



Affinity Water Drought Plan

Strategic Environmental Assessment
Environmental Report

June 2022

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Abbreviations

AA	Appropriate Assessment
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Areas
BEIS	Business, Energy & Industrial Strategy
BNG	Biodiversity Net Gain
CAMS	Catchment Abstraction Management Strategies
CCRA	Climate Change Risk Assessment
CPRE	Campaign for Rural England
CROW	Countryside and Rights of Way
CTMP	Construction Traffic Management Plan
DCLG	Department for Communities and Local Government
EAAP	Ecosystems Approach Action Plan
EAR	Environmental Assessment Report
EBSA	Economics of Balancing Supply and Demand
EEC	European Economic Community
EIA	Environmental Impact Assessment
ELD	Environmental Liability Directive
EMP	Environmental Monitoring Plan
ESRI	Economic and Social Research Institute
GHG	Greenhouse Gas
GUC	Grand Union Canal
GWDE	Groundwater Dependant Terrestrial Ecosystem
HER	Historic Environment Record

HRA	Habitats Regulations Assessment
ICES	International Council for the Exploration of the Sea
IEA	Integrated Environmental Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
IPENS	Improvement Plans for England's Natura 2000 Sites
IRZ	Impact Risk Zone
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
LULUCF	Land Use, Land-use Change, and Forestry
LWS	Local Wildlife Sites
MCZ	Marine Conservation Zone
MPA	Marine Protection Area
MPS	Marine Policy Statement
NAP	National Adaptation Programme
NCA	National Character Area
NEA	National Ecosystem Assessment
NERC	Natural Environment and Rural Communities
NEUBs	Non-Essential Use Bans
NFM	Natural Flood Management
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NVZ	Nitrate Vulnerable Zone
RAG	Red, Amber, Green

RAPID	Regulators' Alliance for Progressing Infrastructure Development
RBD	River Basin District
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SAC	Special Areas of Conservation
SCP	Systematic Conservation Planning
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SESRO	South East Strategic Reservoir Option
SLR	South Lincolnshire Reservoir
SPA	Special Protection Area
SPZ	Source Protection Zone
SRO	Strategic Resource Option
SSSI	Sites of Special Scientific Interest
STT	Severn to Thames Transfer
STW	Severn Trent Water
TUBs	Temporary Use Bans
UKCP18	UK Climate Projections 2018
WFD	Water Framework Directive
WRE	Water Resources East
WRMP	Water Resource Management Plan
WRPG	Water Resources Planning Guidelines
WRSE	Water Resources South East
WRW	Water Resources West
WRZ	Water Resource Zone
WWF	World Wide Fund (for nature)

1 Introduction

1.1 Introduction and background to the Drought Plan 2022

Affinity Water are a water company situated in the South East of England, supplying parts of Bedfordshire, Berkshire, Buckinghamshire, Essex, Hertfordshire, Surrey, and North West London. They also supply water to the Tendring peninsula in Essex and the Folkestone and Dover areas of Kent. Affinity Water are currently developing their Drought Plan 2022, covering the period 2022 – 2027, to demonstrate what actions will be taken to protect public water supplies during a drought and how they intend to minimise any resulting environmental impacts.

Water companies in England and Wales are required to prepare and maintain Statutory Drought Plans under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003, and in accordance with the Drought Plan (England) Direction 2020. The Water Industry Act 1991 defines a Drought Plan as ‘a plan for how the water undertaker will continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water, with as little recourse as reasonably possible to drought orders or drought permits’.

On 1 October 2010, Section 76 of the Water Industry Act 1991 was amended by the commencement of Section 36 of the Flood and Water Management Act 2010. The Water Use (Temporary Bans) Order 2010 also commenced on 1 October 2010 and provides definitions and clarifications on these activities.

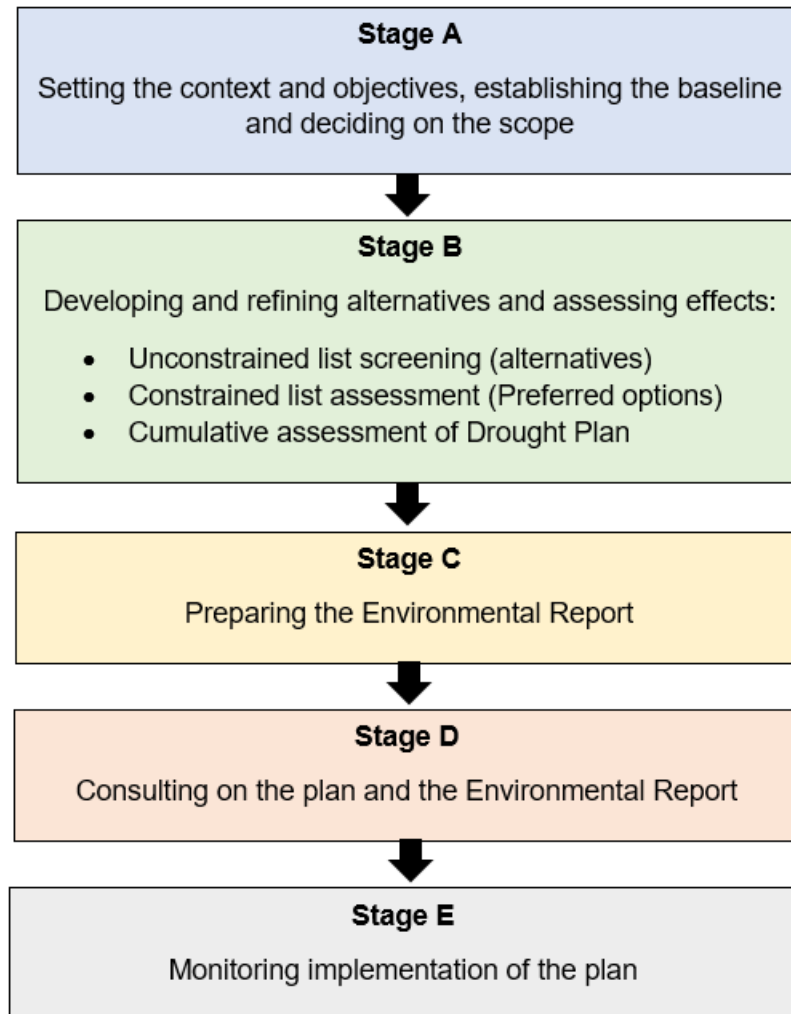
The Affinity Water Drought Plan was published in June 2021 and was subject to public consultation where customers and stakeholders were able to provide feedback on the content and approach of the Plan. Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) were not undertaken as part of the initial development of the draft Drought Plan. However, following the consultation feedback from Natural England, it was identified that these assessments were required to support the Drought Plan. SEA and HRA have therefore now been undertaken to feed into the development of the Drought Plan. This SEA Environmental Report has been prepared for the Drought Plan 2022 and documents the outcomes of the SEA process. The HRA (Ricardo, 2022) is documented in a separate report but has been used to inform the SEA process.

1.2 The SEA Process

The SEA Directive and Regulations require an assessment of the effects of certain plans and programmes on the environment. Article 3 (2b) states that SEA is required for plans and programmes which are prepared for water management, set the framework for development consents, and/or are likely to have a significant environmental effect.

The SEA works to inform the decision-making process through the identification and assessment of significant and cumulative effects a plan or programme may have on the environment. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders. 1.1 shows the different stages in the SEA process and Appendix A presents the different tasks involved in each of the SEA stages. The SEA for the Drought Plan is currently at Stage D of the SEA process.

Figure 1.1: SEA Process Stages



The SEA process has followed current guidance on the application of SEA assessment within water resource planning including incorporating best practice within the proposed approach. The current guidance documents include:

- Environmental assessment guidance for water resources management plans and drought plans, 2021, UK Water Industry Research¹.
- Strategic Environmental Assessment: Core Objective Identification, 2020, All Company Working Group
- A Practical Guide to the SEA Directive, 2005, DCLG².
- Topic related SEA guidance on climate change, biodiversity and the historic environment from Natural England, Environment Agency and Historic England.
- Water Resource Planning Guidelines, 2021, Environment Agency, Ofwat, Natural Resources Wales and Supplementary Planning Guidance 'Environmental and Society in Decision-Making'.

1.3 Relationship with Affinity Water WRMP24 and Regional Planning

Affinity Water are currently developing their Water Resource Management Plan 2024 (WRMP24) and SEA is being undertaken as part of that process. A SEA Scoping Report (Mott MacDonald, 2021) was prepared to satisfy the requirements of the Scoping Stage and has been consulted on and fully agreed with the Statutory Consultees (Natural England, Environment Agency and Historic England).

It has been agreed with the Statutory Consultees that the WRMP24 Scoping Report can be used to inform the SEA for the Drought Plan. As such, a separate SEA Scoping Report was not required for the Drought Plan SEA. The Scoping undertaken as part of WRMP24 is summarised within this Environmental Report (Chapter 3). The SEA assessment has been undertaken in line with the SEA Framework and methodology set out in the Affinity Water WRMP24 Scoping Report as agreed with the Statutory Consultees.

The WRMP24 Scoping Report sets out the approach for the SEA to be undertaken in the context of the regional planning currently being carried out. Affinity Water sits within both Water Resources South East (WRSE) and Water Resources East (WRE). The proposed approach to the SEA aligns with the regional methodologies and provides efficiencies through use of regional environmental assessments as a basis for further assessment work.

The constrained list of options within the Drought Plan have been subject to environmental assessment as part of the WRSE regional plan process. These assessments have therefore been utilised to inform the SEA and have been updated with additional information as it has become available through the development of the Drought Plan.

1.4 The purpose of the Environmental Report

The purpose of this Environmental Report is to present the results of the SEA process for the Drought Plan including the potential effects (positive and negative) of the options included within the Plan, cumulative effects, mitigation and enhancement measures, and monitoring proposals.

The key tasks undertaken, and the structure of the Environmental Report are presented below:

¹ UK Water Industry Research, Environmental Assessment Guidance for Water Resources Management Plans

² DCLG, September 2005, A 'Practical Guide to the Strategic Environmental Assessment Directive', Pages 26 - 29

- Chapter 1 - Introduction to the Drought Plan, the SEA process and requirements
- Chapter 2 - Description and context of the Drought Plan
- Chapter 3 - Summary of the WRMP24 Scoping Stage, including the plans and programmes review, baseline, key issues and opportunities, and SEA Framework
- Chapter 4 – Environmental Assessment Methodology
- Chapter 5 – Assessment of the Drought Plan, including the results of the individual Drought Plan options assessments
- Chapter 6 – Cumulative Effects Assessment, including cumulative assessment of the options within the Drought Plan and cumulative effects with other plans
- Chapter 7 – Mitigation and Monitoring
- Chapter 8 - Summary and Next Steps
- Chapter 9 - References
- Appendix A - SEA Process Tasks
- Appendix B – WRMP24 Scoping Report Consultation Log
- Appendix C – WRMP24 Policy, Plans and Programmes Review
- Appendix D – WRMP24 Baseline Review and Baseline Maps
- Appendix E – Assessment Scoring Criteria
- Appendix F – TUBs and NEUBs Assessment Matrices
- Appendix G – Drought Permit Assessment Matrices
- Appendix H – Environmental Report Consultation Log
- Appendix I – Preliminary Assessment Summary Report

1.5 Compliance with other legislation

If a plan or project is deemed to have a ‘likely significant effect’ on any site that is designated under the European Habitats or Birds Directives, an assessment is required under the Conservation of Habitats and Species Regulations 2010 (as amended) (the ‘Habitats Regulations’). This assessment is more commonly referred to as a Habitats Regulations Assessment (HRA). Sites designated under the European Habitats and Birds Directives are Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) respectively. HRA is also required, as a matter of UK Government policy for potential SPAs (pSPA), candidate SACs (cSAC) and Wetlands of International Importance designated under the Ramsar Convention of 1979 (Ramsar sites). All of these sites are herein collectively referred to as European Sites.

Under Regulation 63³, any plan or project which is likely to have a significant effect on a European site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to an Appropriate Assessment (AA) to determine the implications for the site, in view of its conservation objectives.

The Drought Plan 2022 area contains a number of European sites and a HRA has been undertaken (Ricardo, 2022) to determine whether any of the drought permits within the Drought Plan could result in likely significant effects (Stage 1 Screening) on European sites. Where likely significant effects could not be ruled out, a Stage 2 AA was undertaken. The HRA is presented in a separate report, however the results of the HRA have been used to inform the SEA.

³ UK Government, Regulation 63, [online] at: [The Conservation of Habitats and Species Regulations 2017 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

1.6 Assumptions and Limitations

Mott MacDonald has relied on published data and information provided by Affinity Water and from third party organisations. The baseline information collected in this report is the most up-to-date information currently available; however, it is possible that conditions described in this report may change over time. This dataset has been reviewed and updated as appropriate throughout the SEA process, as new information becomes available. The information has also been reviewed and updated following the Affinity Water WRMP24 SEA Scoping Stage.

It should also be noted that drought permits are considered as a last resort and they have never been applied for by Affinity Water as there has not been a drought serious enough in their operational history to necessitate the requirement for them. As such, there is limited baseline information in relation to the impacts they may have, therefore potential effects are identified based on modelling as presented in the Environmental Assessment Reports (EARs).

EARs have been prepared for the drought permit options included within the Drought Plan and these have been used to inform the SEA. It should be noted that the modelling within the EARs for drought permits in the Central region takes a precautionary approach. For this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome.

The Affinity Water region in the South-East of England is designated as an area of 'serious water stress' and future climate change and population growth is likely to place additional pressure on already scarce resources. Affinity Water have a statutory duty to prepare and maintain a Drought Plan under the Water Industry Act 1991, as amended by the Water Act 2003 and in accordance with the Drought Plan (England) Direction 2020.

Water companies in England and Wales are required to prepare and maintain Statutory Drought Plans under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003, and in accordance with the Drought Plan (England) Direction 2020.

Affinity Water are currently updating their Drought Plan which was previously published in November 2019. The Drought Plan is due to be published in July 2022 and will cover the period from 2022 to 2027. The purpose of a drought plan is to describe the actions that Affinity Water will take before, during and after a drought event and when they will be implemented. It outlines how water resources will be monitored, and how water resources will be forecasted in a developing drought. The drought actions outlined in the Drought Plan aim to safeguard supplies for customers, protect the environment and work with customers and stakeholders to understand the environmental and operational impacts of drought, as well as explaining how Affinity Water's customers can help.

The Drought Plan includes the following main areas of action:

- Actions to reduce demand
- Actions to protect the environment
- Actions to maintain supply
- Emergency Drought Orders

A number of the actions within the Drought Plan have been developed and refined more than others at this stage. As such, the SEA has not assessed all the options which are outlined within the Drought Plan given the lack of detail available. As the options are brought forward and developed, they will be subject to relevant and appropriate environmental assessment.

The SEA has assessed the following actions within the Drought Plan with further detail presented in Sections 2.2 and 2.3 respectively:

- Actions to reduce demand (Temporary Use Bans (TUBs) and Non-essential Use Bans (NEUBs))
- Actions to maintain supply (drought permits)

2.2 Actions to reduce demand

During a period of drought, powers can be granted to water companies to allow them to impose TUBs restrictions on customer' water use to help to reduce demand. They allow essential supplies to be maintained and also help to conserve water resources for later in a drought and reduce the environmental impacts of abstraction during this critical period. The Water Use (Temporary Bans) Order 2010 provides detailed definitions of uses, exemptions and conditions in relation to these powers. A summary of measures under TUBs include:

- Watering a garden using a hosepipe
- Cleaning a private motor-vehicle using a hosepipe
- Watering plants on domestic or other non-commercial premises using a hosepipe
- Cleaning a private leisure boat using a hosepipe
- Filling or maintaining a domestic swimming or paddling pool
- Drawing water, using a hosepipe, for domestic recreational use

- Filling or maintaining a domestic pond using a hosepipe; and
- Filling or maintaining an ornamental fountain
- Cleaning walls, or windows, of domestic premises using a hosepipe
- Cleaning paths or patios using a hosepipe
- Cleaning other artificial outdoor surfaces using a hosepipe

Where a drought continues to worsen, water companies can then apply to further increase water restrictions. NEUBs are an additional set of measures that water companies can be granted to impose further restrictions on water use in relation to commercial operations. Measures included under NEUBs can be summarised as:

- Watering outdoor plants on commercial premises
- Filling or maintaining a non-domestic swimming or paddling pool
- Filling or maintaining a pond
- Cleaning non-domestic premises
- Cleaning a window of a non-domestic building
- Operating a mechanical vehicle-washer
- Cleaning any vehicle, boat, aircraft, or railway rolling stock
- Cleaning industrial plant
- Suppressing dust
- Operating cisterns in any building that is unoccupied or closed

2.3 Actions to maintain supply

Drought permits are an option available to water companies during serious (drought trigger 3 or greater) drought events. They are actions which, if authorised by the Environment Agency under drought conditions, allow for an additional source of water outside the schedule of an existing licence on a temporary basis once available demand-side options have been exhausted.

Due to the potential for environmental impacts, the decision to use drought permits are not taken lightly, and Affinity Water have not needed to use them in any of their three regions in the past. Drought permits are considered as a last resort, however they form a key part of mitigation planning for serious drought events.

It is important to note that drought permits have never been applied for by Affinity Water, as there has not been a drought serious enough in their operational history to necessitate the requirement for them. Affinity Water's current level of service means that drought permits would only be used for drought events equivalent to or greater than a 1 in 40 years return period. Affinity Water's WRMP 2019 (WRMP19) has committed to an increased resilience without the need for drought permits, and Affinity Water's planned level of service from 2024 onwards will be for a 1 in 200 year return period event or greater. Through their WRMP24 process they will ultimately plan to move towards a 1 in 500 year return period resilience level without the need for drought permits.

Drought permits are one of the last remaining options set out in the Drought Plan and would be used once all other non-emergency options have already been implemented. The decision to apply for these would only happen in the event that the drought situation is serious enough to pose a risk to public water supplies. In most circumstances the drought itself will have already caused significant environmental impacts, and many river reaches in their area are likely to already be dry. In these cases, the impacts caused by the implementation of drought permits will predominantly be concentrated around possible delays in recovery of flows, rather than reductions in flows.

3 Scoping

3.1 SEA Scoping

Affinity Water are currently developing their WRMP24 and are also undertaking SEA as part of that process. A SEA Scoping Report (Mott MacDonald, 2021) was prepared to satisfy the requirements of the Scoping Stage and has been consulted on and fully agreed with the Statutory Consultees (Natural England, Environment Agency and Historic England). It has been agreed with the Statutory Consultees that the WRMP24 Scoping Report can be used to inform the SEA for the Drought Plan. As such, a separate SEA Scoping Report was not required for the Drought Plan SEA.

The SEA Scoping Report can be found at the following link for further information:

<https://affinitywater.uk.engagementhq.com/4398/widgets/28286/documents/14440>

This chapter presents a summary of the Scoping stage undertaken as part of the WRMP24 process and is supported by Appendix B to D.

3.2 Consultation

The WRMP24 Scoping Report was issued for formal consultation for a seven-week period from 26 July 2021 to the following key consultees: Natural England, Environment Agency, Historic England and Ofwat. The consultation period allowed stakeholders to comment on the proposed scope and approach for the SEA of the WRMP24.

Given the WRMP24 Scoping Report is being used to inform the Drought Plan SEA, the comments received from the formal consultation process have therefore been taken into account in the preparation of this Environmental Report. The comments and the resulting updates are detailed in Appendix B.

The consultation responses received as part of the SEA Scoping Stage of the WRSE regional plan process have also been reviewed. All the relevant comments made by the Statutory Consultees have been addressed within this Environmental Report.

3.3 Relationship with other Plans, Policies and Programmes

3.3.1 Plans, Policies and Programmes Review

A review of the policies, plans, and programmes was undertaken as part of the WRMP24 SEA Scoping process (listed in Table 3.1). The aim was to determine how the emerging WRMP may be affected by these external factors. Furthermore, the WRMP must aim to support current relevant policies, plans, programmes, and environmental protection legislation at international, national, and local levels. The WRMP must aim to support, and where possible, strengthen the objectives of other local plans and strategies within the Affinity Water region

A review of these documents was required to identify potential inconsistencies or constraints, and consistencies between these documents and the draft WRMP to inform the development of the SEA Framework. Table 3.1 lists current relevant policies, plans, and programmes which were considered during the WRMP24 SEA scoping stage. Appendix C presents the policies, plans, and programmes review in full.

