MOTT MACDONALD

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Anglian Water Drought Plan 2019

SEA Environmental Report
Appendix A - Plans and Programmes Review

March 2020

Anglian Water Services Limited

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
F +44 (0)1223 461007
mottmac.com

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Issue and Revision Record

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Document reference: 399155 | 003 | D

Information class: Standard

Contents

A. Plans and Programmes Review

Document name	Key objectives, requirements, and guidance
International and European	
The Birds Directive (2009/147/EC)	The Directive aims to provide protection to the all of the 500 wild bird species which naturally occur in the European Union. The EU legislation was adopted in 1979 due to concerns of wild bird species decline and was amended in 2009. It places emphasis on the protection of habitats for endangered and migratory species and establishes a network of Special Protection Areas (SPAs) including all the most suitable territories for these species.
EU 7th Environmental Action Plan (2013)	The 7th EU Environmental Action Plan (EAP) will provide guidance for European environmental policy until 2020 and also sets out a long-term vision of where it aims the Union will be in 2050. The EAP has three key objectives: • To protect, conserve and enhance the Union's natural capital • To turn the Union into a resource-efficient, green, and competitive low-carbon economy • To safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing
European Landscape Convention, October (2000)	The Convention is dedicated to promoting the protection, management and planning of landscape, and to organise European co-operation of landscape issues. It covers land and water (inland and seas) as well as natural, rural, urban and peri-urban landscapes. It takes into account degraded landscapes alongside those that are considered as outstanding. The Convention also considers the interaction between landscape elements.
The Convention for the Protection on the Archaeological Heritage of Europe (Revised, 1992)	The aim of the Convention is to protect archaeological heritage as a source of European collective memory and as an instrument for historical and scientific study. It promotes co-operation between archaeologist and planning to ensure the optimum conversation of archaeological heritage. It sets out framework for funding of work related to archaeology and also deals with public access and awareness.
National	
Draft National Policy Statement for Water Resources (November 2017)	The government recognises the need for a 'twin track' approach to improve the resilience of water supplies. This means further ambitious action to reduce the demand for water alongside new water resources. The government wants to make sure that where new large infrastructure is needed, it can be delivered in a timely manner to a high standard. To help achieve this, NPS will streamline the process of gaining planning consents for nationally significant water resource infrastructure projects. The government intends to support infrastructure that: • Secures long-term resilience to the impacts of drought and climate change as set out in the strategic policy statement (SPS)14 to Ofwat and supports the aims of the government's national adaptation programme (NAP) on climate change • Supports both an increase in population and economic growth across England, in line with the aims of the Industrial Strategy • Supports the achievement of sustainability goals and enhances the environment, in line the Environment Agency's water industry national environment programme (WINEP) and in a way that will be set out in the government's 25-year Environment Plan • Offers best value for customers so that water needs can be met in an affordable way both now and in the future, in line with the strategic objective set out in the SPS.
UK Post-2010 Biodiversity Framework (2012)	The purpose of the Framework is to set a broad enabling structure for action across the UK between now and 2020: • Set out a shared vision and priorities for UK-scale activities, in a framework jointly owned by the four countries, and to which their own strategies will contribute • Identify priority work at a UK level which will be needed to help deliver the Aichi targets and the EU Biodiversity Strategy • Facilitate the aggregation and collation of information on activity and outcomes across all countries of the UK, where the four countries agree this will bring benefits compared to individual country work • Streamline governance arrangements for UK-scale activity
The Conservation of Habitats and Species Regulations (2017)	The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations 2017) consolidates the Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations 2010) with subsequent amendments. It aims to provide conservation of natural habitats and species of wild flora and fauna, and places rules for the protection, management and exploitation of such habitats and species. The Habitats Regulations 2017 provide for the designation and protection of natural habitats and habitats of species, the protection of species, and the adaptation of planning and other controls for the protection of European Sites.

