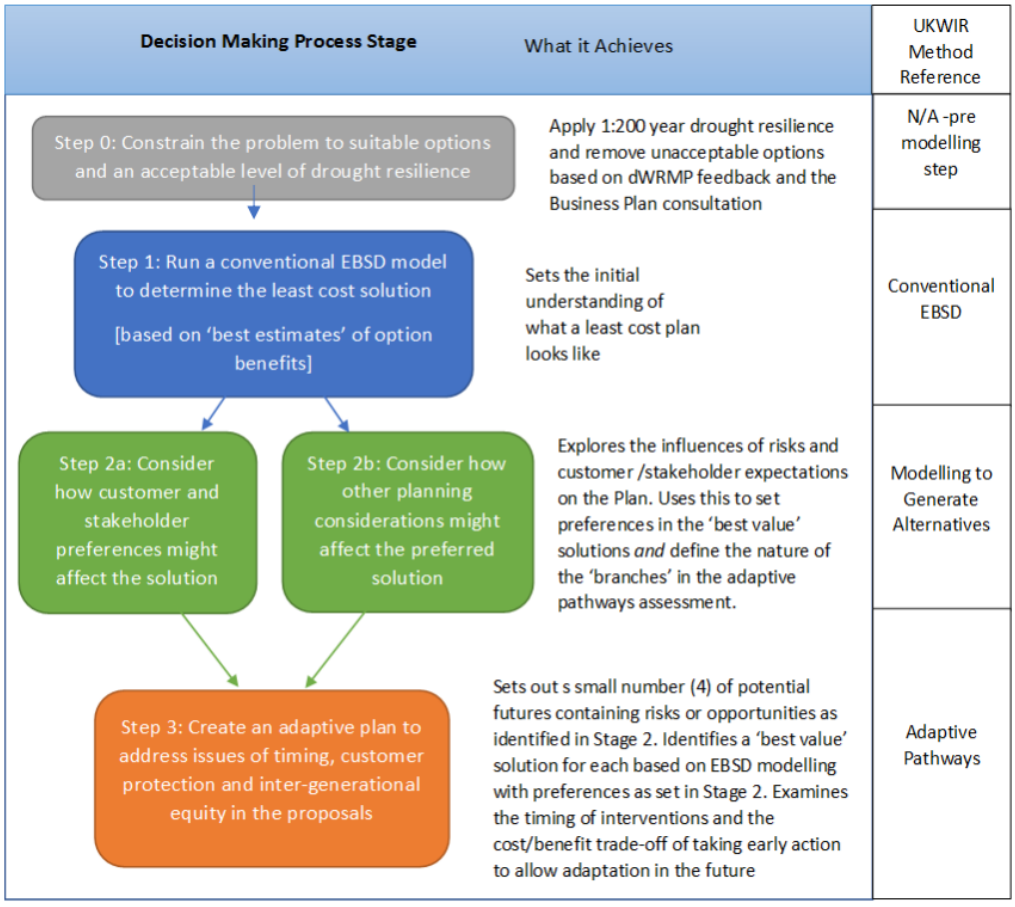
5. SEA of the Alternative Programmes and revised draft WRMP19 decision making

The final task in Affinity Water's option appraisal process (**see Figure 2**) is the programme appraisal. Essentially the aim of the programme appraisal process is to find the 'best value' programme of supply and/ or demand management options to secure a supply-demand balance across the Affinity Water supply area.

5.1 Affinity Water's Decision Making Process

To address the concerns raised during the consultation for the dWRMP19 in 2018, a revised decision making process has been used for the rdWRMP19. The process developed and used by Affinity Water is fully compliant with both the Environment Agency Water Resources Planning Guidance, and the modelling processes and tools described within the UKWIR Decision Making Method guidance. A summary of the revised decision-making process used is provided in **Figure 3** below.

Figure 3: Summary of the Selected Decision Making Process



5.2 Integration of SEA into the programme appraisal

The SEA process was integrated into the programme appraisal stage and informed decision making as follows:

- The SEA findings for individual constrained options were converted into a metric that was fed into the computer model.
- Step 0, removed options/ supply-side schemes associated with new Chalk groundwater abstractions in the Central Region to align with the findings of the SEA, HRA and WFD as well as feedback received from stakeholders, including statutory consultees.

- Step 2, the SEA findings informed the 'bottom up' multi-criteria analysis to determine where the key risks and uncertainties lie in the Plan. The SEA findings along with the customer and stakeholder preferences were used to structure the Adaptive Pathways analysis at the next stage. As a result, a reduced yield was explored for a number of schemes identified as having the potential for impacts on surface and/ or groundwater levels/ flows.
- Following Step 2, a comparative assessment of all reasonable alternative programmes/ adaptive futures was carried out and the findings informed the selection of the preferred programme and adaptive futures in Step 3.

5.3 Identifying reasonable alternative programmes

The SEA Directive states in Article 5 that "*an environmental report shall be prepared in which the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme, are identified, described and evaluated*".

Whilst the rdWRMP19 has a number of objectives, it is clear that meeting the water supply needs of customers over the next 25 years is at the heart of the plan. It is the key issue to be addressed, and taken to be the primary objective of the plan. This is reflected in Environment Agency's WRPG (2018), which states in Section 3 that, "*If there is a deficit you must identify options to increase supply or reduce demand so that you achieve a secure supply of water*".

There are a number of important secondary objectives that have been derived as a result of the guidance and/ or customer, stakeholder or regulator representations to the Affinity Water draft WRMP19 submission in 2018. The secondary objectives are as follows:

1. 1 in 200 Deployable Output (DO Drought Resilience);
2. WINEP3 Sustainability Reductions;
3. No drought options post 2024;
4. To not include source options that pose a risk to the environment in our Central region (no new chalk groundwater options, these are listed earlier in this Chapter);
5. Headroom at 95th percentile;
6. Plan based growth forecast; and
7. AMP7 Leakage Reduction of 18%.
8. Strive to reduce demand (beyond dWRMP19 levels)

For a programme to be considered a reasonable alternative for the purposes of the SEA it must meet the primary and secondary objectives set out above. **Table 2** below identifies the model scenarios (and resultant programmes) that were not taken forward in the modelling process and provides outline reasons why they are not considered to represent reasonable alternative programmes.

Table 2: Outline reasons for programmes identified as not reasonable

Model scenarios	Outline reasons for rejection
Worst Historic DO	Fails to meet objective 1 as this model scenario would not provide the additional level of DO resilience.
1 in 80 DO	Fails to meet objective 1 as this model scenario would not provide the additional level of DO resilience.
1 in 40 DO	Fails to meet objective 1 as this model scenario would not provide the additional level of DO resilience.
1 in 20 DO	Fails to meet objective 1 as this model scenario would not provide the additional level of DO resilience.
1 in 10 DO	Fails to meet objective 1 as this model scenario would not provide the additional level of DO resilience.

SELL leakage reduction target	SELL provides a much lower leakage reduction than the regulator supported 15% AMP7 target. Fails to meet objective 7.
Headroom at 90th percentile	This headroom percentile did not meet secondary objectives which received stakeholder support and fails to meet objective 5.
Headroom at 85th percentile	This headroom percentile did not meet secondary objectives which received stakeholder support and fails to meet objective 5.
Headroom at 80th percentile	This headroom percentile did not meet secondary objectives which received stakeholder support and fails to meet objective 5.
Headroom at 75th percentile	This headroom percentile did not meet secondary objectives which received stakeholder support and fails to meet objective 5.
90% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
85% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
80% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
75% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
70% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
65% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
60% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
55%WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
50% WINEP3	This scenario would not meet the requirements of the secondary objective to meet WINEP3. Fails to meet objective 2.
Grafham full licence from 2020	This scenario is not technically feasible to deliver within the timescale. This scenario therefore fails to meet the water supply needs of customers and fails the primary objective of the plan.
Grafham full licence from 2030	Though this scenario is feasible, it would not meet the secondary objective to remove drought options from 2024 onwards. Fails to meet objective 3.
No Ardleigh agreement revert	This scenario poses a risk to the WRZ8 supply demand balance and uncertain WINEP in the future. Fails to meet objective 2.
Trend based growth forecast	Not in line with recent growth pattern. Fails to meet objective 6.
Econometric based growth forecast	Not in line with recent growth pattern. Fails to meet objective 6.
Hybrid growth forecast	Not in line with recent growth pattern. Fails to meet objective 6.
Chalk groundwater options available	Does not meet the secondary objective to not include options that pose a risk to the environment. Fails to meet objective 4.
LC_1 Least Cost	Does not meet appropriate levels of demand management expected of Affinity Water by representations to the draft WRMP19, nor the 15% AMP7 leakage target that is a secondary objective. Fails to meet objective 7.

The model scenarios identified above and their subsequent programmes have not been carried forward for further consideration in the SEA process as they are not reasonable alternatives, in that they do not meet the objectives of the rdWRMP19.

The model runs and resultant programmes identified by Affinity Water as meeting the objectives (primary and secondary) of the rdWRMP19 are set out below:

- **LC_2** - This is a least cost run with 2025 targets on leakage and PCC.
- **ATL_1** - This run introduced four metrics into our modelling process based on the data collated through the optioneering. Each option was scored against these metrics which were based on Risk, Resilience, Environment and Deliverability. The purpose of this approach was to be able to have the functionality to model different 'priorities' within a least cost model. We could allow the model to select options which only allow for low risk for example, and see to what extent that would changes the outputs, or with a certain level of environmental benefit required etc. This run was ultimately not taken forward as it excluded key demand management and leakage options on the basis of risk whereby these options would be required to meet specific targets.
- **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. It should be noted that the model could not balance supply and demand with no strategic options selected under this scenario. As a result, Affinity Water allowed the selection of AFF-RTR-WRZ3-4016: Minworth Strategic Transfer (100 Ml/d) based on the findings of the SEA, WFD and HRA as it was not identified as having any significant negative effects during operation (apart from the carbon related SEA objective).
- **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.
- **Demand-side Challenging Future Adaptive Run** - This run looks to simulate a challenging demand-side future by using lower levels of demand management savings. 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 the 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 incorporates the 50% leakage reduction target, but does not assume policy support for some key demand management options.
- **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 (see Section 4) as having the potential for a moderate (-2) or major negative (-3) effect during operation are not selected for this run[3]. This run includes expected levels of demand management savings.

It should be noted that demand management options could have an upper (optimistic), central (expected) and lower (reliable) levels of savings. So they have 3x potential savings. Utilisation of

[3] 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.

supply side options can vary (from 100% maximum to 0%), whereas demand side options are simply used or not used, hence this ability to change the savings.