Given review has been undertaken as part of the WRMP24 process, consideration has been given to additional plans, policies and programmes that are relevant to the Drought Plan. Additional plan, policies and programmes that were identified as part of the WRMP24 Scoping

Consultation process have also been added. The following additional plans and legislation have been reviewed as part of the SEA process for the Drought Plan:

- Drought Plan (England) Direction 2020
- The Water Use (Temporary Bans) Order 2010
- Drought Plan Regulations 2005
- Drought Plan Direction 2011
- National Parks and Access to the Countryside Act 2008
- COVID19 Recovery Strategy (2020)
- Build Back Better (2021)
- The Clean Growth Strategy (2017)

3.3.2 Identification of Key Themes

The main themes, messages and objectives from the policies, plans and programmes review that are considered relevant to the WRMP are presented below. These are as follows:

- Conserve flora and fauna and their habitats, including designated and non-designated sites
- Conservation and wise use of wetlands and their resources
- Protection of wild birds and their habitats
- Support environmental and biodiversity net gain
- Integrate ecosystem service and natural capital principles
- Halt overall biodiversity loss and support the protection, recovery and enhancement of biodiversity
- Contribute to nature recovery and nature recovery networks and strategies
- Habitat creation and safeguarding ecosystem services (Woodland Carbon Guarantee scheme in line with the Woodland Carbon Fund)
- Catchment management / nature-based solutions working to enhance natural processes (existing work through a Catchment Based Approach (CaBA))
- Creation of green infrastructure⁵
- Protection of landscape character and quality
- Improve water quality so all waters achieve 'good status' as set out in the Water Framework Directive
- Prevent or limit inputs of pollutants into groundwater
- Monitor and provide information to consumers on drinking water quality
- Promote efficient use of water
- Reduce water waste and leakage (Ofwat targets and penalties)
- Reduce and manage the risks of flooding through sustainable design, including the use of nature based solutions
- Reduce greenhouse gas emissions to support the transition to the UK Government's 2050 net zero target
- Carbon sequestration with the aim of net zero carbon emissions by 2050 as per Paris Climate Agreement (and legislation passed by UK govt. in 2018)

⁵ The UK Government's 25-year Environment Plan includes a sub-objective for the provision of more and better-quality green infrastructure including urban trees. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan>

- Adapt to the impacts of climate change including drought, flooding and peak water demand conditions
- Improve resilience to extreme droughts ensuring consistency with WRMP24 (1/500 year resilience)
- Increase resource efficiency and reduce natural resource use and waste
- Create a green economy and promote sustainable growth
- Promote sustainable and healthy communities⁶
- Promote social inclusion and community participation
- Protect cultural heritage assets including archaeology and built heritage
- Protect best quality soils and agricultural land
- Improve the health and resilience of Chalk Catchments
- Improve soil health
- Support the Lawton recommendation⁷ for statutory undertakers planning the management of water resources to:
 - Make space for water and wildlife along rivers and around wetlands
 - Restore natural processes in river catchments, including in ways that support climate change adaptation and mitigation
 - Accelerate the programme to reduce nutrient overload, particularly from diffuse pollution
- Support the UK Government's 25 Year Plan to Improve the Environment⁸:
 - Using and managing land sustainably – including embedding an “environmental net gain” principle into development (as supported by the Environment Act 2021)
 - Recovering nature and enhancing the beauty of landscapes
 - Connecting people to the environment to improve health and wellbeing
 - Increase resource efficiency and reducing pollution
 - Securing clean, healthy and productive and biologically diverse seas and oceans
 - Protecting and improving the global environment

The themes, messages and objectives identified from the policies, plans, and programmes review provided an input into the process of identifying key issues and opportunities and developing the SEA Framework.

⁶ The UK Government definition of sustainable communities as outlined in the document ‘Sustainable Communities: Homes for All’ (ODPM, January 2005, page 74) is: “*Sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all*”.

⁷ Lawton, 2010, Making Space for Nature, Recommendation 4, Page 73

⁸ UK Government (2018). A Green Future: Our 25 Year Plan to Improve the Environment. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf

Table 3.1: Relevant international, national, and regional policies, plans and programmes

Policies, Plans and Programmes

International	
<ul style="list-style-type: none"> • Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979) • Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983) • Convention on Biological Diversity (1992) • Ramsar Convention - The Convention on Wetlands of International Importance (1971) • UN Framework Convention on Climate Change (1992) • Kyoto Protocol to the UN Framework Convention on Climate Change (1997) 	<ul style="list-style-type: none"> • Commitments arising from the World Summit on Sustainable Development, Johannesburg (2002) • Paris Agreement (2015) • Charter for the Protection and Management of Archaeological Heritage (1990) • The World Heritage Convention (1972) • Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1998)
European ⁹	
<ul style="list-style-type: none"> • Ambient Air Quality Directive (2008/50/EC) • Thematic Strategy on Air Pollution (2005) • Establishing measures for the recovery of the stock of European eel 2007 (1100/2007) • Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011) • Fresh Water Fish Directive (2006/44/EC) • Directive on the Conservation of Wild Birds (79/409/EEC) (as amended) • Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC) • Directive on Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC) • Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond (2007) • A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (2018) • Promotion of the use of energy and renewable sources Directive (2009/28/EC) • Energy Act 2013 • Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development • European Commission Environmental Liability Directive (2004/35/EC) • Directive on the assessment of the effects of certain plans and programmes on the environment (2001/42/EC) 	<ul style="list-style-type: none"> • The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) (1985) • The European Convention on the Protection of Archaeological Heritage (Valletta Convention) (1992) • The European Landscape Convention (2006) • The Environmental Noise Directive (2002/49/EC) • European Soils Charter (2003) • Thematic Strategy for Soil Protection (2006) • The Nitrates Directive (91/676/EEC) • The Water Framework Directive (WFD) (2000/60/EC) • Urban Wastewater Treatment Directive (91/271/EEC) • Drinking Water Directive (1998/83/EC) • Directive on Bathing Water (76/160/EEC); and Directive 2006/7/EC repealing Directive 76/160/EEC (from 2014) • Groundwater Directive (2006/118/EC) • Marine Strategy Framework Directive (2008/56/EEC) • Directive on the Assessment and Management of Flood Risks (2007/60/EC) • Blueprint to Safeguard Europe's Water Resources (2012)

⁹ It is acknowledged that the UK has left the European Union. However, European law and policy has formed the basis for UK environmental laws and contributed to the direction of UK policy in these areas for many years. As such, they are considered to remain a useful contextual frame as part of the policies, plans and programmes review.

Policies, Plans and Programmes

National

- The Eels (England & Wales) Regulations 2009 (as amended)
- Salmon and Freshwater Fisheries Act 1975
- UK Post-2010 Biodiversity Framework, JNCC and Defra (2012)
- Making Space for Nature - A review of England's Wildlife Sites and Ecological Network (2010)
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services, Defra (2011)
- The Conservation of Habitats and Species Regulations (2010) (as amended)
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations (2019)
- Delivering a healthy natural environment. Ecosystem approach action plan, Defra (2010)
- The Invasive Alien Species (Enforcement and Permitting) Order 2019
- The Great Britain Invasive Non-Native Species Strategy, Defra (2015)
- A narrative for conserving freshwater and wetland habitats in England, Natural England (2016)
- Conservation 21 - Natural England's Conservation Strategy for the 21st Century, Natural England (2016)
- State of Natural Capital Annual Report 2020, Natural Capital Committee (2020)
- Standing Advice on Protected Species, Natural England (2016)
- Climate Change Act 2008
- UK Climate Change Risk Assessment, Defra (2017)
- The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting, Defra (2018)
- National Planning Policy Framework (NPPF) (2019)
- A Green Future: Our 25 Year Plan to Improve the Environment, UK Government (2018)
- Environment Act 2021
- Securing the Future – Delivering the UK Sustainable Development Strategy (2005)
- The Natural Choice: Securing the Value of Nature, Defra (2011)
- Marine and Coastal Access Act (2009)
- The Wildlife and Countryside Act 1981 (as amended)
- Environment Protection Act 1990
- Countryside and Rights of Way (CROW) Act
- The Natural Environment and Communities Act 2006 (NERC Act)
- Creating a better place: Our ambition to 2020, Environment Agency (2018)
- UK National Ecosystem Assessment Follow-on (2014)
- Our Waste, Our Resources: A Strategy for England, HM Government (2018)
- Safeguarding our Soils - A strategy for England, Defra (2009)
- Water Resources Act 1991
- Water Industry Act 1991
- Water Act 2003 (as amended)
- Preparing for a drier future: England's water infrastructure needs, National Infrastructure Commission (2018)
- Draft National Policy Statement for Water Resources Infrastructure, Defra (2018)
- Water for Life White Paper, Defra (2011)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended)
- Protect groundwater and prevent groundwater pollution, Environment Agency (2017)
- Groundwater protection technical guidance, Environment Agency (2017)
- The Environment Agency's approach to groundwater protection, Environment Agency (2018)
- The Groundwater (England and Wales) Regulations 2009
- Flood and Water Management Act 2010
- National Flood and Coastal Erosion Risk Management Strategy for England, Environment Agency (2020)
- The Flood and Coastal Erosion Risk Management Policy Statement, Defra (2020)
- Flood risk assessments: climate change allowances, Environment Agency (2016)
- The Water Resources Management Plan Regulations 2007
- Water Resources Planning Framework (2015-2065), Water UK (2016)
- Water Supply (Water Quality) Regulations 2016 (as amended)
- National Policy Statement for Wastewater (2012)
- Climate change approaches in water resources planning – Overview of new methods, Environment Agency (2013)
- Drought response: our framework for England, Environment Agency (2017)
- Future Water: the Government's water strategy for England, Defra (2008)
- Water Resources Planning Guideline, Environment Agency (2016)
- The Urban Waste Water Treatment (England and Wales) Regulations 1994
- The Nitrate Pollution Prevention Regulations 2015

Policies, Plans and Programmes

- National Infrastructure Delivery Plan 2016–2021, Infrastructure and Projects Authority (HM Government) (2016)
- Fixing the foundations: Creating a more prosperous nation, HM Government (2015)
- Environment Act 1995
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
- Environmental Assessment of Plans and Programmes Regulations 2004
- Creating a great place for living: together we are building a green and healthy future (2018)
- Planning (Listed Buildings and Conservation Areas) Act 1990
- The Ancient Monuments and Archaeological Areas Act 1979
- Climate Change and the Historic Environment, English Heritage (2008)
- Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment, Historic Environment (2016)
- The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3, Historic Environment (2017)
- Ancient Woodland and Veteran Trees: Protecting them from development, Forestry Commission and Natural England (2014)
- Managing Water Abstraction, Environment Agency (2016)
- Marine Plans – South East Inshore, South Inshore, South Offshore (Marine Management Organisation)
- UK Marine Policy Statement (2011)
- Drought Plan (England) Direction 2020
- The Water Use (Temporary Bans) Order 2010
- Drought Plan Regulations 2005
- Drought Plan Direction 2011
- National Parks and Access to the Countryside Act 2008
- COVID19 Recovery Strategy (2020)
- Build Back Better (2021)
- The Clean Growth Strategy (2017)

Regional and Local

- Site Improvement Plans for Natura 2000 sites: London & South East, Natural England
- Local Development Plans (Various)
- Public Rights of Way Improvement Plans (ROWIPs) (Various)
- Local level Green Infrastructure Plans and Strategies (Various)
- AONB Management Plans (Various)
- National Character Area (NCA) Profiles, Natural England
- Anglian River Basin Management Plan (2015)
- Chalk-Streams First: A Permanent and Sustainable Solution to the Chilterns Chalk-Streams Crisis, Various (2020)
- National Natural Capital Atlas: Mapping Indicators, Natural England (2020)
- South East River Basin Management Plan (2015)
- Thames River Basin Management Plan (2015)
- Catchment Flood Management Plans (2009): Anglian River Basin; South East River Basin; and Thames River Basin
- Catchment Abstraction Management Strategies (CAMS) (2016) (Various)
- WRSE Regional Plan (pending 2022)
- WRSE SEA Scoping Report (2020)
- WRSE Natural Capital and Biodiversity Net Gain Method Statement (2020)
- WRSE Regional Plan Environmental Assessment Methodology (2020)
- Developing our 'Best Value' multi-sector regional resilience plan, a consultation on our objectives, value criteria and metrics, WRSE (2021)
- WRE Regional Plan (pending 2022)
- WRE Regional Plan Method Statement, WRE (2020)
- WRE Draft Integrated Environmental Assessment Scoping Report, WRE (2021)
- WRW Regional Plan, WRW (pending 2022)
- Draft South East Marine Plan, Marine Management Organisation (2020)
- Water Resources Planning Guideline, Various (2021)
- Meeting our Future Water Needs: a National Framework for Water Resources, Environment Agency (2020)
- Long-term water resources environmental destination, Environment Agency (2020)
- Forward programme 2021-22, RAPID (2021)

Policies, Plans and Programmes

Affinity Water

- Climate adaptation reporting second round, Affinity Water and Defra (2015)
- Environment Policy (2019)
- WRMP 2020-2080 (2020)
- Drought Plan Annual Update (2019)
- Strategic Resource Options (SROs), Gate 1 Submission Documents (2021)
- Revised Business Plan (2019)
- Strategic Direction Statement (TBC)

3.4 Scoping Baseline Review

3.4.1 Current baseline

The SEA Regulations requires consideration of “the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the Plan or Programme”, and “the environmental characteristics of areas likely to be significantly affected”.

An ESRI ArcGIS platform was created to store the environmental and drought permit options data. The platform was used to identify that specific baseline in relation to the drought permit options sites and the surrounding areas. This was also supplemented with information presented in the EARs developed for each of the drought permit options. The key features for each of the nine drought permit options are presented in Table 3.2.

Table 3.2: Drought Permit Options Key Baseline Features

Option	Baseline Summary
THUN	<ul style="list-style-type: none"> Lee Valley Special Protection Area (SPA) and Ramsar; Amwell Quarry Site of Special Scientific Interest (SSSI) (100.00% favourable) and Rye Meads SSSI (39.95% favourable, 60.05% unfavourable – recovering), and SSSI Impact Risk Zone (IRZ) Chalk rivers Priority Habitat, including Priority Habitat with high vulnerability to climate change Grade 3 agricultural land Flood Zone 1 Source Protection Zone (SPZ) 1 Nitrate Vulnerable Zone (NVZ)
PICC	<ul style="list-style-type: none"> Chiltern Beechwoods Special Area of Conservation (SAC); Croxley Common Moor SSSI (100.00% unfavourable – recovering) and SSSI IRZ; Shrubhill Common Local Nature Reserve (LNR); Howe Grove Wood LNR; Cassiobury Park LNR; Croxley Common Moor LNR; Stocker’s Lake LNR; and Rickmansworth Aquadrome LNR Chalk rivers Priority Habitat, including Priority Habitat with high vulnerability to climate change Grade 3 agricultural land Flood Zone 1 SPZ 1 Listed buildings and Gadebridge Roman villa Scheduled Monument Chilterns National Character Area (NCA)
AMER	<ul style="list-style-type: none"> Chiltern Beechwoods SAC; Sarratt Bottom SSSI (100.00% unfavourable – no change) and Frogmore Meadows SSSI (100.00% unfavourable – recovering), and SSSI IRZ; and Denham Country Park LNR Chalk rivers Priority Habitat, including Priority Habitat with high vulnerability to climate change Ancient Woodland Urban land Flood Zone 2 SPZ1 Listed building Chilterns NCA and Chilterns Area of Outstanding Natural Beauty (AONB)
FULL	<ul style="list-style-type: none"> Lee Valley SPA and Ramsar; Tewinbury SSSI (50.98% unfavourable – recovering, 49.02% unfavourable – declining), Rye Meads SSSI (39.95% favourable, 60.05% unfavourable – recovering), Amwell Quarry SSSI (100.00% favourable), and SSSI IRZ; Danesbury Park LNR; and Singlers Marsh LNR Chalk rivers

Option	Baseline Summary
WHIH	<ul style="list-style-type: none"> • Priority Habitat, including Priority Habitat with high vulnerability to climate change • Urban land • Flood Zone 2 • SPZ1 • NVZ • Listed buildings • Chilterns NCA <hr/> <ul style="list-style-type: none"> • Lee Valley SPA and Ramsar; Benington High Wood SSSI (100.00% unfavourable – recovering), Rye Meads SSSI (39.95% favourable, 60.05% unfavourable – recovering), Amwell Quarry SSSI (100.00% favourable), and SSSI IRZ; and Mardley Heath LNR • Chalk rivers • Priority Habitat, including Priority Habitat with high vulnerability to climate change • Grade 3 agricultural land • Flood Zone 3 • SPZ1 • NVZ • Listed buildings and Benington Lordship Registered Park and Garden • South Suffolk and North Essex Claylands NCA
RUNGS	<ul style="list-style-type: none"> • Chilterns Beechwoods SAC; Flitwick Moor SSSI (76.83% favourable, 23.17% unfavourable – recovering), Galley and Warden Hills SSSI (23.26% favourable, 76.74% unfavourable – recovering), Blow's Down SSSI (100.00% unfavourable – recovering), and SSSI IRZ; Cottage Bottom Fields and Galley and Warden Hills LNR • Priority Habitat • Ancient Woodland • Urban land • Flood Zone 1 • SPZ1 • NVZ • Chilterns NCA and Chilterns AONB
SLYE	<ul style="list-style-type: none"> • Parkgate Downs SAC and Lydden and Temple Ewell Downs SAC; Alkham, Lydden and Swingfield Woods SSSI (76.56% favourable, 21.94% unfavourable – recovering, 1.50% unfavourable - declining), Lydden and Temple Ewell Downs SSSI (86.10% favourable, 13.90% unfavourable – recovering), and SSSI IRZ; and Lydden Temple Ewell NNR. • Priority Habitat, including Priority Habitat with high vulnerability to climate change • Ancient Woodland • Grade 3 agricultural land • Flood Zone 1 • SPZ1 • North Downs NCA and Kent Downs AONB
SDRE	<ul style="list-style-type: none"> • Parkgate Downs SAC, Lydden and Tempel Ewell Downs SAC, Kingsdown Cliff SAC and Folkestone to Etchinghill Escarpment SAC; Folkestone to Etchinghill Escarpment SSSI (69.95% favourable, 25.39% unfavourable – recovering, 1.99% unfavourable – no change, 2.67% unfavourable – declining), Folkestone Warren SSSI (60.55% favourable, 39.45% unfavourable – recovering), Alkham, Lydden and Swingfield Woods SSSI (76.56% favourable, 21.94% unfavourable – recovering, 1.50% unfavourable - declining), and Lydden and Temple Ewell Downs SSSI (86.10% favourable, 13.90% unfavourable – recovering), and SSSI IRZ; and Whinless Down LNR. • Priority Habitat, including Priority Habitat with low – moderate vulnerability to climate change • Ancient Woodland • Grade 3 agricultural land • Flood Zone 1

Option	Baseline Summary
	<ul style="list-style-type: none"> • SPZ1 • North Downs NCA and Kent Downs AONB
SBUC	<ul style="list-style-type: none"> • Lydden and Temple Ewell Downs SAC and Dover to Kingsdown Cliff SAC; Dover to Kingsdown Cliffs SSSI (66.19% favourable, 27.46% unfavourable – recovering, 6.35% unfavourable – no change), Lydden and Temple Ewell Downs SSSI (86.10% favourable, 13.90% unfavourable – recovering) and Alkham, Lydden and Swingfield Woods SSSI (76.56% favourable, 21.94% unfavourable – recovering, 1.50% unfavourable - declining), and SSSI IRZ; and High Meadow LNR. • Priority Habitat, including Priority Habitat with high vulnerability to climate change • Urban land • Flood Zone 1 • SPZ1 • North Downs NCA

Current baseline information for the environment and socio-economics was also reviewed for the Affinity Water area as part of the WRMP24 Scoping report and is summarised below. The full environmental baseline chapter of the WRMP24 scoping report can be found in Appendix D, including baseline mapping.

- **Air** - Air quality in the Affinity Water region is varied and there are certain areas with higher concentrations of air pollutants likely to be associated with transport or business activities. Air Quality Management Areas (AQMAs) are declared where the national air quality objectives are not being met¹⁰. A high proportion of the local authorities which fall within the Affinity Water region contain at least one AQMA and are predominately designated for Nitrogen dioxide (NO₂) and Particulate Matter (PM₁₀)¹¹. In total, there are 54 AQMAs designated within the Affinity Water region.
- **Water** – The Affinity Water region is one of the driest areas in the UK and is classed as an area with serious water stress¹². The anticipated population and economic growth alongside the projected changes in climate will likely continue to place additional stress on water availability and the natural environment within the Affinity Water region. The Affinity Water region also has several nationally and internationally important wetlands and other water-dependent habitats. Therefore, the management of water resources is particularly important. There are three river basin districts (RBD) within the Affinity Water region; Thames¹³, South-East¹⁴ and Anglian¹⁵, covering areas of 16,200km², 10,200km², and 27,900km², respectively. All RBDs are affected by significant water management issues which prevent the sustainable management of water within the entirety of each river basin. Physical modifications and pollution from wastewater affect the highest proportions of water bodies followed by pollution from rural areas. Flood risk across the Affinity Water region is diverse and can occur from a wide range of sources including rivers and the sea, groundwater, reservoir, and surface water. Climate change is projected to result in more extreme weather events such more severe and prolonged drought period. Projected increases in extreme precipitation events and increases in sea level is likely to have an impact on the future flood risk of the region.