Document name	Key objectives, requirements, and guidance
Water Resources Planning Guidelines, Environment Agency (2016)	This provides technical framework for water companies to follow when developing and present their water resource management plans (WRMP) which they must produce every five years. The guidelines demonstrate how water companies can forecast supply and demand and plan to deliver secure public water supplies over a 25-year period.
Making Space for Nature - A review of England's Wildlife Sites and Ecological Network (Lawton, 2010)	The report aims to answer the following questions: Do England's wildlife sites comprise a coherent and resilient ecological network? If not, what needs to be done? The report concludes that the approaches required to achieve a coherent and resilient ecological network are varied, and 24 wide-ranging recommendations are presented. Five themes unite them: • We need to continue the recent progress in improving the management and condition of wildlife sites, particularly our SSSIs. We also make recommendations for how these should be designated and managed in ways that enhance their resilience to climate change. • We need to properly plan ecological networks, including restoration areas. Restoration needs to take place throughout England. However, in some areas, both the scale of what can be delivered to enhance the network, and the ensuing There are a large number of surviving patches of important wildlife habitat scattered across England outside of SSSIs, for example in Local Wildlife Sites. We need to take steps to improve the protection and management of these remaining wildlife habitats. 'Protection' will usually be best achieved through incentive-based mechanisms, but at times may require designation. • We need to become better at deriving multiple benefits from the ways we use and interact with our environment. There are many things that society has to do that may seem to have rather little to do with nature conservation, but could have, or even should have if we embrace more radical thinking; flood management by creating wetlands is an obvious example. We need to exploit these 'win-win' opportunities to the full. Being better at valuing a wider range of ecosystem services would help this process. • We will not achieve a step-change in nature conservation in England without society accepting it to be necessary, desirable, and achievable. This will require strong leadership from government and significant improvements in collaboration between local authorities, local communities, statutory agencies, the voluntary and private sectors, farmers, landowners and other land-managers and individual citizens. Recommendation 4 is relevant for Anglian Water and states: 'Public bodies and statutory undertakers planning the management of water resources should: • 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.
Planning (Listed Buildings and Conservation Areas) Act	Sets out laws in relation to planning permission for building works, with a particular focus on listed buildings and conservation areas. It creates controls for the demolition, alteration, extension of buildings, objects or structure of particular historic interest as well as conservation areas.
Ancient Monuments and Archaeological Areas Act 1979	This Act is concerned with the provisioning, investigation, recording and the preservation and protection of archaeological sites and ancient monuments.
Marine and Coastal Access Act 2009	The aim of the Act is to make provision for the management and protection of the marine and coastal environment. It helps to ensure these environments are clean, healthy, safe, productive and biologically diverse. It mainly affects England and Wales, and comprises of eight key elements: • Marine Management Organisation • Strategic Marine Planning System • Streamlined Marine Licensing System • Marine Nature Conservation • Fisheries Management and Marine Enforcement • Migratory and Freshwater Fisheries • Costal Access • Coastal and Estuarine Management