Not all of the programmes identified above were carried forward for further assessment through the SEA process:

- **LC_2** was not progressed as it is not ambitious enough in terms of demand management levels expected of Affinity Water as informed by the representations to the draft WRMP19 and as a result, this programme was deemed to not meet secondary objectives 4 and 7.
- **DMT_1** was not carried forward as it includes the selection and utilisation of a relatively high amount of water efficiency schemes, which in combination are recognised to generate a high level of delivery risk. Affinity Water deems this level of risk to be unacceptable with regards to meeting the primary objective of the plan; meeting the supply needs of customers. For this reason, it was not progressed as a reasonable alternative programme for the rdWRMP19.
- **ATL_1** was not taken further in the modelling process as it involved metric scoring (explained earlier), which excluded key demand management options on the basis of risk. In reality, Affinity Water are willing to accept the level of risk associated with these excluded demand management options and have covered this within their final plan headroom allocation. As these demand management schemes were excluded in this run, the programme of options lacked the ambition our stakeholders and customers requested through the draft WRMP19 consultation and for this reason this programme did not meet secondary objective 8.

It should be noted that, based on expected levels of demand management savings, the **Environmental Adaptive Run** would result in supply deficits near the end of the planning horizon from 2070. This is due to the removal of a number of key supply-side schemes based on the criteria used for this programme of excluding options identified in the SEA as having the potential for moderate (-2) or major negative (-3) effects during operation. This could be mitigated by expecting optimistic levels of demand management savings but this then reduces the flexibility and resilience of this programme. As a result of the supply deficit late in the plan period, it could be argued that the **Environmental Adaptive Run** is not a reasonable alternative because it does not meet the primary objective of the rdWRMP19. Despite this, the programme was carried forward for further consideration through the SEA process as it provides a useful comparison to the other programmes, in particular the **Expected Future Adaptive Run**.

Taking the above into account, the following programmes were considered further through the SEA reasonable alternative programme assessment process:

- AD_1;
- AD_2;
- AD_3;
- Aspirational Adaptive Run;
- Expected Future Adaptive Run;
- Demand-side Challenging Future Adaptive Plan;
- Supply-side Challenging Future Adaptive Run;
- Optimistic Adaptive Run; and
- Environmental Adaptive Run.

The supply-side schemes and their delivery dates (DD) proposed under each of the reasonable alternative programmes are presented in **Table 3** below and are structured according to WRZs.

It should be noted that the adaptive plan ‘futures’ that are presented here as stand-alone alternatives, rather than as an integrated set of actions. For the adaptive plan itself the Brent Reservoir scheme is included in the expected future, and a minimum leakage target is set based on the economics within that run. Both of these apply to all the alternative futures. That means the dates of some subsequent schemes for the ‘challenging and ‘optimistic’ futures are delayed by 1 or 2 years in the main rdWRMP compared to some of the dates descried in the table below.

Table 3: Supply-side schemes under each reasonable alternative programme

	AD_1		Aspirational		Expected Future		Demand-side Challenging		AD_2		AD_3		Supply-side Challenging		Optimistic		Environmental	
Supply-side scheme	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**	**DD**	**AMP**
WRZ1																		
AFF-RTR-WRZ1-4010:Abingdon Reservoir to Harefield Transfer (50Ml)	2059	14	2068	16	2053	13	2073	17					2051	13	2057	16		
AFF-RTR-WRZ1-1066:GUC (GUC - Berkhamstead/Hemel Hempstead)	2070	17			2065	16							2062	15	2069	16		
WRZ2																		
AFF-EGW-WRZ2-0090 : Stonecross Source Optimisation			2051	13	2052	13	2050	13	2071	17	2071	17	2036	10			2069	16
WRZ 3																		
AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole)	2035	10	2046	12	2025	8	2026	8	2025	8	2025	8	2024	7	2037	10		
AFF-NGW-WRZ3-1053 : Kings Walden	2040	11	2051	13	2030	9	2031	9	2030	9	2030	9	2029	8	2042	11		
AFF-CTR-WRZ3-1099 : Boxted to Chaul End	2067	16			2065	15							2059	14	2065	16		
AFF-CTR-WRZ3-4005 : Arkley North	2046	12	2056	14	2041	11	2035	9					2034	9	2045	12		
AFF-CTR-WRZ3-0028 : Iver Arkley Transfer Upgrade			2074	17														
AFF-RTR-WRZ3-4016 : Minworth Strategic Transfer (100 Ml/d)							2051	13			2042	11					2034	9
AFF-EFF-WRZ3-0180 : Stevenage STW - Effluent Reuse									2075	18	2075	18						
AFF-RES-WRZ3-0814 : Honeywick Rye Reservoir									2077	18	2077	18						
WRZ 4																		
AFF-CTR-WRZ4-4001 : Egham to Iver	2022	7	2022	7	2022	7	2022	7	2022	7	2022	7	2022	7	2022	7	2022	7
AFF-RES-WRZ4-0832 : Brent Reservoir	2042	11	2052	13	2034	9	2032	9	2031	9	2031	9						
AFF-NGW-WRZ4-0624 : C&R Trust and GSK Slough Boreholes	2044	11	2055	14	2039	10	2035	10	2040	11	2040	11	2026	8	2043	11		
AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d)	2047	12	2056	14	2041	11	2037	10					2037	10	2045	12		
AFF-TPO-WRZ4-0412 : Hillingdon Hospital boreholes			2067	16	2064	15	2050	13	2041	11	2041	11	2065	16			2058	14

Supply-side scheme	AD_1		Aspirational		Expected Future		Demand-side Challenging		AD_2		AD_3		Supply-side Challenging		Optimistic		Environmental	
	DD	AMP	DD	AMP	DD	AMP	DD	AMP	DD	AMP	DD	AMP	DD	AMP	DD	AMP	DD	AMP
WRZ 5																		
AFF-RES-WRZ5-0809 : Birds Green Reservoir					2078	18			2072	17	2072	17	2078	18				
WRZ 6																		
AFF-TPO-WRZ6-1083 : Surrey University (Guildford Site)					2076	18	2071	17	2074	18	2074	17	2076	18	2079	18	2076	18
AFF-RTR-WRZ6-0752 : Ladymead Optimisation					2077	18			2076	18	2076	18	2076	18				
AFF-EGW-WRZ6-0173 : Clandon Source Optimisation					2079	18			2076	18	2076	18			2079	18	2076	18
AFF-ASR-WRZ6-0174 : Egham ASR							2072	17			2074	17	2077	18				
AFF-NGW-WRZ6-0005 : Horsley source recommissioning											2079	18						
WRZ 7																		
AFF-RTR-WRZ7-0639 : Deal Continuation After 2020	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7
AFF-RTR-WRZ7-0909 : Barham Continuation (After 2019/20)	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7	2020	7
AFF-EGW-WRZ7-0629 : Lye Oak Licence Variation	2021	7	2021	7	2021	7	2021	7	2021	7	2021	7	2021	7	2021	7	2021	7
AFF-RNC-WRZ7-0900 : Dover Constraint Removal	2022	7	2022	7	2021	7	2022	7	2022	7	2022	7	2022	7	2022	7	2022	7
AFF-EGW-WRZ7-0908 : Tappington South - Licence Variation	2059	14	2074	17	2044	11	2041	11	2044	11	2044	11	2049	12	2057	14	2048	12
AFF-RTR-WRZ7-0301 : Barham Import Increase (of 2Ml/d) to 4 Ml/d	2071	17			2057	14	2053	13	2068	16	2068	16	2061	15				
AFF-RNC-WRZ7-0626 : Broome Network Improvement					2066	16	2063	15	2057	14	2057	14	2070	17	2069	16	2058	14
AFF-RTR-WRZ7-0842 : Aldington to Saltwood Import Increase by 3Mld							2020	7									2072	17
Total number of supply-side options	**16**		**16**		**23**		**21**		**20**		**23**		**22**		**17**		**13**	

5.4 SEA of reasonable alternative programmes

An assessment of each of the reasonable alternative programmes was carried out against the SEA objectives. The programmes are all based on different model conditions, which include varying levels of demand management savings (optimistic, expected and lower) as well as the number of supply-side schemes available for selection. As a result, there are differences between the programmes in terms of the overall number of supply-side schemes selected as well as differences between the individual schemes selected.

The programmes that are based on expected or lower demand management savings, or where strategic supply-side schemes (with +50Ml/d benefit) are removed from consideration tend to result in a greater number of supply-side schemes being selected for delivery. This includes the Expected Future (23 supply-side schemes), Demand-side Challenging (21 supply-side schemes), AD_2 (20 supply-side schemes), AD_3 (23 supply-side schemes) and Supply-side Challenging (22 supply-side schemes). The Environmental Adaptive Run includes the fewest supply-side schemes at 13 as a number of schemes could not be selected based on the criteria adopted for this run (i.e. excluding options with moderate or major adverse effects as identified by the SEA).

All of the programmes propose the delivery of the same five supply-side schemes in the first five years of the plan period in AMP7 and with the same delivery date:

- AFF-RTR-WRZ7-0639: Deal Continuation After 2020 (Delivery in 2020)
- AFF-RTR-WRZ7-0909: Barham Continuation (After 2019/20) (Delivery in 2020)
- AFF-EGW-WRZ7-0629: Lye Oak Licence Variation (Delivery in 2021)
- AFF-CTR-WRZ4-4001: Egham to Iver (Delivery in 2022)
- AFF-RNC-WRZ7-0900: Dover Constraint Removal (Delivery in 2022)

All these schemes propose minimal new infrastructure and as a result, they are not identified as having the potential for a significant negative effect either during construction or operation through the SEA, HRA or the WFD assessment.

All of the programmes except for the Environmental Adaptive Run include the delivery of AFF-NGW-WRZ3-1068: Runley Wood (AMP7 LGS Borehole) and AFF-NGW-WRZ3-1053: Kings Walden. Both of these schemes are identified through the assessment as having the potential for a moderate negative effect on SEA objectives relating to WFD status and surface and groundwater levels/ flows. This was informed by the WFD assessment for the rdWRMP19, which identifies that the groundwater abstractions may influence local water balance in Woburn Sands groundwater body depending on extent of confined Lower Greensand (LGS) abstraction influence.

All of the programmes select the delivery of AFF-NGW-WRZ3-1068: Runley Wood (AMP7 LGS Borehole) first and then AFF-NGW-WRZ3-1053: Kings Walden shortly after in the following AMP. The Supply-side Challenging Future Adaptive programme proposes the earliest delivery of AFF-NGW-WRZ3-1068: Runley Wood (AMP7 LGS Borehole)) in AMP7. Four programmes propose it for delivery in AMP8 (Expected Future, Demand-side challenging, AD_2 and AD_3), two in AMP10 (AD_1 and Optimistic) and one in AMP12 (Aspirational). The early delivery of the schemes through the Supply-side Challenging Future Adaptive programme restricts the amount of time available for further investigative work and assessment.

The assessment found that there is the potential for a moderate negative effect against SEA objectives relating to WFD status and surface and groundwater levels/ flows for AFF-NGW-WRZ4-0624: Canal & River Trust and GSK Slough Boreholes. All of the programmes except the Environmental Adaptive Run include the delivery of AFF-NGW-WRZ4-0624: Canal & River Trust and GSK Slough Boreholes. The earliest delivery is proposed through the Supply-side Challenging programme in AMP8. Two programmes propose it for delivery in AMP10 (Expected Future and Demand-side challenging), four in AMP11 (AD_1, AD_2, AD_3 and Optimistic) and one in AMP14 (Aspirational).