¹⁰ Defra National Air Quality Objectives. Available at: https://uk-air.defra.gov.uk/assets/documents/National_air_quality_objectives.pdf

¹¹ Defra List of Local Authorities with AQMAs. Available at: <https://uk-air.defra.gov.uk/aqma/list>

¹² Environment Agency (2013). Water Stressed Areas – Final Classification. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/244333/water-stressed-classification-2013.pdf

¹³ Defra and Environment Agency (2015). Part 1: Thames River Basin District – River Basin Management Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718342/Thames_RBD_Part_1_river_basin_management_plan.pdf

¹⁴ Defra and Environment Agency (2015). Part 1: South East River Basin District – River Basin Management Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718337/South_East_RBD_Part_1_river_basin_management_plan.pdf

¹⁵ Defra, EA, December 2015 "Part 1: Anglian river basin district river basin management plan", Page 9

- Climatic Factors** - Current observations indicate that the UK is continuing to warm and show a 0.3°C between 2010 and 2019 compared to 1981-2010 and 0.9°C warmer than 1961-1990. In 2019, four new temperature records were set, including a high of 38.7°C and a new winter record of 21.2°C¹⁶. Annual precipitation has increased across the UK in the last few decades with 2019 seeing 107% more rainfall than the 1981-2010 average¹⁷. Summers have been 11% wetter on average than 1981-2010 and 13% wetter than 1961-1990. Winters have been 4% and 12% wetter than 1981-2010 and 1961-1990 respectively. The Met Office UK Climate Projections 2018 (UKCP18)¹⁸ projects warmer and wetter winters alongside drier and hotter summers across the UK. Based on the local authorities which fall within the Affinity Water region, the total carbon dioxide (CO₂) emissions for 2018 across all sectors is estimated at 37,465 kilo tonnes (ktCO₂) (not including Land use, land-use change, and forestry (LULUCF))¹⁹. The transport sector contributed the highest proportion of emissions to the total in 2018 at 44% followed by the domestic and industrial sector at 32% and 26% respectively. The LULUCF sector is estimated to be responsible for the removal of 790 ktCO₂ equating to a 2% reduction in the total CO₂ emissions.
- Biodiversity, Flora and Fauna** - The Affinity Water region contains 12 SACs, seven SPAs, six Ramsar sites, 139 SSSIs, nine National Nature Reserves (NNR) and 113 LNRs. There are two Marine Conservation Zones (MCZ) adjacent to the Southeast area of Affinity Water's region. The Affinity Water region is rich in species and habitat diversity, including rare species of birds and butterflies. Under the Natural Environment and Rural Communities (NERC) Act 2006, Affinity Water has a duty to conservation of biodiversity in exercising its function. Priority habitats make up 11.9% of the Affinity Water region equating to a total of 53,702 ha²⁰. Deciduous woodland accounts for the highest percentage of priority habitat in the region. The Affinity Water region also contains 8-9% of globally rare Chalk streams.
- Population and Human Health** – Approximately 3.6 million people live within the Affinity Water region. The population is growing and is expected to increase by 12% by 2025, 27% by 2045 and 51% by 2080. This is equivalent to approximately 1.8 million more people in the Affinity Water region²¹. Life expectancy for both men and women in London, the East, and the South East of England (which covers the Affinity Water region), is higher than in England as a whole. The average life expectancy projections (2017-2019) for residents in the region is approximately 80.7 years for males and 84.3 years for females²². The Index of Multiple Deprivation (IMD) (2019) for the Lower Super Output Areas (LSOAs) within the region are ranked from 1 to 10 with 1 being the most deprived and 10 being the least. Around 49% of the LSOAs in the region have an IMD ranking of 7 or over, 43% have a ranking between 3 and 6, and the remaining 8% are 2 or below²³.
- Material Assets** - The Affinity Water region²⁴ has an extensive transport network which connects people, places and services both within the region and beyond to support the regional and national economy. It supports gateways for international trade with the UK's

¹⁶ RMetS (2020). State of the UK Climate. Available at: <https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/joc.6726>

¹⁷ RMetS (2020). State of the UK Climate.

¹⁸ Met Office UKCP18. Available at: <https://ukclimateprojections-ui.metoffice.gov.uk/>

¹⁹ BEIS (2020). UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018. Available at: <https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018>

²⁰ Natural England (2020). Priority Habitat Inventory. Available at: <https://data.gov.uk/dataset/4b6ddb7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england>

²¹ Affinity Water, Our Plan for Customers and Communities April 2020. Available at: https://www.affinitywater.co.uk/docs/Final_WRMP19_Non-technical_summary.pdf

²² Office for National Statistics, Life Expectancy for Local Areas of the UK: between 2001 to 2003 and 2017 to 2019. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/bulletins/lifeexpectancyforlocalareasoftheuk/between2001to2003and2017to2019>

²³ Ministry of Housing, Communities & Local Government (2019). English indices of deprivation 2019. Available at: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019>

²⁴ CO₂ emissions data covers the entirety of each local authority; however, it is acknowledged that not all of the relevant local authorities are located entirely within the Affinity Water region boundary. Therefore, at this stage of the SEA process the ktCO₂ values indicated in the baseline are to be taken as an approximation.

busiest airport, Heathrow, and the UK's busiest port, Dover, where one seventh of the UK's trade passes through and is Europe's busiest ferry port²⁵. The rail link to Europe via the Channel Tunnel Rail Link is also located within the region. In 2019/20 the total amount of local authority managed waste was 25.6 million tonnes. The Southeast managed the largest tonnage of local authority collected waste in 2019/20 at 4.1 million tonnes, whilst London managed 3.6 million tonnes and the East managed 2.9 million tonnes in the same period²⁶. Incineration accounts for the most common waste disposal method by local authorities in the region with the Southeast sending 44% of all waste for incineration, the East sending 30%, and London sending 63% which made it the highest out of all the regions across England. Recycling and composting is the second most common waste disposal method, accounting for 48% of total waste in the South East, 48% in the East, and 30% in London. Landfill waste is 6%, 15% and 3% in the Southeast, East and London respectively.

- **Landscape** – The landscape across the Affinity Water region is diverse and is made up of a mixture of lowlands and small hills. The region also has a striking stretch of coastline including the cliffs of Dover, and several picturesque villages and hamlets. Agriculture plays an important role in the landscape, however the region also has densely populated areas. The Green Belt around London is an important aspect of the regional landscape which exists to prevent urban sprawl. NCAs divide England's landscape into 159 distinct areas and are defined by a unique combination of aspects such as landscape, biodiversity, geodiversity and economic activity²⁷. AONBs are protected to conserve and enhance their natural beauty and distinctiveness²⁸. There are 15 NCAs and four AONBs within the Affinity Water region. There are no National Parks within the Affinity Water region.
- **Soil** – The Affinity Water region has a strong agricultural presence, with the Southeast containing some of the best and most versatile agricultural land in England. Agricultural land is classified on a scale of 1 to 5 where 1 is the highest quality and 5 is the lowest. The agricultural land classification of the region is predominately of Grade 2 and Grade 3 with pockets of urban and non-agricultural land. There are some areas with Grade 1, particularly around the Brett zone and in Kent. The southeast of England and London has the largest area of licensed landfill sites of anywhere else in the country²⁹. Currently, there are 103 authorised landfill sites and 842 historic landfill sites across the Affinity Water region.
- **Historic Environment** - The Affinity Water region is rich in heritage, with listed buildings, scheduled monuments, registered parks and gardens and registered battlefields. It is likely that most of the Local Authorities in the Affinity Water region will have designated conservation areas to preserve special areas of historical and architectural importance and hold a Historic Environment Record (HER) which is a database of archaeological sites, listed buildings and other historic buildings, and finds of historic objects. There are hundreds of entries on the HERs from churches and houses to roman coin finds and medieval finds. There is also potential for unidentified heritage assets and archaeological remains to be present within the region.

²⁵ Transport for the South East (2018). Economic Connectivity Review. Available at: <https://transportforthesoutheast.org.uk/wp-content/uploads/2018/07/FINAL-Economic-Connectivity-Review.pdf>

²⁶ Defra (2021). Statistics on waste managed by local authorities in England in 2019/20. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/966114/Statistics_on_waste_managed_by_local_authorities_in_England_in_2019v3_accessible.pdf

²⁷ Natural England (2014). NCAs. Available at: <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making>

²⁸ Natural England (AONBs): designation and management. Available at: <https://www.gov.uk/guidance/areas-of-outstanding-natural-beauty-aonbs-designation-and-management>

²⁹ Environment Agency (2002). Dealing with contaminated land in England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/313967/dealing_with_contaminated_land_i.pdf

3.4.2 Future Baseline

The SEA Regulations require that “the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the Plan or Programme” is identified. Prediction of future trends is difficult because they depend on a wide range of global, national and regional factors and decision making. Key trends have been identified as part of the WRMP24 process and from an initial review it is likely that the following trends will continue:

- **Air** - New development, economic growth and tourism may lead to increased car journeys and congestion within the area leading to localised air quality effects. Public transport improvements, electrification of railways, national air quality targets, European emissions standards for new vehicles, and a shift to electric vehicles should contribute to reducing future air quality impacts from motor vehicles.
- **Water** – Water quality is likely to continue to be maintained and improved through legislation such as the WFD. The region is already water-stressed and projected economic and population growth will likely place further pressure on the region’s water resources and water dependent environments. This is also likely to be exacerbated by climate change as drier conditions are projected, particularly during summer months, and extreme events such as droughts are more likely to occur. Rising temperatures and variation in rainfall patterns will change the recharge to groundwater in UK aquifers. The groundwater recharge season could become shorter, but more recharge may occur within the shorter period, leading to flashy responses in groundwater level. Surface waters are likely to be prone to more flooding, as climate change is increasing the likelihood of intense rainfall in the UK. There is potential for an increased need for wastewater treatments as a result of WFD water quality standards combined with population increase. Given the energy intensity of wastewater treatment, the water industry CO₂ emissions may increase and further contribute to climate change.
- **Climatic Factors** - The climate is expected to continue to change with annual average temperatures projected to increase, particularly in summer. Winters are projected to be wetter and summers drier. Climate change is projected to result in more extreme weather events, potentially causing or exacerbating periods of drought which alongside population and economic growth will impact water availability. Carbon and other greenhouse gas (GHG) emissions will continue to be emitted, however regulations and legislation will likely continue to promote the reduction in emissions through commitments to net zero. The water industry in the UK is aiming to become net zero by 2030³⁰.
- **Biodiversity, Flora and Fauna** - Habitats and species are likely to continue to be protected through European and UK legislation. England’s wildlife habitats have become increasingly fragmented and isolated, leading to declines in the provision of some ecosystem services, and losses to species populations’. Lawton (2010) recognises that future climate change, demographic change, economic growth, new technologies, societal preferences and changes in policy and regulatory environments may all have profound consequences³¹. However, new legislation such as the Environment Act is likely to continue protection of biodiversity by providing a framework for a legally binding target of net gain within the planning system.
- **Population and Human Health** – Water available for consumptive use may be affected by climate change whereby access to water is limited through more frequent droughts or floods. Population is projected to increase in the region and life expectancy is also higher than the nation average meaning that the numbers of elderly residents are likely to increase. As such, water demand will increase, and further pressure will be placed on water resources within the region.

³⁰ Available at: <https://www.water.org.uk/news-item/water-industry-plans-to-reach-net-zero-carbon-by-2030/>

³¹ Lawton (2010). Making Space for Nature.

- **Material Assets** - Regeneration and future investment and demand are likely to increase the number and quality of material assets such as housing, transport infrastructure, waste facilities, and community facilities.
- **Landscape** – Changing and continued development will affect the quality and character of landscapes.
- **Soil** – As the population increases it is likely that more brownfield land will be remediated and developed. There is potential for a loss of agricultural land through development pressures.
- **Historic Environment** - Historic England recently reported that heritage assets at risk are decreasing. There are now 181 fewer heritage assets at risks than in 2019 with successes in buildings and structures and archaeology³². Historic assets will likely continue to be protected through UK legislation. Development could put pressure on heritage assets and their setting.

3.5 Key Issues and Opportunities

A key stage in the Scoping process is to decide what topics are relevant and what topics (if any) should be scoped out. The scoping of topics and identification of key issues and opportunities has been undertaken as part of the WRMP24 process, however this has been updated for the Drought Plan. All the SEA Regulations topics are identified to be relevant to the Drought Plan and are scoped in as presented in Table 3.3, which also provides an overview of the key issues and opportunities relevant to each SEA Regulations topic.

Topics were scoped in based on the baseline situation and the potential for the Drought Plan to impact them. This was assessed by reviewing baseline conditions and current environmental issues for the Affinity Water region and assessing the likelihood of a potential impact.

Table 3.3: Key Issues and Opportunities

SEA Topic	Scoped in	Implications	Opportunities
Biodiversity, Flora and Fauna	Yes	<p>The Affinity Water region is rich in habitats and species diversity, including priority habitats, and includes national and internationally designated sites including SSSIs, NNRs, SPAs, SACs and Ramsar sites as well as non-designated habitats and species.</p> <p>There are also MCZs, however given the nature and location of the options, no risks are likely for these sites.</p> <p>Drought management actions can directly or indirectly affect designated and non-designated sites, habitats and species, including priority habitats, through loss of land, disturbance and damage.</p> <p>There is potential for the options to result in surface and/or groundwater pollution which could have an impact on wildlife.</p> <p>Priority habitats, other habitats and species rely on water, the Drought Plan should ensure that it</p>	<p>The Drought Plan should ensure that there are no impacts on biodiversity (including no adverse effects on internationally designated sites) and should look to enhance biodiversity and achieve biodiversity net gain where possible. There are opportunities to include options which result in improvements to the natural environment and biodiversity net gain through habitat creation or enhancement, support Nature Recovery Networks and Strategies, connectivity of ecological networks to increase species resilience and introduction of vegetation to slow run-off and reduce flood risk, amongst others.</p> <ul style="list-style-type: none"> ● Protect, conserve and enhance biodiversity ● Slow/halt biodiversity losses/declines ● Protect sensitive chalk stream habitats ● Integrate biodiversity into new infrastructure where possible ● Increase the resilience of species and habitats to climate change

³² Historic England (2020). Heritage at Risk. Available at: <https://historicengland.org.uk/advice/heritage-at-risk/findings/>

SEA Topic	Scoped in	Implications	Opportunities
		<p>does not significantly affect these areas through the implementation of drought management actions. Climate change has the potential to exacerbate impacts on biodiversity.</p>	
Soil	Yes	<p>Agriculture has a dominant role in the landscape of the Affinity Water region. Agriculture land of Grade 2 and 3 are the most common across the region.</p> <p>The options within the Drought Plan have the potential to result in a loss of agricultural land or through a reduction in water availability for agricultural processes. There is also potential for soil contamination through the construction phase.</p>	<p>Soil is an important natural resource and as such the Drought Plan should consider the impact of options on the soil stocks and avoid options which have significant negative effects. The options within the Drought Plan should avoid impacts on agricultural land of Grade 1 and 2 if possible, and mitigation should be included where impacts are unavoidable. There are limited opportunities for the options to positively affect agriculture.</p>
Water	Yes	<p>The Affinity Water region is already classed as a water stressed area and it is likely that projected population and economic growth, alongside climate change, will further exacerbate this issue. The options within the Drought Plan have the potential to have impacts on water quality and flows, and the recovery of these, during and after a drought period.</p> <p>Abstraction is a significant pressure, causing many waterbodies to fail in GES/P, having detrimental impact on flows. In times of drought and prolonged dry weather, this could result in a detrimental impact. Groundwater bodies (such as chalk aquifers) are also at risk or already at poor WFD quantitative status.</p> <p>Areas of the region are at high risk of flooding from both surface water and rivers and the sea (Brett and Dour areas). There is potential that the options within the Drought Plan could be affected by flooding.</p>	<p>The Drought Plan should avoid options which have a negative impact on water quality or ecology. Options which reduce pressures on the water environment should be explored such as reducing demand.</p> <p>The Drought Plan has the opportunity to improve the resilience of supplies by allowing Affinity Water to secure water supplies for its customers during a period of drought.</p> <p>The options within the Drought Plan should avoid areas at high risk of flooding and, where appropriate, implement measures to reduce flood risk:</p> <ul style="list-style-type: none"> • Ensure the appropriate management of water during times of drought. • Implement demand management options to reduce the need or amount required via abstraction. • Ensure the protection, improvement and sustainable use of waterbodies • Ensure the integration of water issues and biodiversity, recognising the links between the two. • Avoid, control or reduce water pollution • Leave more water in the natural environment • Reduce or mitigate flood risk, using nature based solutions where feasible
Air	Yes	<p>Air quality in the region is varied. Generally, it is good, however there are some areas designated as AQMAs. Air pollution sources include transport and industry.</p> <p>The options within the Drought Plan have the potential to impact air quality. This could include the generation of air pollutants from treatment plants and there is also</p>	<p>There is potential for the Drought Plan to mitigate any increases in air pollutants as a result of the options and improve air quality in the region. In construction, local materials should be used to construct infrastructure, using low sulphur diesel, or improving existing equipment where feasible. Where possible, removal of trees could look to be avoided by design and be replanted locally. Planting initiatives as nature based solution will</p>

SEA Topic	Scoped in	Implications	Opportunities
		potential for effects from the construction phase.	also be beneficial to improve air quality in the region.
Climatic Factors	Yes	<p>The Affinity Water region is projected to have hotter and drier summers, and wetter and warmer winters, as well as short duration “extreme weather events” such as thunderstorms and heatwaves. There is potential that this could affect water availability through increases in periods of drought.</p> <p>There is also potential for options within the Drought Plan to result in carbon emissions during the construction and operation phase which will further contribute to climate change.</p> <p>Climate change has the potential to exacerbate impacts on biodiversity.</p>	<p>The Affinity region has the opportunity to consider the impact of climate change within the option selection process. The options should also consider the impact on climate change through the optioneering and design processes.</p> <p>The Drought Plan has the opportunity to address the impacts of climate change on demand for water and how much is available, and to increase the region’s resilience to severe drought and other extreme events and stresses:</p> <ul style="list-style-type: none"> • Increase resilience to climate change, including the resilience of resource, infrastructure and the environment • Reduce contribution to climate change • Ensure zero net emissions • Promote nature based solutions and restore habitats to offset and sequester carbon within the Affinity region, while also achieving biodiversity net gains
Landscape	Yes	<p>The Affinity Water region’s landscape is diverse and there are important landscapes within the region, including four AONBs.</p> <p>There is potential for the options within the Drought Plan to have an impact on the landscape. This could include temporary construction effects and permanent effects associated with infrastructure which could affect visual amenity or the character of the area.</p>	<p>Consideration of the impacts of the landscape should be considered as part of the option development. There is potential for the Drought Plan to enhance the landscape. This may involve selecting certain materials or colours for the option or through planting or habitat creation:</p> <ul style="list-style-type: none"> • Ensure the protection of landscape character • Enhance landscapes by working with stakeholders through habitat creation, implementation of catchment-based solutions and safeguarding existing habitats.
Historic Environment	Yes	<p>The Affinity Water region is rich in heritage and contains many listed buildings, scheduled monuments, and registered parks and gardens, amongst others.</p> <p>The options within the Drought Plan have the potential to directly or indirect impact the historic environment through effecting the asset’s fabric or setting. There is a potential risk that abstraction will impact waterlogged archaeological sites.</p>	<p>The options within the Drought Plan should consider the historic environment and minimise adverse effects:</p> <ul style="list-style-type: none"> • Protect known and unknown archaeology • Careful consideration to the siting of options to reduce effects on historic assets and their setting • Encourage public awareness through promoting heritage sites
Population and Human Health	Yes	<p>There are approximately 3.6 million people living within the Affinity Water Region. Population is expected to grow which will likely place additional pressure on the water environment within the region. Economic growth and climate change will also add to this</p>	<p>There is an opportunity for the Drought Plan to engage with the local community.</p> <p>The Drought Plan also has the opportunity to ensure a resilient and reliable water supply for customers now and in the future, ensuring there is enough water for a growing</p>

SEA Topic	Scoped in	Implications	Opportunities
		<p>pressure. Health within the region is generally good.</p> <p>The options within the Drought Plan have the potential to result in temporary disturbance effects during the construction phase.</p> <p>There is also potential for effects from the implementation of water restrictions. Impacts on the water or natural environment which could have impacts on recreation and wellbeing.</p>	<p>population and to support economic growth, during drought conditions.</p> <p>Ensure an economically sustainable water supply for customers. This may see the economic value of water increase and require a greater value to be assigned to water through increased charges and/ or seasonal water rates:</p> <ul style="list-style-type: none"> • Prevent disturbance effects for the local community • Enhance the natural environment for recreation purposes • Improve access to the natural environment for all members of the community • Provide a resilient and reliable water supply for customers
Material Assets	Yes	<p>The Affinity Water region contains important transport links which could be affected during construction works. There are national trails and national cycle routes within the Affinity Water region, however these are not anticipated to be affected by the options within the Drought Plan.</p> <p>There is also significant water and wastewater treatment infrastructure across the region. The region produces and manages a significant amount of waste and there are over 100 authorised landfill sites.</p> <p>The Drought Plan has the potential to increase the use of resources within the region and result in the generation of waste.</p>	<p>The Drought Plan has the opportunity to consider the use of resources within the option development and reduce the use of energy, materials and prevent waste generation:</p> <ul style="list-style-type: none"> • Reduce resource use • Minimise waste generation • Avoid impacts on the transport network • Achieve required leakage reduction targets • Reduce unplanned outages

3.6 SEA Framework

A key part of the SEA Scoping process is the development of the SEA Framework. The SEA Framework forms the basis for predicting and assessing the effects arising from the implementation of the Drought Plan and will be used to assess the options within the Plan.