Document name	Key objectives, requirements, and guidance
Regional and Local	
Anglian Region River Basin Management Plan (2015)	The purpose of a river basin management plan is to provide a framework for protecting and enhancing the benefits provided by the water environment. To achieve this, and because water and land resources are closely linked, it also informs decisions on land-use planning. It sets out the: • Current state of the water environment • Pressures affecting the water environment • Environmental objectives for protecting and improving the waters • Programme of measures, actions needed to achieve the objectives • Progress since the 2009 Plan
Draft WRMP, Anglian Water (2019)	The Draft 2019 WRMP sets out Anglian Water's 25-year (2020-2045) strategy for managing supply and demand. The document recognises that the supply demand balance is under significant pressure. Anglian Water plan to use a twin-track approach to mitigate supply-demand risk which meets short-term needs but is also flexible enough for the future.
The Broads Plan 2017, Broads Authority	The Broads Plan 2017 aims to provide a long-term vision and guide the management actions for benefit of the natural and cultural environmental, local communities and visitors. It covers the period 2017-2022, is the key management plan for the Broads and is updated every five to seven years. The Broads Plan 2017 has eight key themes which integrate environmental, economic, social, and cultural concerns. One such theme is concerned with managing water resources and flood risk.
Management Plans for Areas of Outstanding Natural Beauty (AONB): Lincolnshire Wolds 2018-2023, Norfolk Coast 2014-2019, Dedham Vale 2016-2021	Lincolnshire Wolds 2018-2023: Produced by the Lincolnshire Wolds Countryside Service the Plan sets out strategic objectives to ensure the consistency and continuity for the management of the area over time. Norfolk Coast 2014-2019: Outlines the background and strategic approach of the Norfolk Coast Partnership for managing the area. It sits alongside a separate action which will be reviewed annually. It highlights the qualities of the of the area, the pressures for change, the objectives, and policies, and how the objectives will be achieved. Dedham Vale 2016-2021: Sets out how a partnership of organisations (environmental, agricultural, business etc) seek of balance the need to the various whilst protecting the AONB. It outlines six strategic topics which cover the key issues (the countryside, resident, and villages, enjoying the area, the river and its tributaries, climate change, and working together) and offer management objectives and policies for securing the vision of the area.
Anglian Water Biodiversity Strategy	The Biodiversity Strategy outlines how Anglian Water will conserve biodiversity across the East of England to meet their legal obligations whilst contributing to England's Biodiversity 2020 Strategy. It will also help Anglian Water achieve their 'A Flourishing Environment' Business Plan. The Strategy describes the key threats and challenges and highlights the work Anglian Water will do on their sites and across the region.
Northamptonshire Biodiversity Action Plan (2016)	This is the third edition of the Plan and sets out the priorities for the most threatened and declining habitats in Northamptonshire. It included general as well as habitat specific action plans and targets. It includes a Nature Improvement Area for the Nene Valley.
Suffolk Planning Biodiversity Action Plan (2012)	The Plan covered forward plans including local planning documents, Shoreline Management Plans and Local Authority coastal defence planning and AONB. It was the first in England to develop an action plan dedicated to planning issues and the aim is provide clarity by collating all information on biodiversity in one place.
Northumbrian Water Group (NWG) Biodiversity Strategy (2015)	The NWG is an updated version of the combined Biodiversity Strategy for Northumbrian Water and Essex and Suffolk Water. The strategy sets out NWG's values and approach to biodiversity and identifies areas of focus for supporting involvement in biodiversity conservation.
The Nene Catchment CAMs Strategy, Environmental Agency (2013)	The Catchment Abstraction Management Strategy (CAMS) set out how the Environmental Agency will manage water abstraction and contribute to the Water Framework Directive (WFD). It outlines where water is available, and if relevant, where the Environment Agency needs to reduce current rates of abstraction. It also provides an overview of the catchment area and characteristics, including abstractions, geology, hydrology, hydrometry, water quality and discharges, ecology and conservation, recreation, and navigation. The CAMS make information on water resources and licensing practice publicly available and allow the balance between the needs of abstractors, other water users and the aquatic environment to be considered in consultation with the local community and interested parties.