The assessment identified potential issues and uncertainties in relation to AFF-RES-WRZ4-0832: Brent Reservoir. During operation the scheme proposes the release of water from the Brent

Reservoir, which is also a SSSI. 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. Six of the programmes include AFF-RES-WRZ4-0832: Brent Reservoir, with four proposing it for delivery in AMP9 (Expected Future, Demand-side challenging, AD_2 and AD_3), one in AMP11 (AD_1) and in AMP13 (Aspirational). The three remaining programmes (Supply-side challenging, Optimistic and Environmental) do not include this scheme. Given that the earliest this scheme is proposed for delivery is AMP9, it is considered that there is sufficient time to investigate this issue further.

Four programmes (Expected Future, AD_2, AD_3 and Supply-side Challenging) include the delivery of AFF-RES-WRZ5-0809: Birds Green Reservoir, which is also identified through the assessment as having the potential for a moderate negative effect against SEA objectives relating to WFD status and surface and groundwater levels/ flows. The assessment also identifies the potential for moderate positive effects during operation as once established the raw water reservoir will provide new opportunities for recreation as well as opportunities for biodiversity net gain. The four programmes all propose the delivery of this scheme late in the planning horizon in either AMP17 or 18, as a result it is considered that there is sufficient time to investigate this issue further and identify more detailed mitigation measures if necessary.

It is important to note that the Environmental Adaptive Run does not include any of the schemes identified above as potentially having issues relating to WFD status and surface and groundwater levels/ flows. Furthermore, the Supply-side Challenging Future Adaptive Run cut the yield of these schemes by 50% to help mitigate the risks flagged through assessment as well as help to explore potential alternatives. It is likely that reducing their yield would help to reduce the significance of/ potential risk of residual negative effects identified during operation but this is uncertain at this stage.

The assessment also identifies potential issues during operation in terms of WFD status and surface and groundwater levels/flows for AFF-EFF-WRZ3-0180: Stevenage STW - Effluent Reuse and AFF-RES-WRZ3-0814: Honeywick Rye Reservoir. The assessment also found that there are potential benefits associated with the delivery of a new raw water reservoir in relation to recreation and biodiversity net gain. Only programmes AD_2 and AD_3 include these schemes as a result of restricting the selection of any strategic supply-side schemes. They are both proposed for delivery at the end of the planning horizon in AMP18.

The model parameters associated with programmes AD_2, AD_3 and the Environmental Adaptive Run mean that they generally do not include any strategic supply-side schemes. The only exception to this is the inclusion of AFF-RTR-WRZ3-4016: Minworth Strategic Transfer (100 Ml/d) within programmes AD_3 and the Environmental Adaptive Run. The Minworth scheme is not identified through the SEA as being likely to have significant negative effects during operation[4] and no significant issues are highlighted through the HRA or WFD assessment.

AD_2, AD_3 and the Environmental Adaptive Run do not include any schemes related to the delivery of the South East Strategic Reservoir. The other programmes all include two schemes that are linked to the delivery of the SESR. AFF-RTR-WRZ4-4011: Abingdon to Iver 2 (50Ml/d) is proposed for delivery first under all the programmes and is then followed by AFF-RTR-WRZ1-4010: Abingdon Reservoir to Harefield Transfer (50Ml) at a later date. The Demand-side Challenging programme proposes the earliest delivery of AFF-RTR-WRZ4-4011: Abingdon to Iver 2 (50Ml/d) in AMP10 followed by Supply-side Challenging and Expected Future in AMP11, Optimistic and AD_1 in AMP12 and Aspirational in AMP14. The assessment has highlighted for a number of significant negative as well as positive effects as a result of these schemes.

All of the programmes propose a variety of demand management measures throughout the planning horizon and the assessment found that these will generally perform positively or have a residual neutral effect against the majority of SEA objectives. Some of the leakage options would require construction works to repair or replace pipes and this could have local, temporary and short term minor negative effects; however, these are not likely to be significant.

[4] Except relating to SEA Objective 8 which deals with carbon.

5.5 Outline reasons for the selection and rejection of reasonable alternative programmes

5.5.1 Outline reasons for the selection of the preferred programme and adaptive futures

As described earlier, Affinity Water has progressed with an adaptive modelling approach to help inform decision-making on the preferred programme and manage future uncertainties given the long planning horizon of the WRMP. This includes recognition of points in time whereby they would have to make a decision based on the realisation of benefits from demand-side and leakage measures. This decision-making point could take them down one of a number of adaptive futures.

At this stage, taking account of a wide range of factors, including the findings of the SEA (and associated HRA and WFD assessment), the Expected Future Run is selected by Affinity Water as the preferred programme and is based on expected demand management savings and leakage targets. It contains a suitable range of supply-side schemes throughout the planning horizon to minimise risk and enhance the resilience of the plan.

While it is recognised that the SEA and associated WFD assessment have highlighted a number of potential issues for schemes that are proposed under this programme, it is considered that there is sufficient time before they are implemented to allow for further investigation, assessment and consultation to be carried out in relation to the identified issues. This will establish the likelihood and significance of impacts as well as any detailed mitigation measures that are necessary. All but one of the schemes flagged by WFD are to be delivered in AMP8 or later. The one scheme that has been flagged through this assessment which is scheduled for AMP7 delivery is in the last year of the AMP, and has been recognised by the PR19 business planning process as a key area for investigation. We have already undergone works to investigate and study this particular area and have ongoing discussions with the local EA teams on this topic. To ensure we have all future eventualities covered however, our Challenging Supply-Side Future simulates what would happen if the volumes from this scheme were not able to be materialised as part of an adaptive future.

Alongside the Expected Future Run the following reasonable alternatives have also been progressed as possible adaptive futures under the rdWRMP19:

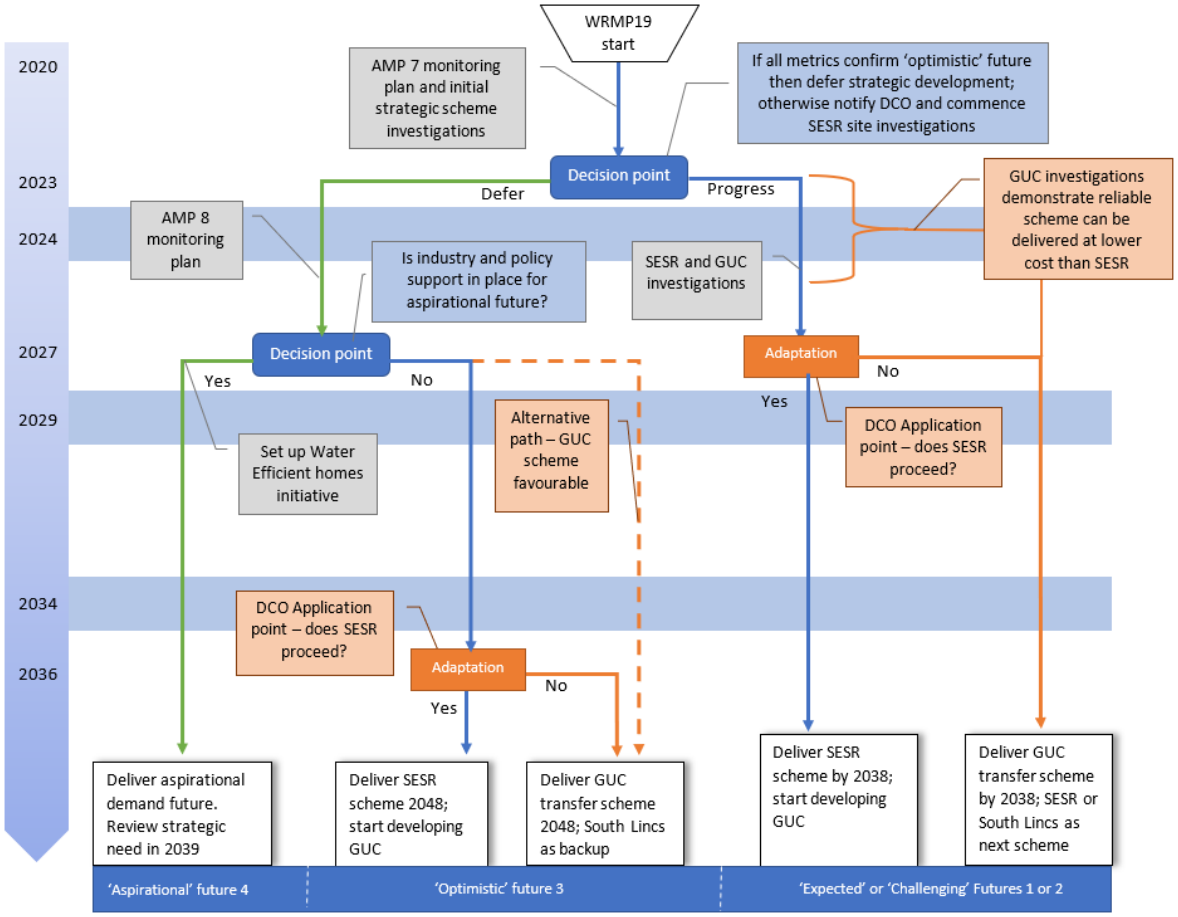
- Aspirational Future;
- Demand-side Challenging Future;
- Supply-side Challenging Future; and
- Optimistic Future.

As noted above, given the adaptive planning approach there are points in the future (**Figure 5.3**) where a decision will be made, based on the evidence available, to determine if it would be more appropriate to progress down the Challenging (supply-side or demand) Future, Optimistic Future or Aspirational Future programmes. Affinity Water's adaptive approach will dictate which of these programmes is progressed as a result of meeting the leakage and/ or demand-side targets set (or conversely not meeting these targets). The four adaptive programmes to our Expected Future are necessary to highlight the different pathways our future could materialise depending upon the realisation of demand management benefits and leakage reduction. They show that if the benefits of these measures are not realised, we will need to bring forward the delivery of specific supply-side schemes to compensate in order to maintain supply to our customers. Conversely, they also show the effect on the same supply-side schemes should we achieve optimistic levels of demand management savings and leakage reduction, which results in these schemes being pushed further into the future.

Figure 4 shows each of these four adaptive futures in relation to a WRMP19 start point. For the majority of AMP7, the plan will continue along one pathway until 2023 whereby Affinity Water will meet a decision point. For the previous years, the demand management and leakage results will have been tracked so once Affinity Water meet this decision point it can then be determined if these demand-side measures are on track or not in delivering demand savings. If the proposed demand management and leakage schemes deliver their expected benefits (central/ expected estimate) as

opposed to the more optimistic forecast benefits, Affinity Water will progress down the Expected Future which involves developing a strategic source for delivery in 2041. This is represented by the right hand 'flow' direction from the first decision point in **Figure 4**.

Figure 4: Flow diagram illustrating adaptive futures



Under the Adaptive Run process, there is the ability to switch between strategic sources depending upon the success of the DCO application. There is also an ability to bring forward the construction of either strategic source option on the grounds of Challenging Supply-Side, or Challenging Demand-Side Futures. These Challenging Futures take consideration of possibilities such as demand management options not performing at their expected levels, or reduced yield of supply options as flagged by the WFD assessment. All schemes flagged by WFD as potentially having adverse impacts on status and where further investigation is required had their yields cut by 50% under the Challenging Supply-Side Future to mitigate the flagged risks and highlight which alternative schemes would be implemented earlier and/ or introduced.