An overarching set of SEA objectives and assessment questions to guide the assessment have been developed for both the WRSE and WRE regional plans. It has been agreed that the SEA for the Drought Plan would follow the methodology set out in the WRMP24 Scoping Report and as part of the WRMP24 Scoping process, Affinity Water made the decision to maintain the same SEA objectives for WRMP24 as outlined in the WRSE regional plan. The reason for this is that the majority of Affinity options are located within the WRSE region and following a consistent approach will enable the results of the regional plan options-level SEA results to be easily used as part of the Affinity WRMP24 process. It should also be noted that the options within the Drought Plan have been assessed as part of the WRSE process therefore it also ensures consistency and allows the SEA for the Drought Plan to build on these assessments.

The SEA objectives are linked to the SEA Regulations topics, the key priorities for WRSE and have been informed by a review of the SEA objectives used for WRMP19 by the six water companies' within WRSE (including Affinity Water).

The compatibility of the Drought Plan SEA objectives with the WRSE / WRE regional plan SEA objectives is shown in Table 3.4 below.

Table 3.4: Drought Plan SEA objectives and WRSE / WRE regional SEA objectives compatibility

SEA Topics	WRSE SEA Objectives	WRE SEA Objectives	Drought Plan (and Affinity WRMP24) SEA Objectives
Biodiversity, Flora and Fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	To protect designated sites and their qualifying features.	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)
		To deliver Biodiversity Net Gain, protect biodiversity, priority species and vulnerable habitats such as chalk rivers.	
		To avoid spreading and, where required, manage invasive and non-native species (INNS).	
		To meet WFD objectives relating to biodiversity.	
Soil	Protect and enhance the functionality, quantity and quality of soils	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	Protect and enhance the functionality, quantity and quality of soils
Water	Increase resilience and reduce flood risk	To reduce or manage flood risk, taking climate change into account.	Increase resilience and reduce flood risk
	Protect and enhance the quality of the water environment and water resources	To enhance or maintain surface water quality, flows and quantity.	Protect and enhance the quality of the water environment and water resources
		To enhance or maintain groundwater quality and resources.	
		To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	
Deliver reliable and resilient water supplies	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	Deliver reliable and resilient water supplies	
Air	Reduce and minimise air emissions	To reduce and minimise air emissions during construction and operation.	Reduce and minimise air emissions
Climatic Factors	Reduce embodied and operational carbon emissions	To minimise/reduce embodied and operational carbon emissions	Reduce embodied and operational carbon emissions
	Reduce vulnerability to climate change risks and hazards	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	Reduce vulnerability to climate change risks and hazards

SEA Topics	WRSE SEA Objectives	WRE SEA Objectives	Drought Plan (and Affinity WRMP24) SEA Objectives
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	To conserve, protect and enhance landscape and townscape character and visual amenity.	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	To conserve/protect and enhance historic environment and heritage assets, and their setting, including archaeologically important sites.	Conserve, protect and enhance the historic environment, including archaeology
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. To secure resilient water supplies for the health and wellbeing of the community.	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing
	Maintain and enhance tourism and recreation	To increase access and connect customers to the natural environment, provide education or information resources for the public. Maintain and enhance tourism and recreation.	Maintain and enhance tourism and recreation
Material Assets	Minimise resource use and waste production	Minimise resource use and waste production.	Minimise resource use and waste production
	Avoid negative effects on built assets and infrastructure	Avoid negative effects on built assets and infrastructure.	Avoid negative effects on built assets and infrastructure

3.7 Assessment Criteria

Table 3.5 presents the proposed assessment criteria that will form the assessment framework for the options within the Drought Plan.

Table 3.5: Proposed SEA assessment criteria

SEA Topic	Proposed SEA Objective	Assessment Questions/Sub-Themes
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	<ul style="list-style-type: none"> Is the option likely to affect the conservation status of any SPA, SACs, Ramsar sites and MCZ, undermine or prevent restoration of SSSI condition or affect the condition of locally designated sites? Will the option protect and enhance aquatic and habitats and species, including freshwater fisheries and chalk rivers? Will the option affect the marine environment, habitats and species (including MCZ and Marine Protection Areas (MPA))? Is the option likely to affect ancient woodlands and/or Priority Habitats and Species? Will the option affect any habitats that support legally protected species or species of conservation concern? Is there potential for contribution to achieving 'favourable' conservation status or for creation of new Priority Habitats?

SEA Topic	Proposed SEA Objective	Assessment Questions/Sub-Themes
		<ul style="list-style-type: none"> • Is the option likely to have an impact on a current or future Nature Recovery Network? • Are there any opportunities for habitat creation or restoration? • Will the option contribute to the loss or gain in habitat connectivity? • Is there a possibility for INNS to be spread/ introduced or for algal blooms to occur? • Is there an opportunity to improve biodiversity value through removal of INNS? • Will the option enable or reduce the potential of water dependent wildlife to adapt to climate change? • Will the option affect the soil and water quality on protected sites?
Soil	Protect and enhance the functionality, quantity and quality of soils	<ul style="list-style-type: none"> • Will the option affect high grade agricultural land? • Will the option prevent soil erosion and retain soil stocks as a natural resource? • Will the option promote soil health? • Will the option involve use of brownfield or greenfield land? • Will the option prevent mineral sterilisation? • Will the option affect soil contamination or involve remediation? • Is the option likely to affect geodiversity, including SSSIs of geological importance? • Will the option prevent nutrient loading in water bodies? • Will the option promote the sustainable use of land?
Water	Increase resilience and reduce flood risk	<ul style="list-style-type: none"> • Is the option vulnerable to flood risk? • Will the option contribute to the risk of flooding? • Will the option mitigate flood risk? (i.e. attenuation of flows through NFM, catchment storage etc.)
	Protect and enhance the quality of the water environment and water resources	<ul style="list-style-type: none"> • Will the option affect surface water quality or quantity? • Will the option affect ground water quality or quantity? • Is the option likely to contribute to or conflict with the achievement of WFD objectives? • Will the option affect bathing waters? • Will the option affect shellfish water protected areas? • Will the option affect chalk rivers? • Will the option affect raw water quality? • Will the option reduce the flashy nature of surface waters? • Will the option slow the flow in upper catchments and reduce soil losses to river systems? • Will the option comply with flow targets? • Will the option provide a water environment more resilient to drought or prolonged dry weather?
	Deliver reliable and resilient water supplies	<ul style="list-style-type: none"> • Does the option provide a reliable and sustainable water supply which meets changing demand? • Will the option protect and enhance the environmental resilience of the water environment to climate change, flood risk and drought? • Does the option reduce the presence of containments in waterbodies, and make more water available to the environment?
Air	Reduce and minimise air emissions	<ul style="list-style-type: none"> • Is the option in an air quality management area (AQMA)? • Will the option affect local air quality?
Climatic Factors	Reduce embodied and operational	<ul style="list-style-type: none"> • Will the option affect carbon or other greenhouse gas (GHG) emissions? • Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy?

SEA Topic	Proposed SEA Objective	Assessment Questions/Sub-Themes
	carbon emissions	<ul style="list-style-type: none"> Will the option affect carbon sequestration?
	Reduce vulnerability to climate change risks and hazards	<ul style="list-style-type: none"> Is the option vulnerable to climate change effects? Does the option include climate resilience measures? Will the option create catchment resilience to drought?
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	<ul style="list-style-type: none"> Will the option have an effect on the character of the landscape, townscape or seascape, including tranquillity and views? Will the option improve access to the countryside? Will the option create or improve green infrastructure which contributes to access to the landscape? Will the option protect and enhance designated landscapes and features?
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	<ul style="list-style-type: none"> Will the option affect designated or non-designated historic assets, sites and features? Will the option affect the setting and/or significance of a historic asset? Will the option affect archaeology (including unknown archaeology)? Will the option affect heritage assets at risk? Will the option affect conservation areas or historic landscape/townscape areas?
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	<ul style="list-style-type: none"> Does the option promote water efficiency and encourage a reduction in water consumption? Will the option secure resilient water supplies for the health and wellbeing of customers? Will the option allow for economic development? Will the option allow for economic diversity? Will the option have an effect on active lifestyles, such as impacts on active travel through disruption to pedestrian and cycle routes? Will the option affect Public Rights of Way? Will the option affect road or rail infrastructure? Will the option minimise disturbance from noise, light, visual, and transport? Will the local communities have been actively engaged to foster an inclusive environment and participate in decision making?
	Maintain and enhance tourism and recreation	<ul style="list-style-type: none"> Will the option maintain or enhance tourism? Does the option improve access to the natural environment for recreation, including those living within deprived areas? Will the option have an effect on freshwater fisheries for recreational purposes? Will the option have an effect on marine fisheries for recreational purposes?
Material Assets	Minimise resource use and waste production	<ul style="list-style-type: none"> Will the option reuse existing infrastructure? Will the option minimise the use of resources? Will the option reduce the production of waste?
	Avoid negative effects on built assets and infrastructure	<ul style="list-style-type: none"> Will the option affect built assets and infrastructure, including transport infrastructure?

4 Environmental Assessment Methodology

4.1 Introduction

A two phased approach has been implemented for the SEA of the Drought Plan as follows:

- Phase One: Preliminary assessment of the unconstrained list of options – this was a precursor to the SEA full assessment and involved assessing the unconstrained list of options to identify risks and opportunities to support decision-making on the options to take forward into the constrained list. The unconstrained list includes a range of potential drought permit options that could be selected (these are the alternatives options)
- Phase Two: Full SEA assessment of the constrained list taken forward into the Drought Plan (the Preferred options) and in-combination effects assessments of the Drought Plan (if the preferred drought permit options were implemented together).

The study area for the SEA covered the Affinity Water region and the specific locations of the drought permit options. These options were stored on the ESRI ArcGIS tool which included buffers up to 5km to ensure all environmental receptors were considered within the assessment. The assessment also went beyond considering effects only in relation to distances and considered effect pathways, for example, a drought permit could have an effect on a designated site or other receptor downstream of the option outside the various boundaries set out in the methodology.

4.2 Phase One: Preliminary Assessment of Unconstrained Options

The Preliminary Assessment Summary Report (Mott MacDonald, 2022) in Appendix I presents the preliminary assessment methodology in full alongside the results which are also summarised in Section 5.1. The preliminary assessment involved the assessment of 27 unconstrained drought permit options (presented in Table 4.1) for the Drought Plan.

Table 4.1: Unconstrained list of options

Region	Source	Waterbody / catchment
Central	THUN	River Rib
	HADH - BH2	River Ash
	HUNT	River Gade
	HUGH	Hughenden Stream
	PICC	River Gade
	FRIA	River Ver
	AMER	River Misbourne
	WELL	Charlton Mill Pond River Hiz
	OFFS/OUGH	River Oughton
	UTTL	River Cam
	FULL	River Mimram
	BOWB	River Ver
	WHIH	River Beane
	BATC	River Colne
	RUNGS	Lower Greensand/Broughton Brook
	DIGS	River Mimram
HOLY & MU DL	River Ver	

	THEG	River Gade
	SLIP	River Rhee
	BROO	River Beane
	ROYD	River Stort
	CHEH & CHAR	River Chess
	STAN	River Stort
South East	SLYE	River Dour
	SDRE	Alkham Bourne/River Dour
	SBUC	River Dour
	SHOL	River Dour

The options were assessed using a Red-Amber-Green (RAG) approach to identify options with high environmental risks. A set of criteria (as shown in full Appendix I) were developed based on the WRSE regional plan and Affinity Water WRMP24 environmental assessment processes which have been fully consulted on and agreed with stakeholders and regulators. The key topics, datasets and features used within the assessment criteria are summarised in Table 4.2.

Table 4.2: Preliminary Assessment Criteria Summary

SEA Topic	Dataset	Features
Air Quality	Air quality management areas (AQMAs)	
Biodiversity, Flora and Fauna	Statutory designated sites	Special areas of conservation (SAC), Special protection area (SPA), RAMSAR
		Sites of special scientific interest (SSSI)
	Non statutory designated sites	Ancient Woodland
		National Nature Reserves
Priority habitats	Local Nature Reserves	
Historic Environment	Statutory designated sites	Listed buildings
		Scheduled monuments
	Non statutory designated sites	Registered Parks and Gardens and Battlefields
Landscape	Statutory Designations	Areas of outstanding natural beauty (AONB)
		National Park
Geology and soils	Agriculture land classification	
	Landfill sites	
Water	Groundwater	Groundwater source protection zones
		Nitrate Vulnerable Zone
	Surface water	Flood risk zones
		Water quality and flows
Operational considerations	Time and work required to commission option	

The RAG assessment considered the potential for both construction effects (if any additional infrastructure was required) and operational effects such as impacts on water quality, designated sites and wildlife. Additional environmental assessments, including the HRA and the EARs, were used to feed into biodiversity, flora and fauna, and water topics within the preliminary assessment. The results of the preliminary assessment of the unconstrained list were used in decision-making to select options to take forward into the constrained list for full assessment.

4.3 Phase Two: SEA of Constrained Options and Cumulative Effects

4.3.1 Overview

The approach to the full SEA to support the Drought Plan development follows the WRPG and supplementary guidance³³ and the UKWIR Guidance (2021)³⁴. The approach is aligned with what is set out in the WRMP24 Scoping Report which follows the WRSE regional plan process. The WRSE regional plan process has formed the basis of the full SEA assessments and the methodology outlined in the sections below is aligned to the WRSE regional plan approach.

The options included within the Drought Plan were assessed as part of the WRSE regional plan process. The assessments undertaken as part of WRSE have been updated to include additional information, such as information obtained from the EARs (see Section 4.4.2).

To determine the environmental effects of the preferred options within the Drought Plan, the following tasks were undertaken:

- Options level environmental assessments of the constrained list of options
 - Assessments undertaken as part of WRSE were reviewed and updated with additional information, including information presented within the EARs
- Cumulative effects assessment of the Drought Plan
 - The cumulative effects of the options within the Drought Plan were assessed
 - The cumulative effects of the Drought Plan with other plans were assessed

4.3.2 Options level assessments

The options level SEA assessment was carried out using the SEA Framework outlined in Table 3.4. Each SEA objective has a set of defined datasets and a defined scoring system using a qualitative scale of minor, moderate, major positive and minor, moderate, major negative, and neutral as summarised in Table 4.3. The effects of each option were assessed using this scale and a narrative justification provided. The datasets and scoring definitions are presented in full in Appendix E.

Table 4.3: Scoring key

Effect	Description
+++	Major Positive
++	Moderate Positive
+	Minor Positive
0	Neutral
-	Minor Negative
--	Moderate Negative
---	Major Negative
?	Uncertain

The ESRI ArcGIS tool stored most of the environmental data and was used to identify the key constraints and opportunities for each option and then professional judgement was applied to score the option using the scoring method in Appendix E. These scoring definitions considers the value of the receptor and impacts to allow differentiation between effects on the eight point

³³ EA, NRW, Defra and Ofwat, 2021, "Water resources planning guideline, section 1.1.1

³⁴ UKWIR, 2021, Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans

scoring scale. For example, nationally or internationally designated sites would be considered a major negative effects, whilst effects on local sites would be moderate or minor (depending on the nature of the site and effect).

The SEA assessment was split into construction effects and operational effects as these can be quite different and would not provide an accurate picture if they were combined. An option may have both positive and negative effects under a SEA objective. Rather than trading these effects to cancel each other out, both positive and negative scoring was used to show there are potential mixed effects.

Potential mitigation and enhancement measures were also identified as part of the assessment process and fed back to the options development team as part of an iterative process.

Additional environmental assessments, including the HRA and the EARs, have been used to feed into the assessment of a number of the SEA objectives. Further information is presented in Section 4.4.

4.3.3 Cumulative effects

An assessment has been undertaken to identify the potential cumulative effects of the options within the Drought Plan as well as the cumulative effects of the Drought Plan with other plans. The aim of the assessment was to ensure that the selected options will not result in significant negative effects in-combination with each other and that opportunities to maximise positive effects across the Drought Plan as a whole are identified.

The ESRI ArcGIS tool developed for the options assessment was used to help identify potential in-combination effects from options on environmental and community features/assets. The HRA in-combination assessment and the in-combination assessment undertaken within the EARs were also used to inform the cumulative effects assessment.

The SEA objectives and assessment criteria used to assess the performance of the individual options have also been used to undertake the SEA cumulative assessment. The results are presented in Chapter 5.

It should be noted that throughout the assessment results table cumulative and in-combination effects are referred to. The definitions of these two terms are set out below.

- Cumulative effects – the additive effect of two or more options.
- In-combination effects – the effect of two or more options together on a certain feature/asset.

4.4 Other Environmental Assessments

4.4.1 Habitats Regulation Assessment

Habitats Regulation Assessment (HRA) Stage 1 Screening and Stage 2 AA (where required) has been undertaken (Ricardo, 2022) as part of the Drought Plan development. HRA was undertaken for the following nine drought permit options which were initially taken through into the Drought Plan:

- THUN
- PICC
- AMER
- FULL
- WHIH
- RUNGS

- SLYE
- SDRE
- SBUC

The HRA considers the features, objectives and conditions of the Natura 2000 sites and the potential effects options may have on these. The preliminary assessment and the full SEA utilised the outputs of the HRA to feed into the Biodiversity, Flora and Fauna topic. Given the HRA was not available for the full unconstrained list assessed as part of the preliminary assessment, the results from the HRA was fed into the assessments for the nine options where it was available.

4.4.2 Environmental Assessment Reports

EARs have been developed to provide a robust assessment of the potential environmental effects of implementation of drought permits, over and above those conditions that already exist under "normal", i.e. licensed, baseline conditions, with the onset of a natural drought.

EARs are available for the nine drought permit options which were initially taken through into the Drought Plan. There are also EARs available for options within the previous iteration of the Drought Plan (HUNT; HUGH and BOWB). The preliminary assessment utilised the outputs of these to feed into Biodiversity, Flora and Fauna and Water topics for the options where they were available. The EARs were also utilised further for a number of the SEA objectives within the full SEA assessments.

5 Assessment of the Drought Plan

5.1 Phase One: Preliminary Assessment of Unconstrained Options

5.1.1 Summary of Results

The results of the preliminary assessment are presented in full in the Preliminary Assessment Summary Report (Mott MacDonald, 2022) in Appendix I. As part of the preliminary assessment, overall RAG ratings were provided, discussed and agreed for each drought permit option as part of a workshop between Affinity Water and Mott MacDonald. There were 13 options which were given an overall red rating as potential effects were identified for Natura 2000 sites or they were identified to have an operational lead time of over nine months, making them currently unsuitable as a drought permit option.

The options identified as having an overall green or amber rating were discussed further and it was then agreed whether they would be taken through into the constrained list. The outcomes of this discussion are summarised in Table 5.1. It was identified that the nine drought permit options which were initially included within the Drought Plan were appropriate to be taken forward into the constrained list and have therefore been subject to the full SEA assessment.