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Abstraction Licensing Strategies, Environmental Agency: Essex (2017), Cam and Ely Ouse (2017) and North-West Norfolk (2017)	The strategy sets out the Environmental Agency's approach to managing new and existing abstraction and impoundment within the Essex, and the Cam and Ely Ouse, catchment in the Anglian river basin district. It provides information about where water is available for further abstraction and also indicates how reliable a new abstraction license may be. It provides an overview of assessment points, groundwater, level dependent environments, heavily modified water bodies, protected areas, and supported rivers.
Drought Management in England, Environmental Agency (2017)	This framework sets out how drought affects England and how the Environmental Agency intends to work with the government, water companies and others to ensure the effects on people, business and the environment are management. It also covers the action they, and others, take to manage drought, how drought is monitored and how they intend to report on drought.
Cambridge Water Revised Draft Drought Management Plan (2017)	This provides an update to the 2012 iteration. It sets out how they will response to periods of extended dry weather and demonstrates how they will monitor and manage these drought event as well as the actions they will take. They intend to use a variety of drought management interventions on both the supply and demand side in order to ensure continued supply for customers. Updates have included amending supply side options to reflect current operation conditions and status of source works. In order to incorporate the latest guidance, the monitoring and environmental assessment of the supply options have been developed. Demand actions have mainly remained unchanged, although they have updated the communication section to align with company changes.
Essex and Suffolk Water Draft Drought Plan (2018)	Essex and Suffolk Water, a trading division of Northumbrian Water Limited, has prepared the Draft Drought Plan to identify how they intend to manage a future drought. They have identified triggers to highlight when action is required and have identified measure available to support supplies when they may be low.
Severn Water Draft Drought Plan (2018)	An update to the 2014 iteration, Severn Water cover 2019-24 and explain how they will manage supply and demand during a drought in their region. They are confident that their plan represents a good balance between cost, environment, and resilience to severe droughts. Their stochastic drought modelling indicates that we are resilient to a 1 in 200-year drought without the need for emergency drought orders.
Thames Water Draft Drought Plan 2017	The Draft Drought Plan 2017 outlines how Thames Water will react to a period of drought and develops a plan for action to achieve increased protection against more severe droughts. It shows Thames Water can meet with the existing asset base: • Its planned levels of service, for the twentieth century droughts in the historic record • A range of more severe drought scenarios, although with less resilience
Yorkshire Water Draft Drought Plan 2018	Yorkshire Water set out how they would manage resource, mitigate risk, and communicate with customer during a drought. They intend to implement a range of drought management action covering customer management, distribution management and resource management.
Haven Gateway Green Infrastructure Strategy	The Strategy provides an update on the progress and carries out analysis on the provision and deficiencies of accessible natural greenspace. It also provides a framework for implementing local plans across the four authorities is covers.
Colchester Borough Green Infrastructure Strategy	The Strategy aims to identify high quality accessible green infrastructure, identify the ecological links and networks between habitats and deliver community well-being.
Northampton Green Infrastructure Plan	The Plan aims to provide the most important step towards Northampton's planning and delivery of green infrastructure. The River Nene is specified as a Green Corridor amongst the different types of green infrastructure.
Greater Norwich Green Infrastructure Strategy	This provides a strategic plan to ensure pressures on important natural and historic aspects of green infrastructure are minimised and seeks to maximise opportunities to enhance green infrastructure.
Peterborough Green Grid Strategy	The Strategy sets out a strategic framework and action plan for green space provision throughout the Greater Peterborough area to ensure the provision of green infrastructure goes hand in hand alongside development and growth in the area.
National Character Areas (NCAs): 92 Rockingham Forest (NE538); 85 The Brecks (NE385); 78 Central North Norfolk (NE526); 48: Trent and Belvoir Vales (NE429); 89 Northamptonshire	92 Rockingham Forest (NE538) a broad, low, undulating ridge underlain by Jurassic limestone which falls away from a prominent, steep northern scarp overlooking the Welland Valley. 85 The Brecks (NE385) lies at the heart of East Anglia, occupying much of south-western Norfolk and north-western Suffolk, together with a small part of north-eastern Cambridgeshire.