If, at the AMP7 decision point, Affinity Water finds they are on track with demand management or leakage targets, they can defer the construction of a strategic option and continue to monitor through AMP8. Another decision point would then be reached in 2027. If at this point Affinity Water finds the more ambitious, long term targets are not likely to be met, they have the ability to then construct a strategic option albeit a bit later than the expected and challenging futures.

Alternatively, if Affinity Water finds the demand management and leakage targets are being met at the 2027 decision point, they can continue down the Aspirational Future pathway with the view to reviewing the need for a strategic option in 2039.

5.5.2 Outline reasons for rejecting the remaining reasonable alternative programmes

The Environmental Adaptive Run, AD_1, AD_2 and AD_3 alternative programmes have all been rejected for the reasons set out below.

The Environmental Adaptive Run is a viable alternative programme which will not select options that the SEA has flagged as being potentially negative without mitigation. This is a reasonable alternative programme; however, on the grounds that there are not enough options under the conditions of this model run, additional levels of leakage reduction are selected to infill the gap left by the supply-side options excluded. This generates a programme with quite a high level of risk and dependency on meeting leakage reduction targets and does not consider that further investigation and more detailed mitigation at the detailed design stage could remove or further reduce the significance of negative effects identified through the SEA. By doing this, we generate a programme with a high level of risk associated with meeting extremely ambitious levels of leakage reduction. We do not deem this to be an acceptable level of risk and have such removed this from our process.

Similarly, AD_2 and AD_3 meet the plan objectives. The intention of these modelling runs was to understand what a programme of options would look like, should a strategic source option not be available. We recognise through our rdWRMP19 modelling that forecasted growth in the rdWRMP19 is so significant that Affinity Water consistently need between 100Ml/d and 150Ml/d of strategic imports into their supply region. Therefore, options which satisfy this need have a great deal of weight, so by undertaking AD_2 and AD_3 Affinity Water can understand the implications of not having one of these schemes available.

AD_2 and AD_3 were removed from the process because they were overly pessimistic. Our Challenging Future runs cover the eventualities of investigations flagging potential reasons to not progress with a particular strategic source, or events like DCO applications being unsuccessful, by allowing for an alternative strategic option to be selected rather than simply not selecting any strategic options. These runs were still useful to allow us to understand the weight of these options on our future ability to provide supply.

AD_1 was rejected because it was superseded by our Optimistic Future. Both runs had optimistic demand management futures involved; however, the long term targets (i.e. leakage reduced by 50% in 2044/45) exist in the Optimistic Future but not in AD_1. This was not a secondary or primary objective, so we were not able to rule AD_1 out of the process, but the run was not required further on the basis that the Optimistic Future does what AD_1 does, and goes further in line with long term targets raised by stakeholders as desirable.

6. SEA of the revised draft WRMP19 and adaptive futures

6.1 Introduction

This Chapter sets out key findings for the preferred programme (Expected Future) set out in the rdWRMP19 as well as any additional schemes that have a reasonable prospect of coming forward under one of the adaptive futures (Challenging (demand or supply-side) Future, Optimistic Future and Aspirational Future).

6.2 Summary SEA findings

6.2.1 Assessment of the rdWRMP19 schemes

A summary of the key findings for the supply and demand schemes proposed in the rdWRMP19 is provided below in **Table 4**. A narrative summary of the assessment findings for the demand management schemes is then provided next and followed by a summary narrative for the supply-side schemes and this is structured according to the Asset Management Period (AMP).

Table 4: rdWRMP19 summary SEA findings

Schemes	Delivery date	AMP	SEA Objectives and assessment questions																																																								
			1						2						3				4				5										6				7		8				9		10								11		12		13				14	
			1a		1b		1c		2a		2b		2c		3a		3b		4a		4b		5a		5b		5c		5d		5e		6a		6b		7a		8a		8b		9a		10a		10b		10c		10d		11a		12a		13a		13b		14a	
Schemes	Delivery date	AMP	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Supply-side																																																														
AFF-RTR-WRZ7-0639 : Deal Continuation After 2020	2020	7	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFF-RTR-WRZ7-0909 : Barham Continuation (After 2019/20)	2020	7	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFF-EGW-WRZ7-0629 : Lye Oak Licence Variation	2021	7	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	?	?	?	0	?	0	0	0	0	0	0	0	0	0	0	0	1	0	-1	0	0	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0
AFF-CTR-WRZ4-4001 : Egham to Iver	2022	7	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	?	?	0	0	?	?	0	0	?	?	0	0	-1	-1	0	1	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0
AFF-RNC-WRZ7-0900 : Dover Constraint Removal	2022	7	0	1	0	1	0	1	0	0	0	0	0	0	-1	0	-1	0	-1	0	-1	0	0	0	-1	0	?	?	0	0	?	?	-1	0	?	?	0	0	-1	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole)	2025	8	0	1	0	1	0	1	0	0	0	?	-1	0	?	0	0	0	0	0	-1	-1	0	0	?	?	?	?	0	?	?	?	-1	0	?	?	0	0	-1	-1	0	1	0	?	0	0	0	-1	0	-2	0	0	0	-2	0	0	0	0	0	0	0	0
AFF-NGW-WRZ3-1053 : Kings Walden	2030	9	0	1	0	1	0	1	0	0	0	?	0	0	0	0	0	0	0	0	-1	-1	0	0	0	?	?	?	0	?	?	?	-1	0	?	?	0	0	-1	-1	0	1	0	?	0	0	0	-2	0	-2	0	0	0	-2	0	0	0	0	0	0	0	0
AFF-RES-WRZ4-0832 : Brent Reservoir	2034	9	0	1	0	1	0	1	0	0	0	?	-1	0	-1	0	-1	0	-2	0	-1	-1	0	0	-1	-1	?	?	0	-2	?	?	-2	-1	?	?	-1	0	-2	-2	0	1	0	-1	-1	0	0	0	0	0	0	0	0	-1	0	0	-2	-1	0	0	0	0
AFF-NGW-WRZ4-0624 : Canal and Rivers Trust and GSK Slough Boreholes	2039	10	0	1	0	1	0	1	0	0	0	?	-1	0	-1	0	-1	0	-1	0	-1	0	0	0	0	-1	?	?	0	0	?	?	-1	0	?	?	-1	0	-1	-1	0	1	0	-1	-1	-2	0	2	0	-1	0	0	0	-2	0	0	-1	0	0	0	0	0
AFF-CTR-WRZ3- 4005 : Arkley North	2041	11	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-1	0	-1	0	0	0	0	0	?	-1	0	0	?	?	-1	0	?	?	-1	0	-1	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0
AFF-RTR-WRZ4- 4011 : Abingdon to Iver 2 (50Ml/d)	2041	11	0	2	0	2	0	2	0	2	0	-1	-2	1	-2	-1	-1	0	-3	0	-1	0	-2	-1	-2	-1	?	?	-2	-1	?	2	-3	-2	?	2	-2	-1	-3	-3	0	2	0	-1	-1	-1	-1	-1	0	-1	-1	-1	0	-1	0	-1	-3	-1	-2	-1	-2	-1
AFF-EGW-WRZ7-0908 : Tappington South - Licence Variation	2044	11	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	?	?	0	0	?	?	-1	0	?	?	0	0	-1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFF-EGW-WRZ2-0090 : Stonecross Source Optimisation	2052	13	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	?	?	0	0	?	?	0	0	?	?	0	0	-1	0	0	1	0	-1	0	0	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0
AFF-RTR-WRZ1- 4010 : Abingdon Reservior to Harefeild Transfer (50Ml/d)	2053	13	0	2	0	2	0	2	0	2	0	-1	-2	1	-2	-1	-1	0	-3	0	-1	0	-2	-1	-2	-1	?	?	-2	-1	?	2	-3	-2	?	2	-2	-1	-3	-3	0	2	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	0	-1	-3	-1	-2	-1	-2	-1
AFF-RTR-WRZ7-0301 : Barham Import Increase (of 2Ml/d) to 4 Ml/d	2057	14	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-1	0	-1	0	0	0	-2	0	?	?	0	0	?	?	-2	-1	?	?	0	0	-1	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0
AFF-TPO-WRZ4-0412 : Hillingdon Hospital boreholes	2064	15	0	1	0	1	0	1	0	0	0	0	?	0	-1	0	-1	0	-1	0	-1	-1	0	0	?	?	?	?	0	0	?	?	?	0	?	?	-1	0	-1	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	?	0	0	0	0	0
AFF-CTR-WRZ3-1099 : Boxted to Chaul End	2065	15	0	1	0	1	0	1	0	0	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	0	0	-1	0	?	?	0	0	?	?	-2	-1	?	?	0	0	-1	-1	0	1	0	0	-1	0	0	0	0	0	-1	0	0	0	0	0	-1	0	0	0	0	0
AFF-RTR-WRZ1-1066 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead)	2065	16	0	2	0	2	0	2	0	0	0	0	0	0	-1	0	-1	0	-2	0	-1	-1	0	0	-1	0	?	-1	0	0	?	?	-2	-1	?	?	0	0	-2	-2	0	2	0	0	0	0	-1	-2	0	-2	0	0	0	-2	0	0	-1	0	0	0	0	0
AFF-RNC-WRZ7-0626 : Broome Network Improvement	2066	16	0	1	0	1	0	1	0	0	0	0	0	0	-1	0	-1	0	-1	0	-1	0	0	0	-1	0	?	?	0	0	?	?	-1	-1	?	?	0	0	-1	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0
AFF-TPO-WRZ6-1083 : Surrey University (Guildford Site)	2076	18	0	1	0	1	0	1	0	0	0	0	0	0	-1	0	-1	0	-1	0	-1	-1	0	0	-2	0	?	?	0	0	?	?	-1	0	?	?	0	0	-1	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFF-RTR-WRZ6-0752 : Ladymead Optimisation	2077	18	0	1	0	1	0	1	0	0	0	0	0	0	-1	0	-1	0	-1	0	-1	0	0	0	-1	0	?	?	0	0	?	?	0	0	?	?	0	0	-1	-1	0	1	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFF-RES-WRZ5-0809 : Birds Green Reservoir	2078	18	0	1	0	1	0	1	0	1	0	?	-1	0	-1	0	-1	0	-2	0	-1	-1	0	0	-1	-1	?	?	-1	-1	?	2	-2	-1	?	1	0	0	-2	-2	0	2	0	-1	-1	-2	0	0	0	0	0	0	0	-2	0	0	-1	-1	0	0	-2	-1
AFF-EGW-WRZ6-0173 : Clandon Source Optimisation	2079	18	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	?	?	0	0	?	?	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand management																																																														
WEFF567			0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
WEFF569			0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
WEFF901			0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
WEFF1000			0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
WEFF1050			0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
MET531			0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
MET904			0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
MET1010			0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
REUSE606			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
REUSE620			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
REUSE621			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
LE423			0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
LE1008			-1	0	0	0	0	1	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
LE1012			-1	0	0	0	0	1	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0

6.2.1.1 Demand management schemes

As illustrated in **Table 4** above there are no significant negative effects identified as a result of the proposed demand management schemes. Significant (moderate) positive effect for the metering options against assessment question 8a (Reduce/increase predicted carbon footprint?) through a medium term carbon saving associated with the reduced water requirement.