Table 5.1: Constrained List Selection Register

Option		Commentary
THUN	Included	The option was taken forward into the constrained list. An overall green rating was identified for this option.
PICC	Included	The option was taken forward into the constrained list. An overall amber rating as EAR identified potential minor effects on Croxley Common Moor SSSI and GWDTE.
FRIA	Excluded	The option was not taken forward into the constrained list as per Environment Agency guidance and updated Section 20 agreement governing the emergency operation of the source.
AMER	Included	The option was not taken forward into the constrained list. An overall amber rating as EAR identified potential minor effects Sarratt Bottom SSSI and Frogmore Meadows SSSI (both GWDTE).
WELL	Excluded	The option was not taken forward into constrained list. The source is located in the headwaters of the Upper Hiz and there will be direct impacts as a result of cessation of augmentation in the Charlton Mill Pond and the river downstream of it.
OFFS/OUGH	Excluded	The option was not taken forward into constrained list. The sources are located near the headwaters of the River Oughton and there will be direct impacts on the Oughton Springs and the river itself, as a result of cessation of augmentation.
UTTL	Excluded	The option was not taken forward into constrained list. This was agreed with the Environment Agency following discussions about requirements for compliance with the licence during drought conditions.
FULL	Included	The option was taken forward into the constrained list. An overall amber rating was identified for this option as the EAR identified potential moderate effects on the Tewinbury SSSI.
WHIH	Included	The option was taken forward into the constrained list. An overall green rating was identified for this option.
RUNGS	Included	The option was taken forward into the constrained list. An overall green rating was identified for this option.
SLIP	Excluded	The option was not taken forward into constrained list. The source is located near the headwaters of the Rhee and there will be direct impacts in the Ashwell Springs as a result of cessation of augmentation.

Option	Commentary	
SLYE	Included	The option was taken forward into the constrained list. An overall green rating was identified for this option.
SDRE	Included	The option was taken forward into the constrained list. An overall green rating was identified for this option.
SBUC	Included	The option was taken forward into the constrained list. An overall green rating was identified for this option.

5.2 Phase Two: SEA of Constrained Options

5.2.1 Introduction

As detailed in section 4.3, the proposed approach to the full SEA to support the Drought Plan development will follow the WRPG and supplementary guidance. The WRSE regional plan process has formed the basis of the full SEA assessments and the methodology outlined in the sections below is aligned to the WRSE regional plan approach.

The drought permit and demand options included within the Drought Plan were assessed as part of the WRSE regional plan process. The assessments undertaken as part of WRSE have been updated to include additional information, such as information obtained from the EARs and HRA undertaken as part of the Drought Plan development.

5.2.2 Constrained Options

As outlined in Section 5.1, the preliminary assessment identified that the nine drought permit options which were initially included in the Drought Plan were appropriate to take through into the constrained list. The nine drought permit options have therefore been subject to the full SEA assessment as part of Phase Two of the project. Phase Two has also involved the assessment of the TUBS and NEUBS options which are identified for each of the nine WRZs. A summary of the options included within the full SEA assessment is presented in Table 5.2. The location of the drought permits in the Central and Southeast regions are presented in Figure 5.1 and Figure 5.2 respectively.

Table 5.2: Summary of the constrained list of options subject to full SEA

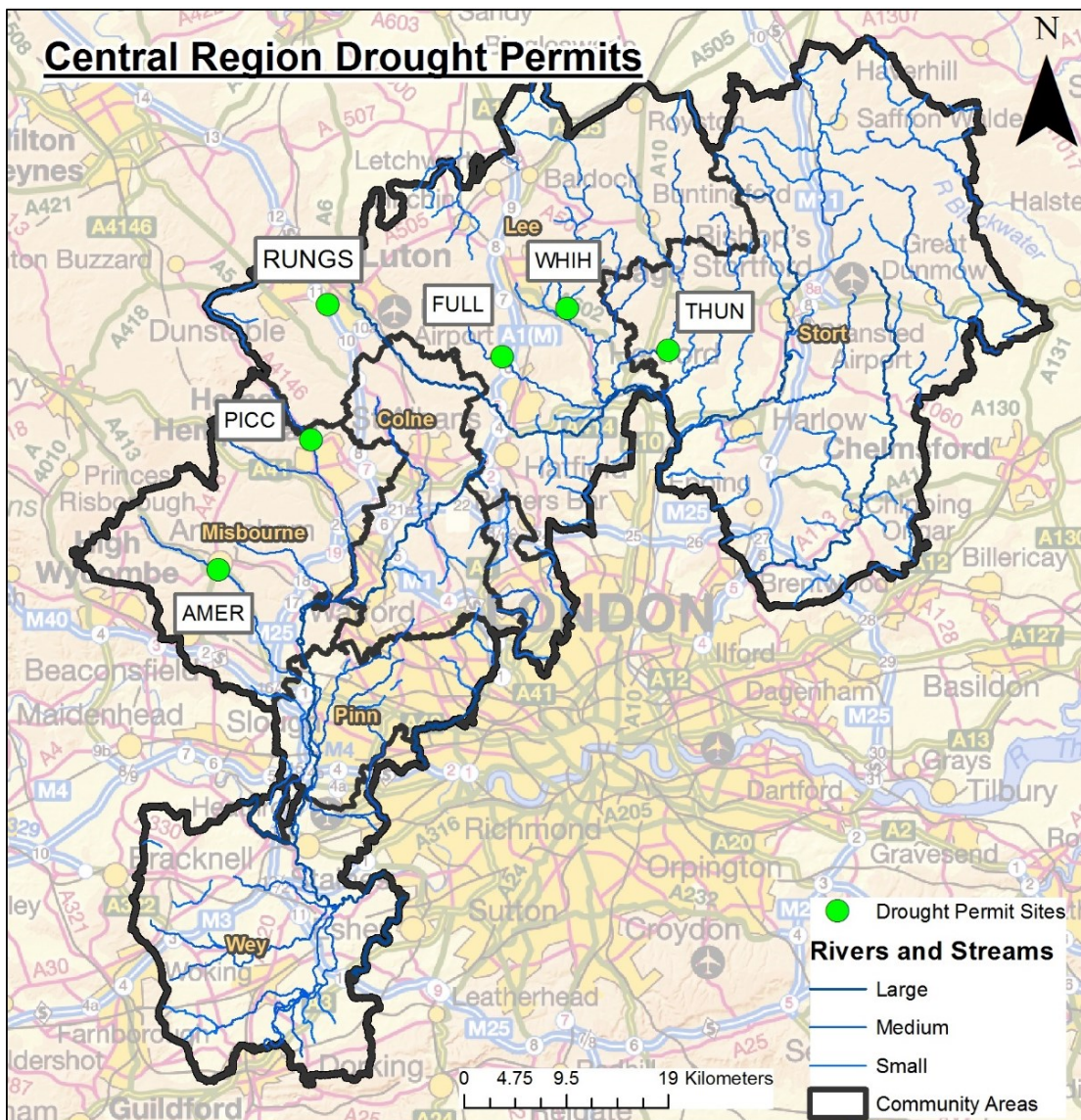
Option Type	Region	Code	Waterbody/ catchment	Volume	Description
Drought permit	Central	THUN	River Rib	4.91	Abstraction increase, including relaxing licence flow constraint
Drought permit	Central	WHIH	River Beane	14.82	Sustainability reduction site.
Drought permit	Central	RUNGS	River Lea ³⁵	5.3	New drought permit site not included in DMP19
Drought permit	Central	PICC	River Gade	6.4	Sustainability reduction site
Drought permit	Central	AMER	River Misbourne	8	Sustainability reduction site
Drought permit	Central	FULL	River Mimram	9.09	Sustainability reduction site
Drought permit	Southeast	SLYE	River Dour	3.5	Removal of hands off level constraint
Drought permit	Southeast	SDRE	River Dour	2	Removal of hands off level constraint
Drought permit	Southeast	SBUC	River Dour	2	Removal of low flow constraint and cessation of augmentation
TUBs	WRZ 1 – 9	N/A	N/A	N/A	Restrictions on domestic customers
NEUBs	WRZ 1 – 9	N/A	N/A	N/A	Restrictions on commercial customers

³⁵ Although RUNGS is situated within the Lea topographic catchment, this source is in the greensand aquifer and therefore would not significantly impact flows in the Lea

As discussed in Section 2.3, drought permit options are one of the last remaining options set out in the Drought Plan and would be used once all other non-emergency options have already been implemented. Affinity Water has never had to implement a drought permit previously as there has never been a drought serious enough for them to be required.

The model outputs which were used to inform the EARs for the drought permits in the Central region and in turn used to inform the SEA use the Hertfordshire Chalk model which represents the Chalk aquifer as two layers. Although this model has a more complex representation of the Chalk than previous models (which represented a single Chalk unit), there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. For this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome.

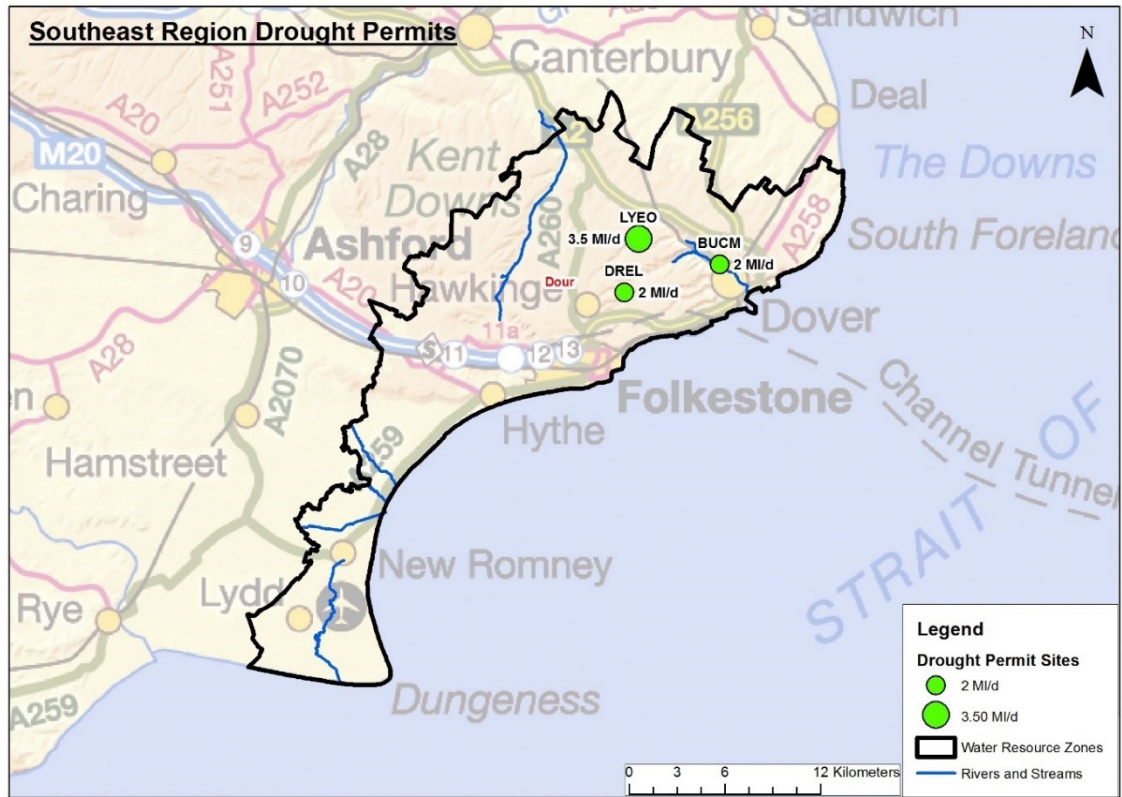
Figure 5.1: Location of drought permits in the Central region



© Affinity Water Limited. Based upon the Ordnance Survey Map by Affinity Water by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office.

Source: Affinity Water Drought Plan

Figure 5.2: Location of drought permits in the Southeast region



© Affinity Water Limited. Based upon the Ordnance Survey map by Affinity Water Limited with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. ©

Source: Affinity Water Drought Plan

5.2.3 Summary of the Results

The drought permit options and TUBs and NEUBs options within the Drought Plan have been assessed in line with the methodology set out in Chapter 4. The sections below provide a summary of the results from the assessments.

5.2.3.1 Actions to reduce demand – TUBs and NEUBs

The assessment matrices for the TUBs and NEUBs options for each WRZ (1 to 9) are presented in full in Appendix F. A summary of the results from the SEA assessments conducted on TUBs options in WRZs 1-9 is summarised in Table 5.3 and Table 5.4 summarises the results for NEUBs options WRZs 1-9.

All predicted potential effects for both TUBs and NEUBs are during the operational phase, as no construction is involved, and are either neutral, minor positive, or minor negative. TUBs and NEUBs may help protect biodiversity, GWDTE and priority habitats by conserving water in the natural environment, but localised habitats in public, private and commercial gardens may suffer from temporary loss of watering. As these options are temporarily introduced in drought conditions, and aim to reduce water required for supply, they provide minor improvements to protection and enhancement of the quality and supply of water in the environment, and to the reliable delivery of water supplies to people. As such, TUBs and NEUBs may contribute to reducing vulnerability to climate change risks and hazards by conserving water in the natural environment.

However, implementation of TUBs and NEUBs may result in minor negative effects on the visual amenity of townscape and landscape due to restrictions on water used for garden watering, decorative fountains, and cleaning of buildings. Given NEUBs apply to commercial properties, the options may also result in minor negative effects on the setting of historic gardens or landscape attached to heritage assets. Considering this potential effect on townscape assets, and on certain domestic and commercial activities, implementation of TUBs and NEUBS may have minor negative effects on the health and wellbeing of the local community and the maintenance and enhancement of local tourism. High levels of communication before, during, and following the implementation of these measures is key to mitigating negative effects.

Table 5.3: SEA output summary for TUBs options within WRZs 1-9

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Residual Construction Effects		Residual Operational Effects	
		+	-	+	-	+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	+	-	0	0	+	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	0	+	0	0	0	+	0
	Deliver reliable and resilient water supplies	0	0	+	0	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	0	0	0	0	0
	Reduce vulnerability to climate change risks and hazards	0	0	+	0	0	0	+	0
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	-	0	0	0	-
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	-	0	0	0	-
	Maintain and enhance tourism and recreation	0	0	0	-	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	0	0	0	0

Table 5.4: SEA output summary for NEUBs options within WRZs 1-9

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Residual Construction Effects		Residual Operational Effects	
		+	-	+	-	+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	+	-	0	0	+	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	0	+	0	0	0	+	0
	Deliver reliable and resilient water supplies	0	0	+	0	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	0	0	0	0	0
	Reduce vulnerability to climate change risks and hazards	0	0	+	0	0	0	+	0
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	-	0	0	0	-
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	-	0	0	0	-
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	-	0	0	0	-
	Maintain and enhance tourism and recreation	0	0	0	-	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	0	0	0	0

5.2.3.2 Actions to maintain supply – Drought Permits

The individual assessment matrices for each of the nine drought permits are presented in Appendix G and Table 5.5 provides a summary of scores identified for each option against the SEA framework. A narrative for each option is also presented below.

As discussed in Section, 5.2.2, the model outputs which were used to inform the EARs in the Central region and in turn used to inform the SEA use the Hertfordshire Chalk model which represents the Chalk aquifer as two layers. Although this model has a more complex representation of the Chalk than previous models (which represented a single Chalk unit), there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. For this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome.

THUN

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, air, flood risk, landscape, the local community and material assets pre and post mitigation. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. However, further baseline collection and assessment may be required at a more detailed stage, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The THUN drought permit option has the potential to result in moderate negative effects on biodiversity pre mitigation and minor effects are identified post mitigation. This is a result of the potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. It should be noted these conclusions are based on the outputs of groundwater modelling which has known limitations for use in this context, and are made on a precautionary basis. The THUN EAR (2022) identified the potential for minor (uncertain) effects on Amwell Quarry SSSI and negligible effects on Rye Meads SSSI. For the Amwell Quarry SSSI, the additional drawdown could result in a reduction in the quality or extent of the habitat as a result of alteration to the environmental conditions, given the high groundwater table present at this site, particularly within the marsh habitats present at the site. The reduction in water may result in the influx of opportunistic terrestrial grass species as the site may undergo succession should recharge rates not be sufficient. These sites both form part of the Lee Valley SPA and Ramsar site. The HRA Stage 1 Screening and AA (Ricardo, 2022) identified no significant impacts on the integrity of the Lee Valley SPA and Ramsar. The HRA Appropriate Assessment also considers impacts on the Amwell Quarry SSSI and Rye Meads SSSI. It indicates no significant impacts on SSSIs are anticipated as there is intermittent hydrological connectivity between the SSSI and groundwater levels, groundwater levels are mostly below surface level and there is limited drawdown, therefore impacts on supporting habitat will not be significant. The implementation of this drought option may increase the spread of Himalayan Balsam which is an INNS.

There is potential for major negative effects (pre mitigation) on the water environment from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. The potential for moderate negative effects is identified for the water environment post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore minor positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long-term resilient water supply option.

Minor negative effects have been identified for climatic factors (pre and post mitigation) given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought. There is also potential for minor negative effects (pre and post mitigation) on recreation during the operational phase of the option.

PICC

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, air, flood risk, landscape, population and human health and material assets. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. However, further baseline collection and assessment may be required at a more detailed stage, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

There is potential for the PICC drought permit option to result in moderate negative effects on biodiversity pre mitigation given potential impacts on aquatic ecology and chalk river habitat and other NERC species and habitats. The potential for minor negative effects are identified post mitigation. The PICC EAR (2022) identified that there is potential for minor (uncertain) negative effects on Croxley Common Moor SSSI (100% Unfavourable recovering) and Croxley Common Moor LNR. The additional drawdown (around 1cm) could result in a reduction in the quality or extent of the habitat. The reduction in water may result in the influx of opportunistic terrestrial species as the site may undergo succession should recharge rates not be sufficient. However, given the limited drawdown that has been modelled, groundwater impacts are expected to be of minimal severity to the site. The potential for minor (uncertain) negative effects on Cassiobury Park LNR (hydrological impacts affecting the wetland habitats), Stocker's Lake LNR (downstream of the impacted reach therefore potential disturbance to the habitat and species supported) and Rickmansworth Aquadrome LNR (within impacted reach and potential disturbance to habitats and supported species) were also identified in the EAR. It should be noted these conclusions are based on the outputs of groundwater modelling which has known limitations for use in this context, and are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on the Chilterns Beechwood SAC. The implementation of this drought option may increase the spread of Himalayan Balsam which is an INNS.

There is potential for major negative effects on the water environment from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. Potential moderate negative effects are identified for the water environment post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period, therefore minor positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought.

AMER

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, air, landscape, the local community and material assets. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the

historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

There is potential for the AMER drought permit option to result in moderate negative effects on biodiversity, pre mitigation, given potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. Potential minor negative effects are identified post mitigation. The AMER EAR (2022) identified the potential for minor negative (uncertain) effects for the Sarratt Bottom SSSI (100.00% unfavourable - no change) and Frogmore Meadows SSSI (100.00% unfavourable - recovering). The operation of AMER has the potential to result additional drawdown within the SSSIs and as such could result in a reduction in the quality or extent of the habitat. However, the additional drawdown will occur a few months after the end of the drought permit when wetter weather conditions may have resumed. The potential for minor (uncertain) negative effects were also identified in the EAR for the and Denham Country Park LNR as flows would be reduced during drought permit implementation and during a potentially extended recovery period. It should be noted these conclusions are based on the outputs of groundwater modelling which has known limitations for use in this context, and are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on the Chilterns Beechwood SAC. The implementation of this drought option may increase the spread of Himalayan Balsam which is an INNS.

There is potential for major negative effects on the water environment from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. There is potential for moderate negative effects for the water environment post mitigation. The option is within Flood Zone 2 and is at high risk of surface water flooding therefore potential minor negative effects have been identified pre and post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought.

FULL

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, air, landscape, the local community and material assets. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The FULL drought permit option has the potential to result in moderate negative effects (pre mitigation) on biodiversity given potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. Potential minor negative effects are identified following mitigation. The potential for moderate negative (uncertain) effects were identified in the FULL EAR (2022) for Tewinbury SSSI (50.98% Unfavourable recovering, 49.02% unfavourable declining). The abstraction of groundwater water (around 8cm drawdown predicted) could result in a reduction in the quality or extent of the habitat within the SSSI given the relatively high groundwater table, particularly for the wetland habitats. The reduction in water may result in the influx of opportunistic terrestrial grass species as the site may undergo succession should

recharge rates not be sufficient. However, the impacts to the site will be temporary in nature. Negligible effects are identified for Rye Meads SSSI and Amwell Quarry SSSI in the FULL EAR (2022). Negligible effects are identified in the EAR on Danesbury Park LNR and moderate (uncertain) effects on Singlers Marsh LNR due to the hydrological impacts within Mimram Reach 2 and therefore could result in impacts on habitat and supported species. It should be noted that the site would be dry at the time of permit application, and is known to recover rapidly when abstraction at the drought permit site is ceased. It should be noted these conclusions are based on the outputs of groundwater modelling which has known limitations for use in this context, and are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on the Lee Valley SPA and Ramsar site. The implementation of this drought option may increase the spread of Himalayan Balsam which is an INNS.