Document name	Key objectives, requirements, and guidance
Vales (NE527); 88 Bedfordshire and Cambridgeshire Claylands (NE555); 86 South Suffolk and North Essex Claylands; and 111 Northern Thames Basin (NE466).	78 Central North Norfolk (NE526) is a gently undulating rural landscape of the Central North Norfolk NCA and stretches from the slightly flatter, more open land of Mid Norfolk NCA, to the prominent glacial landform of the Cromer Ridge and the dynamic exposed coastline of coastal cliffs, where large storm events dramatically shape its character. 48: Trent and Belvoir Vales (NE429) is characterised by undulating, strongly rural and predominantly arable farmland, centred on the River Trent. A low-lying rural landscape with relatively little woodland cover, the NCA offers long, open views. 89 Northamptonshire Vales (NE527) consists of a series of low-lying clay vales and river valleys, including the valleys of the rivers Nene and Welland and their tributaries. The area is 10 per cent urban, and settlement is often visually dominant. 88 Bedfordshire and Cambridgeshire Claylands (NE555) is a broad, gently undulating, lowland plateau dissected by shallow river valleys that gradually widen as they approach The Fens NCA in the east. Within it, but distinct from it, is the Bedfordshire Greensand Ridge, a contrasting narrow and elevated outcrop of Greensand, with its associated habitats on acidic soils such as grassland, heathland and woodland. 86 South Suffolk and North Essex Claylands covers the four counties of Suffolk, Essex, Hertfordshire and Cambridgeshire. It stretches from Bury St Edmunds in the north-west to Ipswich in the north-east, roughly following the line of the A14 trunk road through the Gipping Valley. 111 Northern Thames Basin (NE466) is a diverse area which extends from Hertfordshire in the west to the Essex coast in the east. It is separated from the North Sea and Thames Estuary by a narrow band of land that makes up the Greater Thames Estuary NCA.
Flood Risk Management Plans	Flood Risk Management Plans (FRMPs) highlight the hazards and risks of flooding from rivers, the sea, surface water, groundwater and reservoirs, and set out how Risk Management Authorities (RMAs) work together with communities to manage flood risk.
A Green Future: Our 25 Year Plan to Improve the Environment (2018)	Sets out the Government's actions to help the natural world regain and retain good health and aims to seize the opportunity to create a Green Brexit. It includes a goal to achieve clean and plentiful water by improving at least three quarters of our waters to be close to their natural state as soon as is practicable by: • Reducing the damaging abstraction of water from rivers and groundwater, ensuring that by 2021 the proportion of water bodies with enough water to support environmental standards increases from 82% to 90% for surface water bodies and from 72% to 77% for groundwater bodies. • Reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected, whether for biodiversity or drinking water as per our River Basin Management Plans. • Supporting OFWAT's ambitions on leakage, minimising the amount of water lost through leakage year on year, with water companies expected to reduce leakage by at least an average of 15% by 2025. • Minimising by 2030 the harmful bacteria in our designated bathing waters and continuing to improve the cleanliness of our waters. We will make sure that potential bathers are warned of any short-term pollution risks.
Humber Estuary Coastal Authorities Group - Flamborough Head to Gibraltar Point Shoreline Management Plan (2010)	This SMP covers the northern reaches of the Anglian Water region which includes the coastal along the Humber Estuary to Gibraltar Point. This is coastal frontage number three within the national shoreline management programme. The section of the Anglian Water region which is covered by this SMP predominately includes hold the line policy with some areas of managed realignment. The River Trent Drought Permit option zone of influence is covered within this SMP.
The Wash Shoreline Management Plan 2 – Gibraltar Point to Old Hunstanton	This is coastal frontage number four within the national shoreline management programme. The SMP has a mixture of hold the line, managed realigned and no active intervention across the four policy areas which it covers. The River Nene and River Great Ouse estuaries are covered within this SMP. There is also a separate action plan for The Wash SMP which summarises all the specific actions that are needed to implement the plan and the policies. This includes actions by the EA and local authorities to develop flood and erosion defence schemes.
North Norfolk Shoreline Management Plan (2010)	This is coastal frontage number five within the national shoreline management programme and covers the frontage from Old Hunstanton up to the end of the shingle ridge at Kelling Hard. It also includes a mixture of hold the line, management realignment and no active intervention across the three policy areas which it covers. There are no Drought Plan 2019 options covered by this SMP.
Kelling to Lowestoft Ness Shoreline Management Plan (2012)	Number six in the coastal frontage within the national shoreline management programme. This SMP covers the River Wensum: Costessey Boreholes zone of influence which has a hold the line policy.

Document name	Key objectives, requirements, and guidance
Essex and South Suffolk Shoreline Management Plan 2 (2010)	This SMP is the eighth coastal frontage within the national shoreline management programme. The zone of influence for the River Gipping: Sproughton Intake option is covered within this SMP which a mixture of advance the line, hold the line, managed realignment and no active intervention. The River Colne Augmentation zone of influence is also covered within this SMP which predominately has hold the line policy with some management realigned and one area for no active intervention in the 2055-2100 epoch.
Draft Lincolnshire Rights of Way Improvement Plan (RoWIP) 2014-2019	The second RoWIP produced by the County Council provides a strategic framework for undertaking Public Rights of Way (PRoW) improvements and provides opportunities to attract external funding. It has identified three broad areas for improvement including: network improvements, improved customer service and social inclusion.
Norfolk County Council Rights of Way Improvement Plan 2007-2017	The Plan sets out the County Council's aspirations for improving their network of local rights of way. It has an overarching goal to continuously review and improve efficient management of both Public Rights of Way (PRoW) and Access, as well as cycle tracks, and permissive access in Norfolk, promoting national and regional routes, and parish networks.
Suffolk County Council "In Step with Suffolk, Rights of Way Improvement Plan 2006-2016	The Plan highlights Suffolk County Council's commitment to the network through a targeted maintenance and improvement programme that provides substantial benefits across the county. There are six key objectives included in the Plan which as follows: a better signed and maintained network; provide and protect a better network that provides requirements for all users; develop a safer network; increased community involvement; digitised map of the network for the whole of Suffolk; and improve the promotion, understanding and use of the network.
Essex County Council Rights of Way Improvement Plan (2009)	This outlines the future plans of the County Council to assist in the delivery of a better quality of life by ensuring the network meets the needs of residents and visitors. The objectives of the Plan have been identified across five themes including: environment, improved accessibility, safety, quality of life and good health, tourism and economy, and communities and partnerships.
Cambridgeshire County Council Rights of Way Improvement Plan Update (2016)	First adopted in 2006, the update provides a summary of progress since the publication of the Plan and sets out future for RoW to 2031. Their actions are grouped into eight categories: making the countryside more accessible; safer and health-enhancing activities; 72,500 new homes; knowing what's out there; filling the gaps; better land management; development of a definitive map and other resources; and a better countryside environment.
Peterborough Rights of Way Improvement Plan 2016-2026	This new RoWIP will outline a series of updated policies and measures that will lead to additional investment in local RoW. There are four key actions included in the RoWIP which are as follows: reducing the unnecessary physical barriers to the network, promotion of the countryside to residents and visitors; develop function and well maintained routes into the countryside; and help people improve their health through maintain circular routes.
Extension of the Northamptonshire Rights of Way Improvement Plan 2007-2011 to 2017	The RoWIP was first published in 2007 and contained 38 outcomes which encompassed nine core actions. This document provides an update of the progress made against these actions which include: a safe and joined up network; making access easier for everyone; improve people's health and enjoyment; improve links between communities; improve signage; increase publicity and implementation; travel choices; and harnessing growth.
England Coast Path: improving public access to the coast	Natural England is working on developing the England Coast Path which is a new National Trail around all of England's coast. Work is expected to be completed in 2020. The England Coast Path is at a variety of stages across the Anglian Water supply area where the majority of the coastal stretches have proposals in development. There are also two stretches which are open.