Some of the leakage options would require construction works to repair or replace pipes and this could have a short term minor negative effect on assessment questions relating to water supply (1a) and transport infrastructure (3a), as there could be temporary disruption of supply and disturbance through increased traffic on the road network during construction.

6.2.1.2 AMP7 (2020-25)

The five supply-side schemes to be delivered within the first five years (2020-25) of the plan period during AMP7 all propose minimal new infrastructure. As a result, they are not identified as having the potential for a significant negative effect either during construction or operation through the SEA, HRA or the WFD assessment.

AFF-RTR-WRZ7-0639: Deal Continuation After 2020 and **AFF-RTR-WRZ7-0909: Barham Continuation (After 2019/20) these options involve** the continuation of current agreements with Southern Water and South East Water respectively for the import of water. No new infrastructure is required for either of these schemes and no negative effects identified through the assessment.

AFF-EGW-WRZ7-0629: Lye Oak Licence Variation 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). The assessment found that there is the potential for minor negative effects during operation against SEA objectives relating to East Kent Chalk Stour groundwater levels given the increased abstraction; however, this is likely to be local and minor given the small increase. As a result of this there is also some uncertainty identified against the SEA objective relating to biodiversity as a result of the potential for indirect effects and close proximity of the Lydden and Swingfield Woods SSSI. However, it is again considered that given the small increase in abstraction there is unlikely to be any significant negative effects. 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 level in the East Kent Chalk Stour groundwater body and condition status of the Lydden and Swingfield Woods SSSI are monitored.

AFF-RNC-WRZ7-0900: Dover Constraint Removal involves 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 involves minimal new infrastructure with a new 1.19km main and 1 x 1 m3 Surge Vessel. Minor negative effects are identified during construction against SEA objectives relating to recreation/ tourism, road infrastructure, biodiversity and landscape primarily as a result of the delivery of the new pipeline. Impacts will be temporary, local and minor and good practice construction methods should ensure that there are no significant negative effects.

AFF-CTR-WRZ4-4001: Egham to Iver involves the installation of a new booster station on an existing site, 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). The scheme involves minimal new infrastructure and the assessment found that there would a residual neutral effect against the majority of SEA objectives during construction and operation. Standard construction practices should ensure that there are no significant impacts during the construction phase.

6.2.1.3 AMP8 (2025-30)

The only scheme proposed during AMP8 in 2025 is **AFF-NGW-WRZ3-1068: Runley Wood (AMP7 LGS Borehole)** - a scheme to license a new borehole in the Lower Greensand aquifer within the existing Runley Wood site boundary to allow an increased abstraction at this site. The assessment found that there is the potential for a moderate negative effect for SEA objectives 10 (WFD status) and 11 (surface/ ground water levels and flows). This was informed by the WFD assessment for the rdWRMP19, which identifies that the groundwater abstraction may influence local water balance in

Woburn Sands groundwater body depending on extent of confined Lower Greensand (LGS) abstraction influence. It suggests that this needs to be confirmed through further hydrogeological survey work. There is also the potential to affect groundwater body input to the River Flit which could have impacts on water levels/ flow and quality. The WFD assessment recommends that further information and assessment required. Given the delivery date of this scheme in 2035, there would be sufficient time to undertake further investigative work and detailed assessments 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 level in the Woburn Sands groundwater body is monitored.

As a result of the above, the assessment also identifies that there is some uncertainty in terms of indirect effects on biodiversity (SEA objective 5) reliant on the River Flit during operation although it is unlikely that this would be of significance. The assessment also identified that there is also the potential for a negative effect on SEA objective 5 (biodiversity) during construction. The scheme requires the delivery of a short 580m pipeline 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 run along either side of the motorway. Pipe jacking/ directional drilling 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.

6.2.1.4 AMP9 (2030-35)

Two supply-side schemes are proposed for delivery during AMP9 under this programme. As for **AFF-NGW-WRZ3-1068: Runley Wood (AMP7 LGS Borehole)** in AMP8, similar issues are also identified through the assessment for **AFF-NGW-WRZ3-1053: Kings Walden** scheduled for delivery in 2030. This scheme proposes 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.

The assessment found that there is the potential for a moderate negative effect for SEA objectives 10 (WFD status) and 11 (surface/ ground water levels and flows). This was informed by the WFD assessment for the rdWRMP19, which identifies that the groundwater abstraction may influence local water balance in Woburn Sands groundwater body depending on extent of confined Lower Greensand (LGS) abstraction influence. However, the WFD assessment notes 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. It suggests that this needs to be confirmed through further hydrogeological survey work. There is also the potential to affect groundwater body input to the River Ivel which could have impacts on water levels/ flow and quality at a local scale.

The WFD assessment recommends that further information and assessment required. Given the delivery date of this scheme in 2040, there would be sufficient time to undertake further investigative work and detailed assessments 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 level in the Woburn Sands groundwater body is monitored.

As a result of the above, the assessment also identifies that there is some uncertainty in terms of indirect effects on biodiversity (SEA objective 5) reliant on the River Ivel during operation although it is unlikely that this would be of significance. The mitigation identified above would reduce the potential for any residual negative effects in the medium to long-term.

The second supply-side to be delivered during AMP9 in 2034 is **AFF-RES-WRZ4-0832: Brent Reservoir**, which proposes the import of water from the Canal & River 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 a new Harrow Service Reservoir within WRZ4.

The assessment identified that during the construction phase there is the potential for negative effects on SEA objectives 6 (landscape) and 13 (historic environment). The scheme includes a new Harrow service reservoir at Harrow on the Hill, which is an important local area of open/ green space surrounded by the existing built area that provides areas for recreation and contributes to the

character of the landscape/ townscape. The new reservoir is also situated in close proximity to the Harrow Park Registered Park and Garden. Potential for moderate negative effects during construction against SEA objectives relating to the landscape and historic environment. The assessment recommends the retention of hedgerows, trees, walls wherever possible and the re-instatement of soil/ land following construction of the pipeline. It also proposes the use of construction methods and barriers/ hoardings that are sympathetic to the aesthetics of the surrounding landscape. Where possible any opportunities to merge the reservoir embankment into the landscape should be explored.

During operation **AFF-RES-WRZ4-0832: Brent Reservoir** proposes the release of water from the reservoir, which is also a SSSI. The Brent Reservoir SSSI is currently in a favourable condition and is designated for breeding wetland birds, in particular for significant numbers of nesting great crested grebe, as well as wetland plant communities. There is uncertainty at this stage with regard to the extent and frequency of drawdown in the reservoir as a result of this proposed 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.

There are ongoing discussions between Affinity Water and the Canal & River Trust who operate the reservoir. 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. The assessment proposes that the water levels in the Brent Reservoir are monitored to inform the need and use of hands-off flow conditions to restrict the release of water when levels are low. Furthermore, the release of water could also be restricted during the breeding/ nesting seasons (broadly March to July). The condition status of the Brent Reservoir SSSI should also be monitored.

6.2.1.5 AMP10 (2035-40)

Only one supply-side scheme is proposed during AMP10 in 2039. **AFF-NGW-WRZ4-0624: Canal & River Trust and GSK Slough Boreholes** 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).

The assessment identifies the potential for a moderate negative effect against SEA objectives relating to surface and groundwater body status and flows. The WFD assessment notes that the GSK abstraction is/ was discharged to the Salthill stream following its use as non-evaporative cooling. As a result the WFD assessment found that there is a potential for a reduction in water returned to the surface water body that may lead to deterioration of status and flows. The proposed scheme may involve diverting this discharge to Affinity Water for consumptive use. 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. Given that the delivery date of this scheme is 2044 there is sufficient time to investigate this issue further.

6.2.1.6 AMP11 (2040-45)

Three supply-side schemes are proposed for delivery during AMP11 under this programme.

AFF-CTR-WRZ3-4005: Arkley North will be delivered in 2046 and allows for the bypass of Arkley 2 Reservoir and seeks to improve the interconnectivity between reservoirs. It involves minimal new infrastructure (50m of new main) and is not identified in the SEA, HRA or WFD assessment as having the potential for a significant negative effect during construction or operation. The potential for minor

negative effects are identified during construction of the new pipeline but it is considered that there is suitable mitigation available through standard construction practices to ensure that there are no residual significant negative effects.

Also being delivered in 2046 is **AFF-RTR-WRZ4-4011: Abingdon to Iver 2 (50Ml/d)**, which involves an increased abstraction from the River Thames at Sunnymeads, onwards transfer by a new main for treatment at Iver 2 WTW. Water will be discharged from a new South East Strategic Reservoir (within the Thames Water Supply Area) for abstraction at Sunnymead. The increased abstraction will provide an additional 50 Ml/d during both peak and average conditions for use within WRZ4.

During construction the assessment found that there is the potential for significant negative (moderate and major) effects against a number of SEA objectives as a result of this scheme due to the scale of new infrastructure required. This includes:

- Major negative effects for SEA objectives relating to material consumption and carbon footprint due to the scale of infrastructure.
- Moderate negative effects for SEA Objective 3 due to temporary disruption to local and strategic transport infrastructure, including public rights of way and major roads.
- Moderate negative effects also anticipated for SEA Objective 7 relating to Hillingdon AQMA and Marcham AQMA given the level of traffic anticipated during construction.
- Moderate negative effects for SEA Objective 5 due to temporary and permanent disruption to biodiversity, including internationally and nationally designated sites and other important habitats and species.
- Major negative effects for SEA Objective 6 given the construction of Abingdon reservoir is likely to have significant effects on the landscape. This includes impact on the setting of the North Wessex Downs AONB, and extensive disruption to views, visual amenity and landscape character.
- Major negative effects for SEA Objective 13 as a result of the heritage assets located within close proximity to the new reservoir and pipeline (including archaeological assets).

During operation the assessment found that there is the potential for significant negative (moderate and major) effects against a number of SEA objectives as a result of this scheme due to the scale of new infrastructure required. This includes:

- Moderate negative effects for SEA Objective 6 given that the new reservoir ancillary infrastructure would be a prominent new feature in the landscape. Notably, three towers will be seen against the visual context of the North Wessex Downs AONB to the south and east.
- Major negative effects for SEA Objective 8 relating to carbon footprint due to the scale of infrastructure.

During operation the assessment found that there is the potential for significant positive (moderate) effects against a number of SEA objectives as a result of this scheme due to the scale of new infrastructure required. This includes:

- Moderate positive effects for SEA Objective 2 in relation to tourism, recreation and amenity facilities.
- Moderate positive effects for SEA Objective 5 as the scheme is anticipated to provide opportunities for biodiversity enhancement and net gain.
- Moderate positive effects for SEA Objective 6 as the scheme presents opportunities for landscape enhancements and improvements. Specific mitigation measures and enhancements will be developed in the detailed design stages.
- Moderate positive effects for SEA Objective 8 as the scheme is upgrading transfer and storage capacity, resulting in positive effects on the resilience of Affinity Water's assets to climate change.