There is potential for major negative effects on the water environment from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. The potential for moderate negative effects are identified for the water environment post mitigation. The option is within Flood Zone 2 and is at high risk of surface water flooding therefore minor negative effects are identified pre and post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long-term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought. There is also potential for minor negative effects on recreation, as identified for both pre and post mitigation, during the operational phase of the option.

WHIH

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, air, landscape, the local community and material assets. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The WHIH drought permit option has the potential to result in moderate negative effects on biodiversity pre mitigation given potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. Potential minor negative effects are identified following mitigation. No effects were identified in the WHIH EAR (2022) for Benington High Wood SSSI and negligible effects on Amwell Quarry SSSI and Rye Meads Meadows SSSI. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant impacts on Natura 2000 sites. The implementation of this drought option may increase the spread of Himalayan Balsam which is an INNS.

There is potential for major negative effects on the water environment, pre mitigation, from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are based on the outputs of groundwater modelling which has known limitations for use in this context, and are identified on a precautionary basis. The potential for moderate negative effects are identified for the water environment post mitigation. The option is within Flood Zone 3,

however it is at low risk of surface water flooding, and as such minor negative effects have been identified pre and post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought. There is also potential for minor negative effects on recreation, pre and post mitigation, during the operational phase of the option.

RUNGS

Neutral effects have been identified for SEA objectives on soil, flood risk and the landscape for both the construction and operational phases of the option. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The RUNGS drought permit option is the only option which has minor construction related activities required. The potential for minor negative construction related effects have been identified (pre and post mitigation) for biodiversity given the potential for disturbance effects on priority habitat during the construction phase. Potential moderate negative effects were identified pre mitigation and minor negative effects post mitigation for the biodiversity objective during the operational. The RUNGS EAR (2022) identified that there is potential for moderate (uncertain) effects on Flitwick Moor SSSI and GWDTE based on outputs from the groundwater modelling, as additional drawdown could result in a reduction in the quality or extent of the habitat as a result of alteration to the environmental conditions, given the high groundwater table present at this site, particularly within the wetland habitats present at the site. The reduction in water may result in the influx of opportunistic terrestrial grass species as the site may undergo succession should recharge rates not be sufficient. The potential for moderate (uncertain) effects are also identified for Kings and Bakers Woods and Heaths SSSI (56.80% favourable, 43.20% unfavourable - recovering). The site is not classified a GWDTE however there is uncertainty around the dependence of wet woodland habitat on groundwater and the simulated water table is at surface at this site. An approximately 3 cm additional drawdown is predicted from drought pumping, about 6 months after the end of the drought permit period. It should be noted these conclusions are based on the outputs of groundwater modelling which has known limitations for use in this context, and are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 202) identified no likely significant effects on Chilterns Beechwoods SAC during the construction or operational phases. No effects identified in relation to chalk rivers and negligible effects have been identified for aquatic ecology. Minor (uncertain) effects were identified for NERC species and habitats.

There is potential for minor negative effects on the water environment during construction prior to mitigation and neutral effects have been identified post mitigation. However, no operational effects are identified for the water environment given the option is abstracting from the Lower Greensand aquifer which has high storativity. Negligible effects are identified for hydrology and hydrogeology and there no impacts on water quality within these waterbodies as a result of the option. These conclusions are identified on a precautionary basis. The option is anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

Given there is minor construction related activities, there is potential for localised and temporary effects on air quality both pre and post mitigation. Potential minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate both construction and operational carbon. However, given the option is abstracting from the Lower Greensand aquifer which has high storativity, it is not anticipated that the option will significantly affect the local environment's resilience to climate change therefore neutral effects identified.

The potential for minor construction related effects have been identified (pre and post mitigation) for population and human health given the potential for disturbance effects on the local community and recreation during the construction phase. There may also be disturbance to local built infrastructure and assets during the construction phase and the construction phase will likely use materials and generate waste therefore potential minor negative effects are identified (pre and post mitigation).

SLYE

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, air, landscape, population and human health, and material assets. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The SLYE drought permit option has the potential to result in moderate negative effects on biodiversity (pre mitigation) given potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. Negligible effects for priority habitats. The potential for moderate negative effects are identified post mitigation. The option directly encroaches upon Alkham, Lydden and Swingfield Woods SSSI (1.5% unfavourable-declining, 21.94% unfavourable-recovering, 76.56% favourable), however the additional impact of the drought permit on this designated site is not considered to be significant as per the SLYE EAR (2018). No significant effects are identified for Lydden and Temple Ewell Downs SSSI and Lydden Temple Ewell NNR in the EAR. It should be noted these conclusions are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on the Parkgate Downs SAC and Lydden and Temple Ewell Downs SAC.

There is potential for major negative effects on the water environment (pre mitigation) from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. The potential for moderate negative effects are identified for the water environment post mitigation. The option is within Flood Zone 1, however the option is at high risk of surface water flooding, and minor negative effects are therefore identified for both pre and post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore minor positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought.

SDRE

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, flood risk, air, landscape, population and human health, and material assets. Neutral effects have also been

identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The SDRE drought permit option has the potential to result in moderate negative effects on biodiversity (pre mitigation) given potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. Potential moderate negative effects are identified following mitigation. There is not anticipated to be any effects on Folkestone Warren SSSI, Alkham, Lydden and Swingfield Woods SSSI, and Lydden and Temple Ewell Downs SSSI as per the SDRE EAR (2018). It should be noted these conclusions are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on Parkgate Downs SAC, Lydden and Tempel Ewell Downs SAC, Kingsdown Cliff SAC and Folkestone to Etchinghill Escarpment SAC.

There is potential for major negative effects on the water environment from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. The potential for moderate negative effects are identified for the water environment post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought.

SBUC

No construction related effects have been identified for the option as no new infrastructure is required. Neutral effects have also been identified for SEA objectives on soil, flood risk, air, landscape, population and human health, and material assets. Neutral effects have also been identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. Should additional information come to light around impacts on the historic environment, further baseline collection and assessment may be required, particularly around archaeology and effects on buried, waterlogged archaeological and paleoenvironmental remains.

The SBUC drought permit option has the potential to result in moderate negative effects on biodiversity given potential impacts on aquatic ecology, chalk river habitat and other NERC species and habitats. Potential moderate negative effects are identified following mitigation. No effects are anticipated for Dover to Kingsdown Cliffs SSSI, Lydden and Temple Ewell Downs SSSI and Alkham, Lydden and Swingfield Woods SSSI as per the SBUC EAR (2018). It should be noted these conclusions are made on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on Lydden and Temple Ewell Downs SAC and Dover to Kingsdown Cliff SAC.

There is potential for major negative effects on the water environment from impacts on hydrology and hydrogeology during the drought permit implementation. Subsequent potential effects are identified on water quality as a result. However, these conclusions are identified on a precautionary basis. The potential for moderate negative effects are identified for the water environment post mitigation. The option is anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified (pre and post mitigation) for maintaining supply to customers, but it is not a long term resilient water supply option.

The potential for minor negative effects have been identified (pre and post mitigation) for climatic factors given the option is likely to generate operational carbon and by abstracting water during a drought period, it is likely to reduce the resilience of the natural environment to drought.

Table 5.5: Summary of assessment results of the drought permit options³⁶

SEA Topic	SEA Objective	THUN				WHIH				RUNGS				PICC				AMER				FULL				SLYE				SDRE				SBUC							
		Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects	Construction Effects	Operational Effects	Residual Construction	Residual Operational Effects								
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (to loss and improve connectivity where possible)	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	-
	Soil	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
Water	Increase resilience and reduce flood risk	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
	Protect and enhance the quality of the water environment and water resources	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	-
	Deliver reliable and resilient water supplies	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
Air	Reduce and minimise air emissions	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
Climatic Factors	Reduce embodied and operational carbon emissions	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	-
	Reduce vulnerability to climate change risks and hazards	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	-
Landscape	Conserve, protect and enhance landscape, heritage and seascape character and visual amenity	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
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	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
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	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
	Maintain and enhance tourism and recreation	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	-
Material Assets	Minimise resource use and waste production	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
	Avoid negative effects on built assets and infrastructure	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

³⁶ The model outputs which were used to inform the EARs for the drought permits in the Central region and in turn used to inform the SEA use the Hertfordshire Chalk model which represents the Chalk aquifer as two layers. Although this model has a more complex representation of the Chalk than previous models (which represented a single Chalk unit), there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. For this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome.

5.2.4 Prioritisation of Drought Permit Options

The individual drought permit assessments (Section 5.2.3) and the cumulative effects assessment (Section 6) have been used to identify prioritisation of the implementation of the drought permit options. As discussed previously the implementation of drought permit options will only be taken forward once other demand and supply side measures have been implemented. It should also be noted that the conclusions of the EARs and SEAs for the drought permits in the Central region are based on the model outputs of the Hertfordshire Chalk model which has some limitations and as a result, the conclusions are generally highly conservative and/or uncertain, representing the worst-case scenario rather than the expected outcome.

5.2.4.1 Central Region Drought Permits

The central region drought permits within the Drought Plan are split into two categories based on the priority of use. The permits within Category 1 include THUN, WHIH and RUNGS, and Category 2 includes PICC, AMER and FULL. The prioritisation exercise undertaken as part of the SEA has made recommendations for the order of implementation of the permits within each category.

For Category 1, it is recommended that THUN is taken forward first. Compared to WHIH, which is recommended for implementation second, THUN is likely to have less of an impact on local chalk streams given it is likely to have less of an impact locally on flows and recovery. This is due to the location of these two sources and the wider impacts from other pressures. THUN also has a much lower abstraction volume. THUN, however, is identified to have potential minor (uncertain) effects based on outputs of groundwater modelling for Amwell Quarry SSSI and Lee Valley SPA and Ramsar. The HRA Stage 2 Appropriate Assessment goes on to identify no likely significant effects on site integrity. It also has potential effects on water quality and flows and NERC habitats and species.

WHIH is recommended to be implemented next. It is identified to have negligible effects on designated sites, although it does have potential effects on water quality and flows, chalk streams and NERC habitats and species

RUNGS is recommended to be implemented last within Category 1. It has minor construction works and as a result has a slightly longer commissioning time than the other options at six to nine months (rather than under six months for the other options). During operation, it is identified to have the potential for moderate (uncertain) effects on Flitwick Moor SSSI and Kings and Bakers Woods and Heaths SSSI. It also has potential effects identified for aquatic ecology, NERC species and habitats. However, it has no or negligible effects on water quality and flows and no effects are identified for chalk streams.

Within Category 2, PICC is recommended for implementation first as it has potential for minor effects on Croxley Common Moor SSSI, Cassiobury Park LNR, Croxley Common Moor LNR, Stocker's Lake LNR and Rickmansworth Aquadrome LNR. It also has potential effects on water quality and flows, chalk streams and NERC habitats and species.

AMER is recommended for implementation next as it has potential for minor effects on two SSSIs, Sarratt Bottom SSSI and Frogmore Meadows SSSI, and potential for minor (uncertain) effects on Denham Country Park LNR. It also has potential effects on water quality and flows, chalk streams and NERC habitats and species. AMER also has the potential for cumulative effects with WHIH and THUN on the River Lea.

FULL is recommended for implementation last. FULL has potential for moderate effects on Tewinbury SSSI and GWDTE and moderate (uncertain) effects on Singlers Marsh LNR, as well

as potential effects on water quality and flows, chalk streams, NERC habitats and species, and recreation.

5.2.4.2 Southeast Region Drought Permits

The modelling carried out for WRMP19 did not indicate a deficit which would require the use of drought permits in the Southeast region. The decision was made to not remove them from the Drought Plan completely, but to retain three as a contingency volume. It is highly unlikely that these drought permits will be required. SBUC and SDRE have potential for effects on chalk streams, water quality and flows and NERC habitats and species, however, they are unlikely to have effects on designated sites. These options are also unlikely to have cumulative effects with each other, therefore, it is recommended that these options are implemented first.

SLYE is recommended for implementation last. SLYE directly encroaches on Alkham, Lydden and Swingfield Woods SSSI and although the site is not a GWDTE, the terrestrial vegetation at the site would mainly be dependent on local groundwater levels and these would likely be low during implementation of the drought permit (however, the additional impact of the drought permit on this designated site is not considered to be significant). There is also potential for effects on chalk streams, water quality and flows and NERC habitats and species.

6 Cumulative Effects Assessment

6.1 Cumulative effects within the Drought Plan 2019

A cumulative effects assessment has been undertaken to identify the potential cumulative effects of the options within the Drought Plan that have been assessed as part of the SEA. This includes the nine drought permit options and the TUBs and NEUBs options for WRZ 1 to 9. The results of the assessment are presented in Table 6.1 and are summarised by SEA topic below.

- **Biodiversity, Flora and Fauna** – Amwell Quarry SSSI and Rye Meads SSSI form part of the Lee Valley SPA and Ramsar site and the drought permit options THUN, WHIH and FULL are all identified to have the potential to result in negligible effects on these sites individually. The HRA (Ricardo, 2022) identified no in-combination effects of THUN, FULL and WHIH drought permits are anticipated. Temple Ewell Downs SSSI forms part of the Lydden and Temple Ewell Downs SAC and the SBUC, SDRE and SLYE drought permits are within 5km of these sites. SLYE and SDRE are both within 9km of Parkgate Downs SAC. The HRA (Ricardo, 2022) identified no likely significant effects and that there was not a requirement to undertake an in-combination assessment for these sites. The modelling carried out for the WRMP19 did not indicate a deficit which would require the use of drought permits in the Southeast region. The decision was made to not remove them from the Drought Plan completely, but to retain three as a contingency volume. It is highly unlikely that these drought permits will be required and as such, simultaneous operation which will result in cumulative effects is unlikely. However, if the situation does arise where Affinity Water need to apply, the EAR, SEA and HRA documents will be updated as necessary. The in-combination effects of SLYE and SDRE have therefore not been considered within the EARs. Individually, the SLYE, SDRE and SBUC options are identified to have negligible effects on the Alkham, Lydden and Swingfield SSSI. However, it is unlikely there would be any additional effects to the negligible effects identified within the individual drought permit EARs. The site is not a GWDTE and the SLYE EAR (2018) outlines that terrestrial vegetation at the site would mainly be dependent on local groundwater levels and these would likely be low during implementation of the drought permits. SLYE and SDRE are considered to be the most relevant to this SSSI, both of which are located within dry valleys, and it is likely these will be dry during periods of drought and as such there is not anticipated to have cumulative effects. There is potential for cumulative impacts on the River Lea from FULL, WHIH and THUN. These are areas of chalk stream and priority habitat and there may also be cumulative impacts upon aquatic ecology. However, given the abstraction is from groundwater, effects are likely to be indirect. These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. There is not anticipated to be cumulative effects on the River Colne as a result of AMER and PICC. The simultaneous application of the Southeast region permits (SLYE, SDRE and SBUC) are not considered at this stage given they are unlikely to be implemented at the same time. Should this be required, the EARs will be updated to consider the cumulative effects. However, it is noted from the individual EARs that the SLYE and SDRE options both affect Reach 1 Kearsney Stem, Reach 2 Upper Dour Reach 3A Braided section, and Reach 3B Lower Dour. Given the effects identified on these reaches individually, there is potential for cumulative effects on aquatic ecology and NERC species and habitats. There may be positive cumulative effects on biodiversity from the implementation of the TUBs and NEUBs options across the WRZs as they may help to conserve water in the natural environment. However, there is potential for negative cumulative effects to occur for localised habitat from a loss of watering (e.g. domestic gardens, public gardens).

- **Soils** - The drought permit options are to be implemented in areas of differing land use, including urban land and Grade 3 agricultural land. There is only one option (RUNGS) with minor construction works therefore no cumulative construction related impacts were identified. There are no operational effects identified across the drought permits and no cumulative effects are anticipated. The TUBs and NEUBs options have the potential to marginally impact soil quality and create dusty conditions. If these were to be applied at the same time across all or multiple WRZs, there may be negative cumulative effects. However, this will be temporary.
- **Water** – There is not anticipated to be cumulative effects as a result of construction given there is only one options (RUNGS) which has construction related effects. There is not anticipated to be any cumulative effects associated with flood risk. There is potential for cumulative effects in the River Lea as a result of simultaneous operation of five of the drought permits in the Central region (AMER, PICC, FULL, WHIH and THUN) which influence the chalk aquifer. Cumulative impacts should be considered in the event that applications for implementation of the FULL, WHIH, and THUN drought permits are made and simultaneous operation is proposed. There is not anticipated to be cumulative effects on the River Colne as a result of AMER and PICC. As stated above, the modelling carried out for the WRMP19 did not indicate a deficit which would require the use of drought permits in the Southeast region and as such, simultaneous operation which will result in cumulative effects is unlikely. Cumulative effects of SBUC, SLYE and SDRE are therefore not considered at this stage. However, if the situation does arise where Affinity Water need to apply, the EAR, SEA and HRA documents will be updated as necessary. However, it was noted as part of the SEA, the EARs for the SLYE and SDRE both identify impacts on the Reach 1 Kearsney Stem and Reach 2 Upper Dour; Reach 3A Braided section and Reach 3B Lower Dour. As such, there is potential for cumulative effects on the water environment given the effects (negligible to major but uncertain) identified for SDRE and SLYE individually. There is potential for positive cumulative effects as a result of the implementation of the TUBs and NEUBs options. The options aim to reduce the quantity of water required for supply, therefore limiting a further increase in abstraction which may help maintain river flows and protect groundwater and surface water bodies during drought conditions. The drought permits will likely have a positive cumulative effect on the resilience of water supplies as they allow for the continued delivery of water during drought periods. However, these options would only be actioned under severe drought conditions and are therefore not a long-term option for securing resilient supplies. The TUBs and NEUBs options are also likely to have a positive cumulative effect on the resilience of supplies as they reduce demand and therefore contribute to maintaining supplies for essential services.
- **Air** – There are no cumulative effects identified for air quality. None of the drought permit options are located within or within 500m of an AQMA. There is only one option which has minor construction works and as such, no cumulative effects are identified in relation to construction. There is not anticipated to be any operational air quality effects for the drought permit or the TUBs and NEUBs options therefore no cumulative effects are identified.
- **Climatic Factors** – There is not anticipated to be cumulative effects associated with construction related emissions given there is only one option (RUNGS) which requires construction. Carbon may be generated during the operational phase of the drought permits from increased abstraction and processing therefore the potential for minor negative cumulative effects from operational related carbon emissions are identified. The TUBs and the NEUBs options are not anticipated to have any significant carbon emissions associated with them therefore no cumulative effects are anticipated.
- **Landscape** - There are a number of the drought permit options which are located within or within close proximity to the same landscape designation, including the Chilterns AONB and the Kent Downs AONB. However, the options are not identified to affect the setting of these landscape designations or wider landscape setting and no cumulative effects have been

identified. There may be some negative cumulative effects as a result of the TUBs and NEUBs options given they have the potential to result in minor impacts on landscape and townscape. Water will be restricted for watering public and private gardens, use of ornamental fountains, cleaning of building exteriors and windows.

- **Historic Environment** - There are drought permit options which are located within proximity to historic environment assets. However, no cumulative construction related impacts are anticipated given only one option (RUNGS) requires construction. No cumulative operational effects have been identified for the historic environment. There may be negative cumulative effects as a result of the NEUBs options being implemented across WRZs as they could affect the setting of historic gardens or landscape attached to heritage assets.
- **Population and Human Health** – There is not anticipated to be cumulative effects on the local community as a result of construction related disturbance given RUNGS is the only option which requires construction. No operational cumulative effects are identified for the drought permit options. The implementation of the TUBS and NEUBS options across the WRZs at the same time have the potential to result in negative cumulative effects on the local community as a wider population will be affected. There may also be negative cumulative effects on recreation as although the options may not affect the same recreation assets, a wider area and more assets have the potential to be affected by the drought permit implementation. There is also potential for negative cumulative effects on recreation and tourism as a result of the implementation of the TUBs and NEUBs options across the WRZs.
- **Material Assets** – There is not anticipated to be construction related cumulative effects on material assets given only one option (RUNGS) requires construction. There is no waste production of resource use associated with the TUBs and NEUBs therefore no cumulative effects.