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Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
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Information class: Standard

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B. Baseline Information

B.1 Introduction

This appendix presents the current baseline information for the environment and socio-economics for the Drought Plan 2019 study area. The previous SEA baseline information has been reviewed and updated where new information was available.

The baseline was collected from published sources including:

- Anglian Water Drought Plan 2014 Update – SEA Environmental Report (Atkins, June 2013)
- Office for National Statistics
- Draft Drought Permit Environmental Assessment - River Trent (Mott MacDonald, Version E, July 2018)
- Multi-Agency Geographic Information for the Countryside (MAGIC) Interactive Mapping
- Environmental Agency Data Catchment Explorer
- Natural England website
- Historic England website

B.2 Biodiversity, Flora, and Fauna

B.2.1 Nature Conservation Designations

Atkins (2013) SEA Baseline

The baseline from the previous SEA has collected information for the numerous Special Areas of Conservation (SAC), Special Protection Areas, Ramsar, Sites of Special Scientific Interest (SSSI) and national and locally designated sites located within Anglian Water's supply area which have the potential to be affected by the Drought Plan 2019. They identified all sites within 5km of the proposed Drought Plan 2019 options together with any sites beyond the 5km boundary that could be affected by changes to surface or groundwater levels either upstream or downstream of the proposed option. Sites which have no water dependent habitats or species were screened out of the baseline. These are shown in Table B.1 to B.7.

Table B.1: Ardleigh Reservoir (River Colne Augmentation): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	Arger Fen Blackwater Estuary Cornard Mere, Little Cornard Roman River Chalkney Wood Upper Colne Marshes Colne Estuary	SPA	Colne Estuary (Mid Essex Coast Phase 2) Blackwater Estuary (Mid-Essex Coast Phase 4)	LNR	Colne Valley Bull Meadows Spring Lane Meadows Hilly Fields Local Nature Reserve Lexden Park Welsh Wood Salary Brook
		Ramsar	Colne Estuary (Mid Essex Coast Phase 2) Blackwater Estuary (Mid-Essex Coast Phase 4)		
		SAC	Essex Estuaries		

Source: Drought Plan 2014 SEA (Atkins, 2013)

Table B.2: Costessey Groundwater Source (River Wensum): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	River Wensum (also SAC) Swannington Upgate Common Buxton Heath	SPA	Broadland	LNR	Bowthrope Marsh
		SAC	River Wensum The Broads Norfolk Valley Fens		

Source: Drought Plan 2014 SEA (Atkins, 2013)

Table B.3: Grafham Water (River Great Ouse: Intake): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	Ouse Washes The Wash Portholme Godmanchester East Side Common Houghton Meadow Berry Fen Grafham Water	SPA/Ramsar	Ouse Washes SPA and Ramsar The Wash SPA and Ramsar	SAC	Portholme Ouse Washes The Wash and North Norfolk Coast