The final supply-side scheme to be delivered in AMP11 in 2044 is **AFF-EGW-WRZ7-0908: Tappington South - Licence Variation**. This scheme involves the re-commissioning of the currently disused borehole at Tappington Source to provide resilience for the licence group. The scheme

involves minimal new infrastructure and was not identified as having the potential for a significant effect through the SEA, HRA or the WFD assessment.

6.2.1.7 AMP13 (2050-55)

Two supply-side schemes are proposed in AMP13. The first of these is **AFF-EGW-WRZ2-0090: Stonecross Source Optimisation** to be delivered in 2052. The scheme involves upgrading the borehole pumps at the existing Stonecross chalk groundwater source, as well as treatment works, and a network modification to close the 0.41 Ml/d gap between DO and licence. The scheme would result in minimal new infrastructure and the assessment does not identify the potential for any residual moderate or major negative effects during construction or operation.

The assessment identifies that there is the potential for minor negative effects in the medium to long-term during operation as the increased abstraction at peak times may have some potential impact on water level in the aquifer and impact base flow in the linked surface water body (Ver River). The WFD assessment notes that these impacts are likely to be local, minor and temporary. The assessment also acknowledges that the issue above could have indirect effects on biodiversity. 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.

The second supply-side scheme to be delivered in AMP 13 is **AFF-RTR-WRZ1-4010: Abingdon Reservoir to Harefield Transfer (50Ml)**, which is closely linked to **AFF-RTR-WRZ4-4011** delivered in AMP11.

AFF-RTR-WRZ1-4010: Abingdon Reservoir to Harefield Transfer (50Ml/d) utilises the same infrastructure as **AFF-RTR-WRZ4-4011** up to point near Iver 2 WTW. It would then extend the mains northward to an upgraded Harefield Reservoir and Harefield Treatment Works. The detailed assessment of this scheme was carried out on the basis that this scheme could include the delivery of the South East Strategic Reservoir (SESR). However, the SESR would already be established at this point given the earlier delivery of AFF-RTR-WRZ4-4011. While there is still the potential for negative effects as a result of the delivery of the pipeline and expanded Harefield reservoir it is considered that there is suitable mitigation available to ensure that residual effects are minor. It is also considered that there is unlikely to be any significant negative effects during operation.

6.2.1.8 AMP14 (2055-60)

The only scheme to be delivered in AMP14 in 2057 is **AFF-RTR-WRZ7-0301: Barham Import Increase (of 2Ml/d) to 4 Ml/d**. An agreement between Affinity Water and South East Water exists for the import of 2 Ml/d via the Barham Interconnection Point. This scheme proposes an 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.

The Chalksole Reservoir is situated within the Kent Downs AONB and is surrounded by areas of Priority Habitat (deciduous woodland) that is also listed as Ancient and Semi-Natural Woodland. Potential for moderate negative effects on SEA objectives relating to biodiversity and the landscape during construction; however, it is acknowledged that there is uncertainty as the precise direction and area of land lost to the reservoir expansion is not known at this stage. The assessment notes that there are a number of areas around the existing reservoir where there are no designated habitats. It is therefore considered that there is high likelihood that the upgrade of the reservoir can avoid the important habitats and this should be explored as a first step at the detailed design stage. Further consultation with NE will be necessary as well as more detailed ecological surveys.

The assessment recommends that any 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. More detailed mitigation measures should be set out at the detailed design stage.

6.2.1.9 AMP15 (2060-65)

Two supply-side schemes are proposed during AMP15. The first to be delivered in 2064 is **AFF-TPO-WRZ4-0412: Hillingdon Hospital boreholes**. This scheme seeks to purchase or lease and then transfer any potential spare capacity from three 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.

The assessment does not identify any moderate or major negative effects in relation to this scheme during construction or operation. The potential for minor negative effects are identified during construction of the new pipeline and WTW but it is considered that there is suitable mitigation available through standard construction practices to ensure that there are no residual significant negative effects.

The second supply-side scheme to be delivered in 2065 is **AFF-CTR-WRZ3-1099: Boxted to Chaul End**, which involves 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 includes a 40Ml capacity upgrade of Chaul End Reservoir amongst other new infrastructure.

Key issues identified during the construction phase include potential impacts on landscape and biodiversity. 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 is identified as having the potential for a minor negative effect in the short term and a residual neutral effect during operation once buried. The upgrade of the Chaul End Service Reservoir is likely to have moderate negative effects on landscape during construction and it should be noted that the Chilterns AONB is around 550m form the reservoir. Once mitigation is taken into account it is unlikely that there will be any significant negative effects during operation, particularly given that the Chaul Reservoir lies in close proximity to the M1 and is separated from the AONB by new residential development. 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.

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.

The construction of the new pipeline route may result in the loss of Priority Habitats (in particular deciduous woodland) near to the Chaul End Reservoir. The assessment recommends that the pipeline is re-routed at the detailed design stage to avoid the Priority Habitat near to Chaul End Reservoir. There is also the potential for disturbance to species during the construction of the pipeline route; however, good practice construction methods should ensure that there are no significant negative effects.

6.2.1.10 AMP16 (2065-70)

Two supply-side schemes are proposed during AMP16. The first to be delivered in 2065 is **AFF-RTR-WRZ1-1066: Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead)**. This scheme proposes 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 stored in an expanded Boxted Reservoir.

The assessment found that there is the potential for a moderate negative effect for SEA objectives 10 (WFD status) and 11 (surface/ ground water levels and flows). This was informed by the WFD assessment for the rdWRMP19, which identifies that the abstraction has the potential for impacts during operation on water levels/ flows and quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body. It suggests that this needs to be confirmed through further hydrogeological survey work. Given the delivery date of this scheme in 2065, there would be sufficient time to undertake further investigative work and detailed assessments 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.

The second supply-side scheme to be delivered in AMP16 in 2066 is **AFF-RNC-WRZ7-0626: Broome Network Improvement**. The 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).

The assessment does not identify any moderate or major negative effects in relation to this scheme during construction or operation. The potential for minor negative effects are identified during construction of the new pipeline and upgrading of the WTW but it is considered that there is suitable mitigation available through standard construction practices to ensure that there are no residual significant negative effects.

It should be noted that this scheme 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.

6.2.1.11 AMP18 (2075-80)

Under this programme no further supply-side options would then be delivered until AMP18, during which four new schemes are proposed.

The first to be delivered in 2076 is **AFF-TPO-WRZ6-1083: Surrey University (Guildford Site)**, which 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.

The assessment does not identify any moderate or major negative effects in relation to this scheme during construction or operation for the majority of SEA objectives. The potential for minor negative effects are identified during construction of mew or upgraded infrastructure but it is considered that there is suitable mitigation available through standard construction practices to ensure that there are no residual significant negative effects. A moderate negative effect is predicted against biodiversity as the pipeline currently passes through priority habitat (deciduous woodland). The assessment recommends that the pipeline should be re-routed at the detailed design stage to avoid the loss of any priority habitat.

The next supply-side scheme to be delivered in 2077 is **AFF-RTR-WRZ6-0752: Ladymead Optimisation**. 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.

The assessment does not identify any moderate or major negative effects in relation to this scheme during construction or operation. The potential for minor negative effects are identified during construction of the new pipeline and upgrading of the WTW but it is considered that there is suitable mitigation available through standard construction practices to ensure that there are no residual significant negative effects. The assessment identifies some uncertainty over the as the precise area required for the reservoir expansion is not known at this stage and there is priority habitat to the north, west and south of the site. The detailed design stage should ensure that priority habitats are avoided as part of the reservoir expansion.

The next supply-side scheme to be delivered in 2078 is **AFF-RES-WRZ5-0809: Birds Green Reservoir**. 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 WTW and pumping station, and a treated water pipeline to Rye Hill service reservoir.

During construction the assessment identifies that there is the potential for moderate negative effects against SEA objectives relating to material consumption, landscape and carbon footprint primarily as a result of the scale of new infrastructure required. There is also a moderate negative effect identified

during construction in relation to agricultural land, given the presence of best and most versatile agricultural land.

During operation moderate negative effects are identified for SEA objectives relating to carbon footprint, WFD status and surface and groundwater levels/ flows. The assessment identifies that there is the potential for the scheme to reduce water flow and levels as well as quality in the Lower Roding (Cripsey Brook to Loughton) Surface Water Body during operation. This is informed by the WFD assessment which recommends that further assessments and discussions with the EA are required. The SEA suggests that the water levels and flows in the Lower Roding (Cripsey Brook to Loughton) should be monitored and hands-off flow conditions used when water levels and flows are low. Another issue identified during operation is that the new Birds Green Reservoir will lead to the loss of Best and Most versatile agricultural land.

Additional benefits/ moderate positive effects were identified during operation as once established the raw water reservoir provides new opportunities for recreation as well as opportunities for biodiversity net gain.

The final supply-side scheme to be delivered in AMP18 in 2079 is **AFF-EGW-WRZ6-0173: Clandon Source Optimisation**. This scheme seeks to optimise the Clandon source by changing the software to allow water level based control of the pump speed, which should allow an increase in DO. The assessment found that this this scheme is not likely to have significant negative effects during construction or operation given that it involves a change in software.

6.2.2 Assessment of the adaptive future schemes

A summary of the key findings for the four additional supply-side schemes that could come forward under one of the adaptive futures is provided below in **Table 5**.

Table 5: Additional adaptive future scheme SEA findings

SEA Objectives and assessment questions

Schemes	1						2						3				4				5									
	1a		1b		1c		2a		2b		2c		3a		3b		4a		4b		5a		5b		5c		5d		5e	
	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Supply-side																														
AFF-CTR-WRZ3-0028 : Iver Arkley Transfer Upgrade	0	1	0	1	0	1	0	0	0	0	-1	0	-2	0	-1	0	-2	0	-1	0	0	0	-2	0	?	?	-1	0	?	?
AFF-ASR-WRZ6-0174 : Egham ASR	0	1	0	1	0	1	0	0	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	0	0	-1	0	?	?	-1	0	?	?
AFF-RTR-WRZ7-0842 : Aldington to Saltwood Import Increase by 3Mld	0	1	0	1	0	1	0	0	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	0	0	-1	-1	?	0	0	0	?	?
AFF-RTR-WRZ1-4020 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead ; 100 Ml/d)	0	3	0	3	0	3	0	0	0	0	0	0	-1	0	-1	0	-2	0	-1	-1	0	0	-1	0	?	-1	0	0	?	?