Table 6.1: Cumulative effects assessment

SEA Topic	SEA Objective	Construction Effects		Operation Effects		Comments	Mitigation	Residual Construction Effects		Residual Operation Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	+	--	<p>The drought permit options THUN, WHIH and FULL are all identified to have the potential to result in negligible effects on the Amwell Quarry SSSI and Rye Meads SSSI individually. Both of these SSSIs form part of the Lee Valley SPA and Ramsar site. The HRA (Ricardo, 2022) considered potential in-combination effects as a result of the THUN, WHIH and FULL options. In Stage 1 Screening of FULL and WHIH drought permits, based on the estimated drawdown of each drought permit alone, no likely significant effects are anticipated. Based on a cumulative assessment of THUN, FULL and WHIH, groundwater modelling estimated a 1.2cm drawdown at Amwell quarry, which is equal to the estimated drawdown at Amwell quarry if THUN drought permit was implemented alone. This is due to the distance between the boreholes and interaction of groundwater systems and associated hydrodynamics. On the basis that the THUN drought permit alone would not result in an adverse effect on site integrity, no in-combination effects of THUN, FULL and WHIH drought permits are anticipated.</p> <p>The SBUC, SDRE and SLYE are all within approximately 5km of the Lydden and Temple Ewell Downs SAC and the Lydden and Temple Ewell Downs SSSI forms part of the site. SLYE and SDRE are both within 9km of Parkgate Downs SAC. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects and that there was not a requirement to undertake an in-combination assessment for these sites. The modelling carried out for the WRMP19 did not indicate a deficit which would require the use of drought permits in the Southeast region. The decision was made to not remove them from the Drought Plan completely, but to retain three as a contingency volume. It is highly unlikely that these drought permits will be required and as such, simultaneous operation which will result in cumulative effects is unlikely. The in-combination effects of the Southeast options have therefore not been considered within the EARs at this stage (given unlikely requirement for simultaneous implementation). However, if the situation does arise where Affinity Water need to apply, the EAR, SEA and HRA documents will be updated as necessary. The SLYE, SDRE and SBUC are all identified to have negligible effects on Alkham, Lydden and Swingfield Woods SSSI individually, however it is unlikely there would be any additional effects than what has been identified within the individual drought permit EARs. The site is not a GWDTE and the SLYE EAR (2018) outlines that terrestrial vegetation at the site would mainly be dependent on local groundwater levels and these would likely be low during implementation of the drought permits. SLYE and SDRE are considered to be the most relevant to this SSSI, both of which are located within dry valleys, and it is likely these will be dry during periods of drought and as such there is not anticipated to be cumulative effects.</p> <p>There is potential for in-combination impacts on chalk stream priority habitat and NERC species from the implementation of Drought Permits on Affinity's Central Region. The EAR (2022) groundwater modelling incorporated a cumulative scenario in which all five Chalk drought permits (AMER, PICC, FULL, WHIH and THUN) are implemented simultaneously. The assessment identified the potential for cumulative impacts on the River Lea from FULL, WHIH and THUN. The model simulates potential significant flow reductions in the Cumulative Lea Reach 1 and potential major significant flow reductions in the Cumulative Lea Reach 2 as a result of the simultaneous implementation. These are areas of chalk stream and priority habitat, naturally vulnerable to drought. There may be potential resultant cumulative effects upon aquatic ecology. However, given the abstraction is from groundwater, effects are likely to be indirect. These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. The AMER and PICC EARs (2022) identified that there are no other drought permits implemented within the Ver, Gade and Misbourne catchments, which may result in cumulative effects (including on the River Colne).</p> <p>The EARs for SLYE, SDRE and SBUC do not consider cumulative effects at this stage as the EARs represent the most likely scenario where the drought permits in the Southeast are unlikely to be implemented at the same time. If there is an application for the drought permits in the Southeast to be implemented simultaneously, the potential for cumulative effects will need to be reviewed and updated if required. However, it was noted as part of the SEA, the EARs for the SLYE and SDRE both identify impacts on the Reach 1 Kearsney Stem and Reach 2 Upper Dour; Reach 3A Braided section and Reach</p>	Further consideration of the cumulative effects if applications for implementation of the FULL, WHIH, and THUN are made and simultaneous operation is proposed. Further consideration of the cumulative effects of SLYE and SDRE if applications are made for simultaneous operation. For the individual options, precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). Environmental Monitoring Plans (EMP) have been prepared as part of the EARs which sets out monitoring on a precautionary basis prior to implementation of the drought permits to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	+	-

SEA Topic	SEA Objective	Construction Effects		Operation Effects		Comments	Mitigation	Residual Construction Effects		Residual Operation Effects	
		+	-	+	-			+	-	+	-
						3B Lower Dour. As such, there is potential for cumulative impacts on aquatic ecology and NERC species and habitats given the effects (negligible to major but uncertain) identified in the individual EARs. There may be positive cumulative effects on biodiversity from the implementation of the TUBs and NEUBs options across the WRZs as they may help to conserve water in the natural environment. However, negative cumulative effects may occur for localised habitat from a loss of watering (e.g. domestic gardens, public gardens).					
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	-	The drought permit options are to be implemented in areas of differing land use, including urban land and Grade 3 agricultural land. There is only one option (RUNGS) which has minor construction works associated with it and as a result there is not anticipated to be cumulative construction related impacts on soils. There are no operational effects identified across the drought permits and no cumulative effects are anticipated. The TUBs and NEUBs options have the potential to marginally impact soil quality and create dusty conditions. If these were to be applied at the same time across all or multiple WRZs, there may be negative cumulative effects. However, this will be temporary.	Continued communication throughout the implementation of TUBs and NEUBs option to ensure customers are aware of the situation and expectations are managed.	0	0	0	-
	Increase resilience and reduce flood risk	0	0	0	0	The drought permit options are located in areas with varying flood risk from both rivers and surface water flooding. There is potential for a large widespread flooding event to affect several of the drought permit options through surface water flooding. However, this is considered negligible as the drought permits are less likely to be in place if there are flood conditions. The options themselves are unlikely to have a cumulative effect on flood risk. The TUBs and NEUBs options are not likely to affect or be affected by flood risk therefore no cumulative effects identified.	No cumulative effects are identified therefore mitigation is not required. Measures to reduce the impact of flooding during the construction and operational phases of those individual options at risk will likely be implemented.	0	0	0	0
Water	Protect and enhance the quality of the water environment and water resources	0	0	+	--	There is only one option (RUNGS) which has minor construction works associated with it and as such there is not anticipated to be cumulative effects as a result of construction. Cumulative impacts of drought permit implementation have potentially been identified in the River Lea in relation to simultaneous operation of the five Affinity Central Region drought permits (AMER, PICC, FULL, WHIH, THUN) which influence the chalk aquifer. Groundwater modelling as part of EAR identified potential significant cumulative impacts on the River Lea from FULL, WHIH and THUN which may result in significant flow reductions in the Lea Reach 1 and Lea Reach 2 as a result of the simultaneous implementation. Cumulative impacts should be considered in the event that applications for implementation of the FULL, WHIH, and THUN drought permits are made and simultaneous operation is proposed. The AMER and PICC EARs (2022) identified that there are no other drought permits implemented within the Ver, Gade and Misbourne catchments, which may result in cumulative effects (including on the River Colne). The modelling carried out for the WRMP19 did not indicate a deficit which would require the use of drought permits in the Southeast region. The decision was made to not remove them from the Drought Plan completely, but to retain three as a contingency volume. It is highly unlikely that these drought permits will be required and as such, simultaneous operation which will result in cumulative effects is unlikely. However, if the situation does arise where Affinity Water need to apply, the EAR, SEA and HRA documents will be updated as necessary. The EARs for SLYE, SDRE and SBUC therefore do not consider cumulative effects at this stage as the EARs represent the most likely scenario where the drought permits in the Southeast are unlikely to be implemented at the same time. However, it was noted as part of the SEA, the EARs for the SLYE and SDRE both identify impacts on the Reach 1 Kearsney Stem and Reach 2 Upper Dour; Reach 3A Braided section and Reach 3B Lower Dour. As such, there is potential for cumulative effects on the water environment given the effects (negligible to major but uncertain) identified for SDRE and SLYE individually. All the drought permit options are located in SPZ 1, however given the options do not result in any changes to the SPZs, there is not anticipated to be cumulative effects. There is potential for positive cumulative effects as a result of the implementation of the TUBs and NEUBs options. The options aim to reduce the quantity of water required for supply, therefore limiting a further increase in abstraction which may help maintain river flows and protect groundwater and surface water bodies during drought conditions.	Further consideration of the cumulative effects if applications for implementation of the FULL, WHIH, and THUN are made and simultaneous operation is proposed. Further consideration of the cumulative effects of SLYE and SDRE if applications are made for simultaneous operation. For the individual options, water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	+	--

SEA Topic	SEA Objective	Construction Effects		Operation Effects		Comments	Mitigation	Residual Construction Effects		Residual Operation Effects	
		+	-	+	-			+	-	+	-
	Deliver reliable and resilient water supplies	0	0	+	0	The drought permits will likely have a positive cumulative effect on the resilience of water supplies as they allow for the continued delivery of water during drought periods. However, these options would only be actioned under severe drought conditions and are therefore not a long-term option for securing resilient supplies. The TUBs and NEUBs options are also likely to have a positive cumulative effect on the resilience of supplies as they reduce demand and therefore contribute to maintaining supplies for essential services.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	None of the drought permit options are located within or within 500m of an AQMA. There is only one option (RUNGS) which has minor construction works associated with it therefore no cumulative effects are identified for air quality. There is not anticipated to be any operational air quality effects therefore no cumulative effects are identified. There is not anticipated to be any air quality effects associated with the TUBs and the NEUBs options therefore no cumulative effects are identified.	No cumulative effects are identified therefore mitigation is not required. For those individual options identified as having minor construction effects, the use of best practice mitigation measures is likely to be implemented during construction to minimise impacts on localised air quality.	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	-	0	-	There is no carbon data available for the options. One drought permit option includes minor construction works and carbon will be generated from materials used to construct the new infrastructure (embodied carbon) and construction activities. However, as there is only one option with construction related emissions, cumulative effects are not anticipated. The remaining drought permit options do not require new infrastructure; however, carbon may be generated during the operational phase from increased abstraction and processing (barring SBUC). Minor negative cumulative effects from operational related carbon emissions are therefore identified. The TUBs and the NEUBs options are not anticipated to have any significant carbon emissions associated with them therefore no cumulative effects are anticipated.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available.	0	-	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	+	-	Most of the drought permit options will result in additional abstraction of water from the natural environment during a drought period. As a result, there may be negative cumulative effects as a result of the implementation of the drought permits as the resilience of the local environment to climate change may be affected. By reducing demand and potentially helping to limit the amount of abstraction required, the TUBS and NEUBs options may have positive cumulative effects by helping to reduce the local environment's vulnerability to climate change by conserving water in the natural environment.	Monitor water levels and flows to identify if further action is required.	0	0	+	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	-	There are a number of the drought permit options which are located within or within close proximity to the same landscape designation, including the Chilterns AONB and the Kent Downs AONB. One option (RUNGS) has minor construction works associated with it and as such no cumulative construction effects are anticipated. The options could potentially affect the setting and character of the landscape through reduced flows and longer flow recovery times, however, this is considered negligible in the context of the baseline drought conditions and their effects on landscape. There may be some negative cumulative effects as a result of the TUBs and NEUBs options given they have the potential to result in minor impacts on landscape and townscape. Water will be restricted for watering public and private gardens, use of ornamental fountains, cleaning of building exteriors and windows.	Ensure high levels of communication before, during and following the implementation of TUBs and NEUBs.	0	0	0	-
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	-	There are drought permit options which are located within proximity to historic environment assets. However, cumulative construction effects are not likely given there is only one option with construction (RUNGS) and no construction related effects have been identified for that option individually. There are no options which are located within close proximity to the same historic environment asset. The options do not require a significant amount of excavation therefore cumulative effects on known or unknown archaeology are not anticipated. No cumulative operational effects have been identified for the historic environment. There may be negative cumulative effects as a result of the NEUBs options being implemented across WRZs as they could affect the setting of historic gardens or landscape attached to heritage assets.	Ensure high levels of communication before, during and following the implementation of TUBs and NEUBs.	0	0	0	-
Population and Human Health	Maintain and enhance the health and wellbeing of the local community,	0	0	0	-	Given there is only one drought permit option (RUNGS) which has construction associated with it, there is not anticipated to be cumulative effects on the local community as a result of construction related disturbance. No operational cumulative effects are identified for the drought permit options.	Ensure high levels of communication before, during and following the implementation of TUBs and NEUBs.	0	0	0	-

SEA Topic	SEA Objective	Construction Effects		Operation Effects		Comments	Mitigation	Residual Construction Effects		Residual Operation Effects	
		+	-	+	-			+	-	+	-
	including economic and social wellbeing					There is potential for there to be effects on the local community as a result of the implementation of the TUBs and NEUBs options. If these are implemented across multiple WRZs at the same time, there is potential for a negative cumulative effect on the local community as a wider population will be affected.					
	Maintain and enhance tourism and recreation	0	0	0	-	The operation of the drought permit options have the potential to have negative cumulative effects on recreation. The options may not affect the same recreational assets, however if they are implemented at the same time, there is potential for a cumulative effect on recreation as a wider area and more assets may be affected. There is also potential for negative cumulative effects on recreation and tourism as a result of the implementation of the TUBs and NEUBs options across the WRZs.	Ensure high levels of communication before, during and following the implementation of the drought permit and TUBs and NEUBs options.	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	There is only one drought permit option (RUNGS) which has minor construction work associated with it therefore no construction related cumulative effects are identified. There is no waste production or resource use associated with the TUBs and NEUBs therefore no cumulative effects are identified.	No cumulative effects are identified therefore mitigation is not required. For the individual options with effects identified, there is an opportunity to implement sustainable design measures to reduce the impact and excavated material could be reused on site.	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is only one drought permit option which has minor construction work associated with it (RUNGS) therefore no construction related effects are identified. There is not anticipated to operational cumulative effects as a result of the drought permit options. There is not anticipated to be any cumulative effects associated with the TUBs and NEUBs options.	No cumulative effects are identified therefore mitigation is not required. For the individual options with effects identified, it is likely best practice mitigation measures, such as a CTMP, will be implemented to minimise effects during construction.	0	0	0	0

6.2 Cumulative effects with other plans

6.2.1 Affinity WRMP24

The Affinity WRMP24 is currently being prepared. In-combination effects of the Affinity drought plan and the Affinity WRMP24 will need to be assessed upon completion of the WRMP24.

6.2.2 WRSE Regional Plan

In combination effects will be assessed as part of the WRSE regional plan, this may include the options assessed as part of this SEA.

6.2.3 Other water company Drought Plans

An assessment of potential cumulative effects with neighbouring water companies Drought Plans has been undertaken. Affinity Water have worked with neighbouring companies to check whether any of their current drought options have the potential to cause cumulative impacts with their options. Water companies are currently developing their updated Drought Plans and once other plans are finalised or revised, Affinity can update their assessments within the EARs as part of the annual review process if required. The HRA (Ricardo, 2022) has also assessed the potential for cumulative effects on Natura 2000 sites. The following neighbouring watering company Drought Plans have been considered:

- Thames Water (Draft 2022)
- Anglian Water (2019)
- Bristol Water (2018)
- Essex and Suffolk Water (2018)
- Severn Trent (2019)
- South East Water (2018)
- Southern Water (2019)
- Sutton and East Surrey Water (2019)
- Wessex Water (2018)

6.2.3.1 Thames Water (Draft 2022)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects.

As part of the cumulative assessment of the options within the draft Drought Plan (Section 6.1), potential cumulative effects were identified for the River Lea. Thames Water abstract surface water at Lee Navigation at New Gauge (between Hertford and Ware). The abstraction rate from this source at the time of the implementation of the Affinity Water drought permits (if required) is therefore critical and there is potential for cumulative effects, however it is uncertain at this stage. However, the Affinity Water drought permits are lower in volumetric terms and result in indirect impacts as they are from groundwater.

The HRA (Ricardo, 2022) identified the following supply side options in Thames Water's Draft Drought Plan 2022 overlap with the Lee Valley SPA and Ramsar site: North London Artificial Recharge Scheme (1km), Old Ford (4.1km), Stratford Box (4.4km), Chingford Artificial Recharge Scheme (8.4km) and East London Resource Development (9.6km). As these options relate to groundwater abstractions, there is potential for in-combination effects with the THUN drought permit. However, Thames Water schemes would abstract from a confined chalk aquifer approximately 30 – 60m below surface level and are overlaid with London Clay, whereas Affinity Water's THUN drought permit would abstract from chalk closer to surface level (3 – 7.4m

below surface level). In addition, Thames Water options listed above use existing licenses (they are not drought permits) and have been included in the baseline for the regional modelling conducted by Affinity Water for use in the EAR updates, where no in-combination effects were identified.

6.2.3.2 Anglian Water (2019)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and Anglian Water's Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.3.3 Bristol Water (2018)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and Bristol Water's Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.3.4 Essex and Suffolk Water (2018)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and Essex and East Suffolk Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.3.5 Severn Trent (2019)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and Severn Trent Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.3.6 South East Water (2018)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and South East Water's Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.3.7 Sutton and East Surrey Water (2019)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and Sutton and East Surrey Water's Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.3.8 Wessex Water (2018)

The EARs for the nine drought permit options identified that there are no known other water company drought options that will result in cumulative effects. No in-combination effects between Affinity Water's drought permits and Wessex Water's Drought Plan have been identified as part of the HRA (Ricardo, 2022).

6.2.4 Other water company WRMP24s

In combination effects should be assessed against the most up to date WRMPs, these are currently being updated by all water companies. In-combination effects of the Affinity drought plans and neighbouring WRMP24 will need to be assessed once the WRMPs are available.

6.2.5 Local Authority Plans

Local Development Plans or Core Strategies are the main framework for planning and set out the long-term spatial vision to guide sustainable development. They include policies on key areas such as housing, transport, the natural environment, employment and economic development, carbon reduction and resources, amongst others. An assessment of the cumulative effects of the drought permit options with the following local authorities plans and policies are detailed below:

- **THUN** - East Hertfordshire District Council
- **WHIH** - East Hertfordshire District Council
- **PICC** - Dacorum Borough Council
- **AMER** - South Bucks District Council
- **FULL** - Welwyn Hatfield Borough Council
- **RUNGS** - Luton Borough Council and Central Bedfordshire Council
- **SLYE** - Dover District Council
- **SDRE** - Dover District Council
- **SBUC** - Dover District Council

6.2.5.1 East Hertfordshire District Council

THUN and WHIH are located within East Hertfordshire District Council. East Hertfordshire District Council state in their District Plan (2018)³⁷ the level of need of new homes is 839 per year, or 18,458 new homes by 2033. This will increase demand on water resources, although, water management schemes and the use of sustainable drainage measures in new developments will aim towards water neutrality despite increased demands for water usage rising from new development. There is potential that the increase demand will result in an increase in demand required from the drought permits during periods of drought. WRMP modelling has informed the Drought Plan and has taken into account any known growth. Increased demand from growth is offset within WRMP by demand management.

6.2.5.2 Dacorum Borough Council

PICC option is within Dacorum Borough Council and as per the Dacorum Local Plan (2020 - 2038)³⁸ it is adjacent to the Hemel Hampstead key regeneration area and Areas for Development in the main centre for development and change. The housing target in Policy CS17 sets a level of housing which the Council expects to achieve and exceed. The target alone suggests 10,750 new homes will be provided over the plan period (by 2031). The district has water management plans that incorporate application of water efficiency measures in new and existing development which may help to reduce water demand. There is potential that this increased demand will mean more water will be required through the PICC drought permit.

³⁷ East Hertfordshire District Council (2018). District Plan. Available at: <https://www.eastherts.gov.uk/planning-building/planning-policy/east-herts-district-plan-2018>

³⁸ Dacorum Borough Council (2020). Dacorum Local Plan (2020 – 2038). Available at: https://www.dacorum.gov.uk/docs/default-source/strategic-planning/part-1---local-plan-emerging-strategy-for-growth-2020-2038---pages-1-to-187.pdf?sfvrsn=93bf0c9e_10

WRMP modelling has informed the Drought Plan and has taken into account any known growth. Increased demand from growth is offset within WRMP by demand management.