Source: Drought Plan 2014 SEA (Atkins, 2013)

Table B.4: Pitsford Reservoir (River Nene: Intake): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	Aldwincle Marsh Bonemills Hollow Castor Flood Meadows Pitsford Reservoir Short Wood Sutton Heath and Bog Titchmarsh Meadow Twywell Gullet Wadenhoe and Achurch Wansford Pasture Wollaston Meadow Orton Pit Rutland Water Nene Washes The Upper Nene Valley Gravel Pits The Wash and North Norfolk Coast	SPA/Ramsar	The Wash SPA Rutland Water SPA Nene Washes SPA The Upper Nene Valley Gravel Pits SPA and Ramsar	Local Wildlife Sites	Ditchford Lock Gravel Pits Ecton East Gravel Pit Ecton West Gravel Pit Little Houghton Gravel Pits Ringstead Grange Gravel Pits Storton's Gravel Pits Tansor Gravel Pits Thrapston Gravel Pit Thrapston North Pits Wilson's Pits Wollaston Gravel Pit Yarwell Gravel Pit
		SAC	The Wash and North Norfolk Coast Orton Pit Nene Washes		

Source: Drought Plan 2014 SEA (Atkins, 2013)

Table B.5: Alton Water (River Gipping: Intake): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	Orwell Estuary Stour Estuary	SPA/Ramsar	Stour and Orwell Estuaries	Local Wildlife Sites	Alderman Canal East Alderman Canal West

Source: Drought Plan 2014 SEA (Atkins, 2013)

Table B.6: Wellington Wellfield (Intake): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	Boughton Fen Didlington Park lakes Foulden Common Great Cressingham Fen Hooks Well meadows, Great Cressingham Lakenheath Poors Fen Pashford Poors Fen Stallode Wash Ouse Washes Stour and Orwell Estuaries Stanford Training area The Brinks, Northwold Thetford Golf Course and Marsh Wangford Warren and Carr Weeting Heath	SPA/Ramsar	Breckland	Local Wildlife Sites	Maidscross Hill No. 308 (String Drain) No. 694 (Adjacent to River Wissey) No. 684 (River Wissey) No. 686 (Reedlands Plantation)
		SAC	Breckland Norfolk Valley Fens		

Source: Drought Plan 2014 SEA (Atkins, 2013)

Table B.7: Rutland Water (River Nene: Intake): Designated sites

Designation	Site name	Designation	Site name	Designation	Site name
SSSI	The Nene Washes Rutland Water The Wash Adventurer's Land Bassenhally Pit Castor Flood Meadows Sutton Heath and Bog	Spa/Ramsar	Nene Washes SPA and Ramsar Rutland Water SPA and Ramsar The Wash SPA and Ramsar	Local Wildlife Sites	36 sites present in the vicinity of the option
		SAC	Nene Washes The Wash and North Norfolk Coast		

Source: Drought Plan 2014 SEA (Atkins, 2013)

New River Trent Baseline for the Drought Plan 2019 SEA

The River Trent is one of two major contributors to the Humber Estuary which is a SPA, Ramsar site, SAC and SSSI. The Humber Estuary is over 50km downstream of the Hall abstraction point on the River Trent and is a macro-tidal, coastal-plain estuary.

There are no other SPAs, Ramsar sites, or SACs, however there are 13 SSSIs within 5km of the River Trent downstream of the abstraction point. These are shown in Table B.8.

Table B.8: SSSI sites within 5km of the River Trent downstream of the abstraction point

SSSI Name	Area (ha)	Site Unit Condition	Distance from River Trent (km)
Ashton's Meadow	3.57	Unfavourable Recovering	4.4
Conesby (Yorkshire East) Quarry	0.92	Unfavourable No Change	4.61
Crowle Borrow Pits	4.93	Unfavourable Recovering	5.04
Hatfield Chase Ditches	44.20	Unfavourable Declining	4.87
Hewson's Field	0.49	Favourable	2.56
Laughton Common	54.72	Unfavourable No Change	1.88
Lea Marsh	27.56	Unfavourable No Change	0.10
Messingham Heath	17.77	Unfavourable Recovering	3.52
Mother Drain, Misterton	3.63	Unfavourable Recovering	0.17
Rush Furlong	0.48	Favourable	3.48
Scotton and Laughton Forest Ponds	48.32	Unfavourable No Change	3.05
Scotton Common	15.09	Unfavourable Recovering	4.97
Tuetoes Hills	12.50	Unfavourable Recovering	1.1