Schemes	6				7		8				9		10								11		12		13				14	
	6a		6b		7a		8a		8b		9a		10a		10b		10c		10d		11a		12a		13a		13b		14a	
	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Supply-side																														
AFF-CTR-WRZ3-0028 : Iver Arkley Transfer Upgrade	-1	0	?	?	-1	0	-2	-1	0	1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	-1	0	0	0	-2	0
AFF-ASR-WRZ6-0174 : Egham ASR	-1	0	?	?	-1	0	-1	-1	0	1	0	0	0	0	0	0	0	?	0	?	0	0	0	0	-1	0	0	0	0	0
AFF-RTR-WRZ7-0842 : Aldington to Saltwood Import Increase by 3Mld	-2	-1	?	?	0	0	-2	-1	0	1	0	-1	0	0	-1	-1	0	0	-1	-1	0	0	0	0	-2	0	0	0	-2	0
AFF-RTR-WRZ1-4020 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead ; 100 Ml/d)	-2	-1	?	?	0	0	-1	-1	0	3	0	-1	0	0	-1	-2	0	-2	0	0	0	-2	0	0	-1	0	0	0	0	0

AFF-CTR-WRZ3-0028: Iver Arkley Transfer Upgrade 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 assessment identifies the potential for moderate negative effects during the construction phase against a number of SEA objectives as a result of the new infrastructure, which includes around 69km of new pipeline and an upgraded Bulls Green Service Reservoir. The majority of these moderate negative effects are for SEA Objectives relating to road infrastructure, material consumption and carbon footprint. A moderate negative effect is identified against biodiversity during construction as the pipeline passes through some priority habitats. The assessment recommends that the pipeline should be re-routed at the detailed design stage to avoid the loss of priority habitats. It also identifies the potential for disturbance to some SSSIs given the proximity of the pipeline and recommends that 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 at the SSSIs or other important habitats would not be significantly affected. This would need to be developed further during detailed scheme design.

AFF-ASR-WRZ6-0174: Egham ASR 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 assessment does not identify any moderate or major negative effects in relation to this scheme during construction or operation. The potential for minor negative effects are identified during construction of new or upgraded infrastructure but it is considered that there is suitable mitigation available through standard construction practices to ensure that there are no residual significant negative effects. The new pipeline passes in close proximity to a number of designated biodiversity and heritage assets but there is suitable mitigation available to ensure that there are no significant residual negative effects.

AFF-RTR-WRZ7-0842: Aldington to Saltwood Import Increase by 3Mld is an import of water from South East Water to WRZ7 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).

The assessment does not identify any moderate or major negative effects in relation to this scheme during construction or operation for the majority of SEA objectives. Moderate negative effects identified during construction for SEA objectives relating to carbon footprint, the landscape, historic environment and agricultural land. In terms of the landscape, 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. 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.

The assessment recommends that mitigation measures should include the retention of hedgerows, trees, fields, and 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. The new pump house building should also be designed sympathetically to fit in with the surrounding landscape/ historic environment and screening used

where appropriate. More detailed mitigation measures should be set out at the detailed design stage.

During operation the assessment found that there is unlikely to be any significant negative effects once mitigation is taken into account. Key issues during operation relate to medium to long-term effects on the landscape and historic environment (mitigation referred to above) as well as potential issues in relation to water quality through the creation of new preferential pathways into the aquifer due to below ground workings and construction of mains. The WFD assessment concluded that best practice design, construction and operation should ensure that impacts are minor, localised and temporary.

AFF-RTR-WRZ1-4020: (GUC – Berkhamsted/ Hemel Hempstead, 100 Ml/d) is a strategic 100 Ml/d version of **AFF-RTR-WRZ1-1066**, which is currently proposed under the Expected Future (i.e. the rdWRMP19). The two schemes include the same infrastructure except that AFF-RTR-WRZ1-4020 includes a larger capacity upgrade of the existing Boxted Service Reservoir. As for AFF-RTR-WRZ1-1066 it proposes 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 stored in an expanded Boxted Reservoir.

The first of these is **AFF-RTR-WRZ1-1066: Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead)** and is scheduled to be delivered in 2070. This scheme proposes 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 stored in an expanded Boxted Reservoir.

The assessment found that there is the potential for a moderate negative effect for SEA objectives 10 (WFD status) and 11 (surface/ ground water levels and flows). This was informed by the WFD assessment for the rdWRMP19, which identifies that the abstraction has the potential for impacts during operation on water levels/ flows and quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body. It suggests that this needs to be confirmed through further hydrogeological survey work. Given the delivery date of this scheme in 2070, there would be sufficient time to undertake further investigative work and detailed assessments 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.

The scheme propose new infrastructure that is in close proximity to the Chilterns AONB. Potential for a moderate negative effect on the SEA objective relating to the landscape during construction. The assessment recommends that any new visible infrastructure should be designed sympathetically to fit in with the surrounding landscape, and/or screened as appropriate by landscaping and planting. Residual minor negative effect identified during operation primarily as a result of the expanded Boxted Reservoir.

6.2.3 Cumulative effects

6.2.3.1 Cumulative effects (Intra-plan) for the rdWRMP19 schemes

Overall the cumulative effects assessment 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 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 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, South West London Waterbodies Ramsar and SPA, and the Little Wittenham SAC and SSSI.

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 (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.

6.2.3.2 Cumulative effects (Intra-plan) for the adaptive future schemes

When considering the potential additional schemes under the adaptive future approach (AFF-CTR-WRZ3-0028, AFF-ASR-WRZ6-0174, AFF-RTR-WRZ7-0842 and AFF-RTR-WRZ1-4020), there are a number of additional potential cumulative adverse effects arising that are explored further below.

The strategic scheme AFF-RTR-WRZ1-4020: (GUC – Berkhamsted/ Hemel Hempstead, 100 Ml/d) is a strategic 100 Ml/d version of AFF-RTR-WRZ1-1066, which is currently proposed under the Expected Future (i.e. the rdWRMP19). The two schemes include the same infrastructure except that AFF-RTR-WRZ1-4020 includes a larger capacity upgrade of the existing Boxted Service Reservoir.

A delivery date for AFF-RTR-WRZ1-4020 is not known at this stage; however, it is recognised that there is the potential, in combination with scheme AFF-CTR-WRZ3-1099, for cumulative impacts during construction given their proximity (within 5km) should the scheme be delivered between 2062 and 2065. Overall it is considered that there is low risk of cumulative effects as if required, extended construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods/ times will minimise any residual effects.

Given that the scheme proposes minimal additional infrastructure (a larger capacity upgrade) than identified for rdWRMP19 scheme AFF-RTR-WRZ1-1066 the cumulative effects regarding the Chilterns AONB and SEA topic of landscape and visual amenity are considered likely to be similar and the same proposed mitigation measures will apply.

Scheme AFF-CTR-WRZ3-0028 has the potential to interact with a number of the other rdWRMP19 schemes. Although the delivery date is unknown at this stage, it is recognised that there is the potential (in combination with four of the rdWRMP19 schemes; AFF-RTR-WRZ1-4010, AFF-RES-

WRZ4-0832, AFF-NGW-WRZ4-0624 and AFF-RTR-WRZ4-4011) for cumulative impacts during construction given their proximity (within 5km). Again if required, 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.

In regards to the SEA topic relating to water, scheme AFF-CTR-WRZ3-0028 interacts with scheme AFF-NGW-WRZ4-0624 where there is the potential for cumulative impacts on the Colne Brook Surface Water Body during operation. Mitigation, including CoPC and best practice design, construction and operations is recommended to minimise the potential for any residual negative effects.

In terms of landscape, scheme AFF-CTR-WRZ3-0028 also interacts with six of the rdWRMP19 schemes; and the potential for cumulative impacts on the Chilterns AONB is identified. These effects 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. 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 for negative cumulative effects during construction. Any new visible infrastructure should be sensitively designed and adhere to the aims and policies of the relevant AONB Management Plan.

Scheme AFF-CTR-WRZ3-0028 is also identified as having the potential for cumulative effects on biodiversity. Potential impacts are identified during construction in relation to Ruislip Woods SSSI and this could interact with rdWRMP19 scheme AFF-RTR-WRZ1-4010. Given the interest features of the SSSI (lowland acid grassland, woodland and invertebrate assemblage) impacts are most likely to occur as a result of emissions of dust and changes to water quality and levels during construction. During the detailed design stage the pipelines should be routed to avoid coming within 500m of the interest features sensitive to emissions of dust during earthworks. Otherwise, standard dust suppression measures should be introduced in line with the relevant British Standard. 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 SSSI would not be significantly affected. This would need to be developed further during detailed scheme design.

Scheme AFF-ASR-WRZ6-0174 also has the potential to interact with other rdWRMP19 schemes. Although the delivery date is unknown at this stage, it is recognised that there is the potential (in combination with three of the rdWRMP19 schemes; AFF-RTR-WRZ1-4010, AFF-CTR-WRZ4-4001, and AFF-RTR-WRZ4-4011) for cumulative impacts during construction given their proximity (within 5km). Again if required, 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.

In regards to the SEA topic relating to water, scheme AFF-ASR-WRZ6-0174 interacts with scheme AFF-EGW-WRZ2-0090 where there is the potential for cumulative impacts on the Mid-Chilterns Chalk Groundwater Body during operation. Mitigation, including CoPC and best practice design, construction and operations is recommended to minimise the potential for any residual negative effects.

Scheme AFF-RTR-WRZ7-0842 has the potential to interact with the other supply schemes proposed in the rdWRMP19 within WRZ7 on the Kent Downs AONB. These impacts 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. 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.

7. Cumulative Effects of the revised draft WRMP19 and adaptive futures with other Plans, Programmes and Projects

7.1 Introduction

This Chapter sets out potential inter-plan cumulative effects arising as a result of the rdWRMP19 (including adaptive futures) interacting with other plans, programmes and projects, including other WRMPs.

7.2 Other Affinity Water Plans

The SEA considered the potential for interactions between schemes in the rdWRM19 (or adaptive futures) with Affinity Water's Drought Plan (2018) and the emerging Business Plan. The assessment concluded that the potential risk for negative cumulative effects is low.

7.3 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.[5] The study identified eight schemes proposed within Affinity Water's rdWRMP19 and one scheme within the adaptive futures 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 3Ml/d)

Two of the schemes AFF-RTR-WRZ7-0909 and AFF-EGW-WRZ7-0908 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. A further two schemes AFF-RNC-WRZ7-0626 and AFF-EGW-WRZ7-0908 propose 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 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.

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

[5] 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.

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 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 Affinity Water's rdWRMP19 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.

It is recognised that the Thames Water WRMP19 is continuing to evolve and as it does, it will be necessary to further re-visit the cumulative effects as part of the implementation of the WRMP and in subsequent future WRMPs prepared every five years. Despite this, it is considered likely that any changes will not lead to any adverse cumulative effects.

7.4 Other Drought Plans

Consideration was also given to the potential for cumulative effects to arise as a result of interactions with schemes proposed through the Drought Plans of neighbouring water companies. The assessment found that the potential for the rdWRMP19 (including additional schemes under the adaptive futures) and other Drought Plan to interact and have negative cumulative effects is low. The demand management measures set out in the Drought Plan are likely to have a positive cumulative effect along with the demand management measures proposed through the rdWRMP19 - reducing the pressure on water resources during periods of prolonged dry weather when river flows and groundwater levels are well below normal.

The rdWRMP19 and Drought Plans will help to increase the resilience of the Affinity Water Supply system to withstand a severe drought with positive cumulative effects with those neighbouring water companies that are reliant on bulk water supply exports from Affinity Water during drought.