6.2.5.3 South Bucks District Council

AMER is located within the South Bucks District Council and their Core Strategy Development Plan³⁹ (adopted in 2011) states South Bucks water demand exceeds the volume licensed for abstraction in the South East of England, and South Bucks has been identified as an area of 'serious water stress' by the Environment Agency. The core strategy states housing provision will be made for a net increase of 2,200-2,800 dwellings in the period 2006 to 2026, indicating an increase in water demand in the district. There is potential for increased demand to have result in an increase in the amount of water required for abstraction for the AMER permit. WRMP modelling has informed the Drought Plan and has taken into account any known growth. Increased demand from growth is offset within WRMP by demand management.

6.2.5.4 Welwyn Hatfield Borough Council

The FULL drought permit is located within the Welwyn Hatfield Borough Council and the Draft Local Plan⁴⁰ outlines a target of 12,000 new homes, equating to an average of 637 dwellings a year between 2013 and 2032. This has the potential to increase demand and could result in an increased abstraction required from FULL. WRMP modelling has informed the Drought Plan and has taken into account any known growth. Increased demand from growth is offset within WRMP by demand management. New development will be expected to incorporate water conservation measures wherever applicable, including sustainable drainage systems, water storage systems, soft landscaping and permeable surfaces to help reduce surface water run-off which may help towards water neutrality.

6.2.5.5 Luton Borough Council and Central Bedfordshire Council

RUNGS is located within the Luton Borough Council area. Luton Borough Council and Central Bedfordshire Council work together to support Local Plan development. The Central Bedfordshire Council Local Plan (2015-2035) and the Central Bedfordshire and Luton Strategic Housing Market Assessment (SHMA)⁴¹ (2018) calculated the need for housing in the borough of Luton to be 19,000 across the period of 2015-2035. These increases in demand may be an increase required for abstraction from RUNGS. WRMP modelling has informed the Drought Plan and has taken into account any known growth. Increased demand from growth is offset within WRMP by demand management.

6.2.5.6 Dover District Council

SLYE, SDRE and SBUC are all located within the Diver District Council. The Council states in the Draft Local Plan 2020 – 2040 (2021)⁴² that 11,920 new homes across the plan period (596 a year). This will increase demand on water resources and may result in a requirement for increased abstraction associated with options SLYE, SDRE, SBUC. WRMP modelling has informed the Drought Plan and has taken into account any known growth. Increased demand from growth is offset within WRMP by demand management. Requirements for developments to comply with Sustainable Construction Standards through the development of energy and water

³⁹ South Bucks District (2011). Core Strategy Development Plan. Available at: <https://www.southbucks.gov.uk/planning/corestrategy#:~:text=The%20Core%20Strategy%20is%20the,in%20the%20period%20to%202026>.

⁴⁰ Welwyn Hatfield Borough Council (2016). Draft Local Plan. Available at: <https://www.welhat.gov.uk/local-plan>

⁴¹ Central Bedfordshire Council (2018). Central Bedfordshire and Luton SHMA. Available at: <https://www.luton.gov.uk/Housing/Lists/LutonDocuments/PDF/Housing/Housing%20development%20and%20strategy/shma-2018.pdf>

⁴² Dover District Council (2021). Draft Local Plan. Available at: <https://www.dover.gov.uk/Planning/Planning-Policy-and-Regeneration/New-District-Local-Plan/Home.aspx>

strategies along with water management schemes will aim towards significant water savings despite increased demands for water usage rising from new development.

7 Mitigation and Monitoring

7.1 Mitigation

'Mitigation measures' are measures to prevent, reduce or off-set significant adverse environmental effects that have been identified. In addition, it is important to consider measures aimed at enhancing positive effects.

Mitigation measures have been identified through the SEA process, the HRA process and the EARs. A summary of the proposed general mitigation is identified below. Each drought permit option has specific mitigation proposals (alongside monitoring as discussed in Section 7.2) set out in an Environmental Monitoring Plan (EMP) contained within the EARs. Along with the proposed mitigation and monitoring proposals, further consultation and liaison with the Environment Agency will be undertaken.

Affinity Water are also currently developing their Water Industry National Environment Programme (WINEP) for the 2024 price review (PR24). The programme will aim to improve ecological health in chalk streams including those catchments potentially affected by the drought permit options. There is also potential for in-stream mitigation as identified below to be delivered as part of this programme. Delivery of projects such as through Affinity Water's river restoration programme will help to improve natural resilience which will in turn support resilience to any impacts from drought permits.

Significant negative effects (pre mitigation), equating to moderate and major effects, were identified for two objectives which include biodiversity, flora and fauna, and the objective on the water environment. The identification of these significant effects is based on conservative modelling as discussed in previous chapters. The mitigation and monitoring proposals which are specific to these significant effects are summarised in Table 7.1. The monitoring proposals are split out into three categories to include baseline monitoring, monitoring at the onset of a drought and post drought monitoring. The monitoring will help to inform the implementation of mitigation with some mitigation being put in place during and/or after the drought period. Further detail on these proposals can be found within the EARs and EMPs.

The EARs are not published on Affinity Water's website due to national security restrictions, however summaries are provided in the Drought Plan and appendices, and the information in them has been used to inform the SEA work as stated above. Should you wish to view the EARs, they are available at the Affinity Water head office; Affinity Water, Tamblin Way, Hatfield, AL10 9EZ. You can arrange an appointment to view these documents by contacting dmpconsultation@affinitywater.co.uk.

Table 7.1: Mitigation and Monitoring Proposals

SEA Topic and Objective	Potential Negative Effect	Potential Mitigation	Monitoring Proposals
<p>Biodiversity, flora and fauna</p> <p>Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)</p>	Designated sites (SSSIs, LNRs)	<ul style="list-style-type: none"> Measures to be agreed if required in collaboration with Natural England and the Environment Agency but may include: <ul style="list-style-type: none"> Alteration of drainage Artificial wetting Coppicing Natural regeneration of native species 	<ul style="list-style-type: none"> Baseline: Collate available site condition information available from Natural England Onset: Walkover surveys, groundwater monitoring. Post: None identified at this stage. If required, they will be identified in collaboration with Natural England and the Environment Agency.
	Fish community (including NERC and notable species)	<ul style="list-style-type: none"> Aeration equipment Fish rescue In-stream measures Increased flow utilising other sources Measures specific to spawning gravels Bird scarers Barrier removal or modification Fish rescue Restocking 	<ul style="list-style-type: none"> Baseline: Collation of baseline routine Environment Agency monitoring and further local knowledge. Onset: Walkover surveys, fixed point photography, dissolved oxygen measurements and setting of trigger values. Post: Population surveys, observation of spawning habitats, repeated fixed point photography and continued collation of Environment Agency routine data.
	Macroinvertebrates	<ul style="list-style-type: none"> In-stream measures Removal of fine silt Artificial channel narrowing 	<ul style="list-style-type: none"> Baseline: Seasonal population surveys, collation of Environment Agency monitoring and local knowledge, and water quality monitoring. Onset: Walkover surveys, seasonal surveys continued, sample collection, continued water quality monitoring. Post: Kick samples and mixed taxon level analysis, river habitat surveys.
	Macrophytes	<ul style="list-style-type: none"> Measures to address nutrient loading In-stream measures Maintain water levels via operation of key flow controls Removal of non-native macrophytes if present 	<ul style="list-style-type: none"> Baseline: River LEAFACS2 macrophyte surveys, collation of Environment Agency monitoring and local knowledge, identification of key nutrient loading sources, water quality sampling. Onset: Continued macrophyte survey, walkover survey, water quality sampling and observe nutrient burdens.

SEA Topic and Objective	Potential Negative Effect	Potential Mitigation	Monitoring Proposals
			<ul style="list-style-type: none"> Post: Continued surveys (monthly and each summer for two years), continued water quality sampling and observe nutrient burdens.
Water vole		<ul style="list-style-type: none"> Translocation of water voles 	<ul style="list-style-type: none"> Baseline: Collation of local knowledge and surveys, walk over survey. Onset: Identification of receptor site (should translocation be required) and licence application. Post: Continued surveys, habitat improvements, mink surveillance and trapping and discuss compensation with the Environment Agency.
Otter		<ul style="list-style-type: none"> As noted above for fish community 	<ul style="list-style-type: none"> Baseline: Collation of local knowledge and surveys Onset: Walkover surveys, implement camera traps and licence application. Post: Continued walkovers and implementation of camera traps, and additional measures as noted for fish community above.
		<ul style="list-style-type: none"> As noted above for macroinvertebrates Installation of bat roosts 	<ul style="list-style-type: none"> Baseline: Collation of local knowledge and surveys Onset: Bat activity survey Post: Complete bat activity survey and additional monitoring as noted for macroinvertebrates
Amphibians Common toad Great crested newt Common frog Smooth newt Palmate newt		<ul style="list-style-type: none"> As noted below for ponds. 	<ul style="list-style-type: none"> Baseline: Collation of local knowledge and surveys Onset: eDNA surveys, visual searches, Habitat Suitability Index surveys, population surveys. Post: Complete eDNA surveys, visual searched and population surveys.
Ponds		<ul style="list-style-type: none"> Temporary alteration of drainage Artificial wetting of ponds Maintenance and removal of opportunistic species Vegetation management Dredging / silt removal Bank protection / stabilisation 	<ul style="list-style-type: none"> Baseline: Desktop assessment of pond location within affected extent Onset: Walkover surveys and water quality surveys, use of predictive system for multi metrics methodology Post: Complete surveys
Wet woodland		<ul style="list-style-type: none"> Temporary alteration of drainage Artificial wetting of ponds 	<ul style="list-style-type: none"> Baseline: Collate local knowledge and knowledge from Affinity Water, Natural England and the Environment Agency to determine wet woodlands within affected extent

SEA Topic and Objective	Potential Negative Effect	Potential Mitigation	Monitoring Proposals
		<ul style="list-style-type: none"> • Coppicing • Natural regeneration of native species • Managing access and ensuring breaks in the canopy 	<ul style="list-style-type: none"> • Onset: Walkover surveys and groundwater monitoring • Post: Complete surveys
Water Protect and enhance the quality of the water environment and water resources	Water quality	N/A	<ul style="list-style-type: none"> • Continuous water quality monitoring before (baseline), during and after implementation of the drought permit. • Parameters should include Nitrogen (N), Phosphorous (P), pH, temperature and dissolved oxygen.
	Water levels	N/A	<ul style="list-style-type: none"> • Ground water level monitoring • Gauged river flow monitoring • Spot gauging

Additional mitigation measures are also identified within the SEA for those effects identified as not significant on topics such as climatic factors, population and human health and material assets. Proposed general mitigation measures include:

- Climatic Factors
 - Use of renewable or ‘clean’ energy sources for any options which have high energy demands.
- Historic Environment:
 - Further baseline collection and assessment and implement appropriate mitigation if required.
 - Historic England should remain engaged throughout this process.
- Population and human health:
 - Publicity and extensive consultation in relation to the implementation of water restrictions and bans on use.
 - Consultation with affected water users (particularly in relation to other abstractors) to determine how licences are used, associated conditions and potential impacts of specific drought options.

Construction related mitigation measures are also relevant to the RUNGS option which is the only option to require minor construction work. Best practice methods should be implemented to avoid disturbance on habitats, avoid pollution and contamination of the water environment, minimise impacts on local air quality and any disturbance to the local community or recreation. This is likely to be achieved through the implementation of a Construction Environmental Management Plan (CEMP) and a Construction Traffic Management Plan (CTMP) if required. The construction phase should also seek to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact where possible.

7.2 Monitoring

Provision for monitoring of the effects of Affinity Water Drought Plan is set out in the Drought Permit EMPs (included within the EARs). The recommendations focus on those environmental features that are assessed as most at risk of adverse effects from the proposed drought permits based on the outcome of the environmental assessment. The EMPs set out monitoring required for the:

- Baseline environment;
- The on-set of drought conditions;
- During-drought permit implementation (and any potential mitigation measures); and
- Post-drought permit (and any potential mitigation and/or compensation measures).

As outlined in Table 7.1 and above, monitoring will help to inform the implementation of mitigation and the EMPs include surface and groundwater quality and water level monitoring and ecological monitoring and walkover surveys including fish communities (including NERC and notable species), macroinvertebrates, macrophytes, and species (e.g. water voles) (see EARs for further details). The EMP monitoring proposals are focused on water and biodiversity which corresponds to the main effects identified in the SEA. Full details on monitoring can be found in the EARs.

As noted within the Environmental Report, Affinity Water have never required to apply for the implementation of a drought permit and as such, there is limited baseline information on the impacts of their implementation. Modelling has therefore been undertaken and assessment has taken a conservative approach to determine potential effects. If drought permits are required,

the collection of such baseline data will be addressed through the EARs and monitoring plans set out in the EMPs developed for each of the drought permits.

8 Summary and Next Steps

8.1 Summary

The SEA undertaken for the Drought Plan has identified the potential positive and negative effects associated with the implementation of the options included within the Plan. The Drought Plan contains various actions that Affinity Water will implement before, during and after a drought event to ensure supplies are maintained. The SEA has involved the assessment of the following actions within the Drought Plan:

- Actions to reduce demand (TUBs and NEUBs)
- Actions to maintain supply (drought permits)

8.1.1 Assessment Results and Conclusions

There is no construction related works associated with TUBs and NEUBs options therefore all the effects identified are related to the operational phase. Overall, the TUBs and NEUBs options have the potential to result in positive effects for biodiversity by conserving water in the natural environment, however there may be some localised habitats which are negatively affected by a temporary loss of watering. There is also likely to be positive effects in delivering reliable water supplies to customers given the options aim to conserve water for essential use during periods of drought. The implementation of these options may result in negative effects for the visual amenity of the townscape and landscape given water will be restricted for garden watering, decorative fountains, and the cleaning of buildings. Considering these effects on townscape assets, and on certain domestic and commercial activities, implementation of TUBs and NEUBS may have minor negative effects on the health and wellbeing of the local community and the maintenance and enhancement of local tourism. High levels of communication before, during, and following the implementation of these measures is key to mitigating negative effects.

Nine drought permit options were taken forward into the Drought Plan and assessed as part of the SEA process. Out of the nine drought permit options, only one option (RUNGS) has minor construction works associated with it. Minor negative construction related effects were identified for the SEA objectives on biodiversity, water environment, air quality, carbon, population and health, and material assets due to potential generation of dust, visual intrusion, construction traffic, and disturbance to people and wildlife. The remainder of the effects identified are associated with drought permit implementation within the operational phase. The assessment identified no potential effects for the SEA objectives on soil or landscape. Neutral effects were also identified for the historic environment as there were not identified to be any sensitive above ground assets in proximity to the drought permit sites. However, there are potential for effects where preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets above the impact of the drought itself is not likely to be significant. Further baseline collection and assessment may be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets.

Overall, all of the drought permits have the potential to result in negative effects on aquatic ecology, chalk rivers and NERC species. There are three options (PICC, AMER and FULL) which are identified to have potential effects on nationally and locally designated sites (including SSSIs and LNRs). The potential effects to these sites include a reduction in the quality or extent of the habitat as a result of drawdown and the potential for the influx of opportunistic terrestrial species as the site may undergo succession should recharge rates are not sufficient. However,

it should be noted that these effects have been identified on a precautionary basis. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects for all options on Natura 2000 sites, excluding THUN where the Stage 2 AA went on to identify no significant impacts on the integrity of the Lee Valley SPA and Ramsar.

There is potential for all of the options, excluding RUNGS, to have negative effects on the water environment given impacts on flows and water quality. All the drought permit options are anticipated to increase the resilience of water supplies during a drought period therefore positive effects are identified for maintaining supply to customers. There is potential for minor negative effects on climatic factors given the options are likely to generate operational carbon and by abstracting water during a drought period, they have the potential to reduce the resilience of the natural environment to climate change. Minor negative effects on recreation were also identified for a three (THUN, FULL and WHIH) of the nine drought permit options.

The results of the SEA (including the cumulative assessment, see section below) have been used to influence the phasing of drought permit implementation should they be required. The drought permits with the least potential environmental effects are prioritised for implementation first.

8.1.2 Cumulative Assessment

An assessment of the potential cumulative effects of the Drought Plan has also been undertaken. This has included an assessment of the options within the Drought Plan alongside an assessment of the effects of the Drought Plan with other plans and programmes. For the TUBs and NEUBs options, positive cumulative effects on biodiversity were identified given they may conserve water across the WRZs, however there is also potential for negative effects from a loss of watering. There may be minor negative cumulative effects on soil quality across the WRZs from TUBs and NEUBs implementation. Positive cumulative effects may occur for the water environment and the resilience of supplies given they will contribute to a reduction in the amount of water required for supply and they allow for the continued delivery of water during drought periods. There may be some negative cumulative effects on landscape and townscape given water will be restricted for watering public and private gardens, use of ornamental fountains, cleaning of building exteriors and windows. There may also be negative cumulative effects as a result of the NEUBs options being implemented across WRZs as they could affect the setting of historic gardens or landscape attached to heritage assets. The implementation of the TUBs and NEUBs options across the WRZs at the same time have the potential to result in negative cumulative effects on the local community as a wider population will be affected. There is also potential for negative cumulative effects on recreation and tourism as a result of the implementation of the TUBs and NEUBs options across the WRZs.

For the drought permit options, the assessment identified that the simultaneous implementation of the FULL, WHIH and THUN have the potential to have cumulative effects on biodiversity and the water environment as a result of potential impacts on the River Lea. There is also potential for cumulative effects on biodiversity and the water environment from the simultaneous implementation of SLYE, SBUC and SDRE, however it should be noted that the requirement for these drought permits is unlikely and therefore it is unlikely that they will be implemented at the same time. The potential for negative cumulative effects were identified for climatic factors as a result of the operational carbon and that the options have the potential to reduce the resilience of the local environment to climate change. There is also potential for cumulative effects on recreation. Potential positive cumulative effects were identified for securing water supplies, allowing for continued and resilient delivery during drought periods. No cumulative effects associated with drought permit options were identified for the SEA objectives on soil, flood risk, air, landscape, historic environment, or material assets.

The cumulative assessment of the Drought Plan with other plans identified that there is not likely to be cumulative effects with other company Drought Plans. However, there is potential for Thames Water abstraction at Lee Navigation at New Gauge to have cumulative effects with the Affinity Water permits affecting the River Lea, however given the Affinity Water abstraction is groundwater, effects are likely to be indirect. An assessment of the cumulative effects of the Drought Plan and the Affinity Water WRMP24 could not be undertaken given it is still being developed. Similarly, the WRSE regional plan and other water companies' WRMP24 are also currently being developed. Local Authorities' Local Development Plans set the context for development and there is potential that the planned growth could increase demand for abstraction during periods of drought.

8.1.3 Mitigation and Monitoring

Mitigation measures have been identified through the SEA process, the HRA process and the EARs. Each drought permit option has specific mitigation and monitoring proposals set out in an EMP contained within the EARs.

Provision for monitoring of the effects of the Drought Plan is set out in the Drought Permit EMPs (included within the EARs). The recommendations focus on those environmental features that are assessed as most at risk of adverse effects from the proposed drought permits based on the outcome of the environmental assessment. The EMP monitoring proposals are focused on water and biodiversity which corresponds to the main effects identified in the SEA. Full details on monitoring can be found in the EARs.

8.1.4 Consultation and Next Steps

The SEA Environmental Report was shared for consultation with the Statutory Consultees (Natural England, the Environment Agency and Historic Environment) between April – May 2022. This allowed the Statutory Consultees to review and comment on the contents of the Environmental Report. A consultation log of responses (Appendix H) has been produced to record the comments received from the Statutory Consultees and the action taken to address them. The Environmental Report has been updated to reflect consultation comments and any changes between the draft and final Drought Plan.

The SEA Environmental Report will be published for an eight-week public consultation between June and August 2022. This will allow the public to review and comment on the contents of the Environmental Report. Following the consultation period, a consultation log of responses will be produced to record the comments received (alongside those already received from the Statutory Consultees) and the actions taken to address them. The Environmental Report will be updated to reflect consultation comments. If required, the Drought Plan will also be updated

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Appendices

A. SEA Process Tasks

Appendix A is presented in a separate report.

B. WRMP24 Scoping Report Consultation

Appendix B is presented in a separate report.

C. Plans, Policies and Programmes Review

Appendix C is presented in a separate report.

D. Baseline Review and Baseline Maps

Appendix D is presented in a separate report.

E. Assessment Scoring Criteria

Appendix E is presented in a separate report.

F. TUBs and NEUBs Assessment Matrices

Appendix F is presented in a separate report.

G. Drought Permit Assessment Matrices

Appendix G is presented in a separate report.

H. Environmental Report Consultation Log

Appendix H is presented in a separate report.

I. **Preliminary Assessment Summary Report**

Appendix I is presented in a separate report.