7.5 Other plans and programmes

The potential for interactions with other plans and programmes, including other Affinity Water plans, were explored and it was found that there is a low risk for cumulative effects. The potential for interactions predominantly arises through the delivery of new infrastructure that is proposed through other plans during the construction phase of rdWRMP19 schemes. In the majority of cases the delivery dates for the schemes and infrastructure mean that cumulative effects will be avoided.

The key to avoiding and minimising the potential for cumulative negative effects during construction is to have ongoing and effective communication between the relevant authorities' (local planning, transport, minerals and waste authorities) and key stakeholders (Environment Agency, Historic

8. Mitigation and areas for further investigation

The assessment identifies a range of mitigation measures that are relevant to the majority of schemes proposed within the rdWRM19. These include the following:

- The phased delivery of new infrastructure as well as the creation of temporary road diversions and haul roads at the start of the construction, agreement of HGV routes and working hours.
- Minimise waste during construction and reuse materials and source them locally where possible.
- Use of best practice methods including the development and implementation of Construction Environmental Management Plans should be considered.
- The temporary diversion of public rights of way where necessary.
- In terms of the landscape and historic environment schemes should retain hedgerows, trees, fields, walls and soil/land should be re-instated following construction wherever possible. Use construction methods and barriers/ hoardings that are sympathetic to the aesthetics of the surrounding landscape and deliver screening/ planting. Any new visible should be sensitively designed.
- Methods should be adopted to minimise the impact of localised flooding during construction, including dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions) where necessary.
- Appropriate pipe-laying techniques to minimise impacts on the environment and water bodies.
- Seek to avoid the loss of important habitats, including priority habitats, at the detailed design stage by re-routing pipelines. Appropriate buffers should also be provided between new infrastructure and important habitats to minimise impacts during construction and operation.

Specific mitigation measures for schemes are identified where necessary and **Table 6** below sets out some of the key areas for further investigation/ assessment that need to be addressed.

Table 6: Proposed mitigation and areas for further investigation

Scheme	Potential impact	Mitigation / further investigation
AFF-RES-WRZ4-0832 (BREN Reservoir)	The scheme proposes the release of water from the Brent Reservoir, which is designated as a SSSI. There is uncertainty at this stage with regard to the extent and frequency of drawdown in the reservoir as a result of this proposed scheme.	There ongoing discussions between Affinity Water and the Rivers and Canals Trust who operate the reservoir. 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. The assessment proposes that the water levels in the Brent Reservoir are monitored to inform the need and use of hands-off flow conditions to restrict the release of water when levels are low. Furthermore, the release of water could also be restricted during the breeding/ nesting seasons (broadly March to July). The Challenging Adaptive Future explored the potential for reducing the yield of this scheme by 50% to mitigate the extent and frequency of any drawdown.
AFF-NGW-WRZ4-0624 (Canal & River Trust and SGSK Boreholes)	The WFD assessment found that the cessation of discharge could cause deterioration in status of the Salthill Stream surface water body.	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. Given that the delivery date of this scheme is 2039 there is sufficient time to investigate this issue further. Mitigation could include the use of hands-off flow conditions when water levels/ flows are low. The Challenging Adaptive Future explored the potential for reducing the yield of this scheme by 50% to mitigate the extent and frequency of any drawdown.

Scheme	Potential impact	Mitigation / further investigation
AFF-RES-WRZ5-0809 : Birds Green Reservoir	The WFD assessment found that there the scheme could reduce water flow and levels as well as quality in the Lower Roding (Cripsey Brook to Loughton) Surface Water Body	The WFD assessment recommends that further assessments and discussions with the EA are required to explore the need for and potential of compensatory flows. Given that the delivery date of this scheme is 2078 there is sufficient time to investigate this issue further. Mitigation could include the use of hands-off flow conditions when water levels/ flows are low. The Challenging Adaptive Future explored the potential for reducing the yield of this scheme by 50% to mitigate the extent and frequency of any drawdown.
AFF-NGW-WRZ3-1053 : Kings Walden AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole)	The WFD assessment identifies that the two schemes have the potential for impacts 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	Further investigations should be carried out, including a more detailed WFD assessment. There should also be discussions with the Environment Agency to ensure compliance with the WFD. Mitigation could include the use of hands-off flow conditions when water levels/ flows are low. The Challenging Adaptive Future explored the potential for reducing the yield of this scheme by 50% to mitigate the extent and frequency of any drawdown.
AFF-RTR-WRZ1-4010 : Abingdon Reservoir to Harefield Transfer (50Ml) AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d)	The HRA identified that there is the potential for a likely significant effect on the South West London Waterbodies SPA/ Ramsar site	The HRA concluded that there would not be any adverse effects on the integrity of any European sites if the following recommendations are included in the rdWRMP19: It is recommended that the inclusion of this option within the WRMP 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 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 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.
AFF-RTR-WRZ1-1066: Grand Union Canal (GUC - Berkhamstead/ Hemel Hempstead) AFF-RTR-WRZ1-4020: Grand Union Canal (GUC - Berkhamstead/ Hemel Hempstead 100 Ml/d)	The WFD assessment identifies that the abstraction has the potential for impacts during operation on water levels/ flows and quality in the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body.	Further investigations should be carried out, including a more detailed WFD assessment. There should also be discussions with the Environment Agency to ensure compliance with the WFD. Mitigation could include the use of hands-off flow conditions when water levels/ flows are low. It is anticipated that these schemes would be delivered later in the planning horizon, i.e. after AMP8, so there is sufficient time to undertake further investigations.

9. Next steps and monitoring

9.1 Next Steps

The rdWRMP19 and revised Environmental Report will be sent to the Department for Environment, Food and Rural Affairs (Defra) for review and published for wider consultation. Any comments received will be taken into account when finalising the WRMP19.

Once the final WRMP19 is approved by the Secretary of State, published and adopted, Affinity Water will publish a SEA Post Adoption Statement, describing how the SEA and the responses to consultation have been taken into account during the preparation of the WRMP19. This statement must include:

- How environmental considerations have been integrated into the WRMP;
- How the Environmental Report has been taken into account;
- Any changes to or deletions from the WRMP in response to the information in the Environmental Report;
- How consultations responses have been taken into account;
- Reasons for choosing the WRMP as adopted, and why other reasonable alternatives were rejected; and
- Monitoring measures.

9.2 Monitoring

At the current time, there is a need only to present 'measures envisaged concerning monitoring'. The SEA Regulations expect monitoring and mitigation to be linked, and that the focus should be on any significant negative effects identified through the assessment. The UKWIR SEA guidance recommends that existing arrangements for monitoring should be used where possible to avoid duplication of effort.

Based on the findings of the SEA at this stage, the following monitoring measures are proposed:

Table 7: Proposed monitoring measures

SEA topic	Potential indicator	rdWRMP19 and adaptive future schemes
Water	Groundwater levels/ flows/ quality and WFD status for the Lower Greensand (already monitored by the Environment Agency);	• AFF-NGW-WRZ4-0624 : Canal and Rivers Trust and GSK Slough Boreholes • AFF-NGW-WRZ3-1053 : Kings Walden • AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole)
	Surface water levels/ flows/ quality and WFD status for the Salthill stream (already monitored by the Environment Agency);	• AFF-NGW-WRZ4-0624 : Canal and Rivers Trust and GSK Slough Boreholes
	Surface water levels/ flows/ quality and WFD status for the Lower Roding (Crispey Brook to Loughton) (already monitored by the Environment Agency);	• AFF-RES-WRZ5-0809 : Birds Green Reservoir
	Surface water levels/ flows/ quality and WFD status for the River Ivel (already monitored by the Environment Agency);	• AFF-NGW-WRZ3-1053 : Kings Walden
	Groundwater levels/ flows/ quality and WFD status for the Woburn Sands (already monitored by the Environment Agency);	• AFF-NGW-WRZ3-1053 : Kings Walden • AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole)
	Surface water levels/ flows/ quality and WFD status for the River Flit (already monitored by	• AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole)

SEA topic	Potential indicator	rdWRMP19 and adaptive future schemes
	the Environment Agency);	
	Groundwater levels/ flows/ quality and WFD status for the East Kent Chalk Stour (already monitored by the Environment Agency);	• AFF-EGW-WRZ7-0629: Lye Oak Licence Variation
	Brent Reservoir water levels (already monitored by the Canal & River Trust);	• AFF-RES-WRZ4-0832 : Brent Reservoir
	Surface water levels/ flows/ quality and WFD status for the Tame (R Rea to R Blythe and from R Blythe to River Anker) surface water body (already monitored by the Environment Agency);	• AFF-RTR-WRZ1-1066 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead) • AFF-RTR-WRZ1-4020 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead 100 Ml/d)
Biodiversity	Brent Reservoir SSSI condition status (already monitored by Natural England);	• AFF-RES-WRZ4-0832 : Brent Reservoir
	South West London Waterbodies Ramsar and SPA as well as the Wraysbury No.1 Gravel Pit SSSI condition status (already monitored by Natural England).	• AFF-RTR-WRZ1-4010 : Abingdon Reservoir to Harefield Transfer (50Ml) • AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d)
	Roding Valley SSSI condition status (already monitored by Natural England);	• AFF-RES-WRZ5-0809 : Birds Green Reservoir
	Lydden and Swingfield Woods SSSI	• AFF-EGW-WRZ7-0629: Lye Oak Licence Variation
Landscape	Number of objections from AONB management boards in relation to new schemes.	• AFF-RTR-WRZ1-4010 : Abingdon Reservoir to Harefield Transfer (50Ml) • AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d) • AFF-RTR-WRZ1-1066 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead) • AFF-RTR-WRZ1-4020 : Grand Union Canal (GUC - Berkhamstead/Hemel Hempstead 100 Ml/d) • TR-WRZ3-1099 : Boxted to Chaul End • AFF-NGW-WRZ3-1068 : Runley Wood (AMP7 LGS Borehole) • All schemes proposing new visible infrastructure within WRZ 7.
Historic Environment	Number of objections from Historic England in relation to new schemes.	• AFF-RTR-WRZ1-4010 : Abingdon Reservoir to Harefield Transfer (50Ml) • AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d) • General for all schemes that propose new visible infrastructure.
	Condition of buried archaeology would be monitored during construction works as part of a Watching Brief and associated response measures as set out in the Environmental Management Plan agreed as part of the planning permission process.	• AFF-RTR-WRZ1-4010 : Abingdon Reservoir to Harefield Transfer (50Ml) • AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d) • General for all schemes that propose new visible infrastructure.
	Reference to Historic England's monitoring of heritage assets such as Listed Buildings and Scheduled Monuments, Registered Battlefields, Registered Parks and Gardens, in particular the 'Heritage at risk' register.	• AFF-RTR-WRZ1-4010 : Abingdon Reservoir to Harefield Transfer (50Ml) • AFF-RTR-WRZ4-4011 : Abingdon to Iver 2 (50Ml/d) • General for all schemes that propose new visible infrastructure.

Monitoring measures will be given further consideration and set out within the SEA Post Adoption Statement.

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