Source: Natural England: https://designatedsites.naturalengland.org.uk/SiteSearch.aspx

B.2.2 Flora and fauna

B.2.2.1 BAP Habitats and Species

Atkins (2013) SEA Baseline

The previous SEA concluded that the study area supports a diverse range of aquatic species, many of which are afforded protection under the Wildlife & Countryside Act 1981 (as amended) or are listed as being of conservation concern in the UK Biodiversity Action Plan (BAP). Many of these species are potentially vulnerable to changes in water levels and river flows. It is not considered necessary to list all of the BAP species and habitats that have been recorded in the study area, but further data has been collected in relation to the appraisal of specific options during the assessment stage of the SEA.

B.2.2.2 Aquatic ecology

Atkins (2013) SEA Baseline

Data relating to the aquatic ecology of the watercourses that may be affected by the Drought Plan 2019 options have been collected as part of the previous SEA in support of the Environmental Assessment Reports (EARs) undertaken for the Drought Plan 2014.

The Water Framework Directive (WFD) status of biological elements for each of the water bodies potentially affected by the Drought Plan 2019 options is presented in Section B.6.2.

New River Trent Baseline for the Drought Plan 2019 SEA

For the additional River Trent option, Mott MacDonald previously obtained Environment Agency[1] data for the following waterbodies:

- Carlton-on-Trent to Laughton Drain
- Soar to The Beck which is upstream of the abstraction point

The Carlton-on-Trent to Laughton Drain reflects a low energy flow velocity environment, enriched by an influx of nutrients and therefore at risk of becoming eutrophic. Data suggests that pollution levels have been varied and has had a limiting effect on the macroinvertebrate community.

The Soar to Beck is similar to Carlton-on-Tent to Laughton Drain as it reflects a nutrient-enriched river with low energy flow velocities. The temporal and spatial variations in water quality range from grossly polluted to clean, good quality for aquatic invertebrates.

B.2.3 Fisheries

Atkins (2013) SEA Baseline

The Atkins (2013) baseline reviewed the Freshwater Fish Directive/WFD Protected Area status of the rivers that have the potential to be affected by the Drought Plan 2019. This is summarised in Table B.9.

Table B.9: Rivers designated for fish populations (Freshwater Fish Directive)

River	Freshwater Fish Directive (WFD Protected Area) Cyprinid Waters	Freshwater Fish Directive (WFD Protected Area) Salmonid Waters
River Colne	Nunnery Bridge to Halstead Earls Colne to East Mills Colchester	No
River Wensum	Great Ryburgh to Lenwade Attlebridge to River Yare	Rayham to Great Ryburgh Lenwade to Attlebridge
River Great Ouse	No	No
River Nene	Brampton Branch to Great Billing sewage treatment works	No
River Gipping	No	No
Little Ouse	Hockwold Cum Wilton to Ten Mile River Thetford to Hockwold Cum Wilton Broom Hills Botesdale to Thetford	No
River Wissey	Northwold Common to Ten Mile River	Hilborough to Northwold Common
Cut-off Channel	B1386 Feltwell to Denver Barton Mills to B1386 Feltwell	No

Source: Drought Plan 2014 SEA (Atkins, 2013)

River Trent Baseline for the Drought Plan 2019 SEA

Previous fish studies have been carried out at 21 sites along the River Trent from 2013 to 2017. All sites are located upstream of the Hall abstraction point. Table B.10 below details the fish species which have been recorded in the River Trent.

[1] The Environment Agency collects annual data from the water environment that is available through DEFEAs Open Data Strategy at http://data.gov.uk/publisher/department-for-environment-food-and-rural-affairs.

Table B.10: Fish species present in the River Trent

Location	Species
Carton-on-Trent to Laughton Drain	Dace *(Leuciscus leucisus)*; Roach *(Rutilus rutilus)*; Goby (*Pomatoschistus*); European eel *(Anguilla anguilla)*; and Flounder *(Platichthys flesus).*
Soar to the Beck	Barbel (*Barbus barbus)*; Bullhead *(Cottus gobio)*; European eel; Spined loach *(Cobitis taenia)*; Zander; Chub (*Leuciscus cephalus)*; Common bream (*Abramis brama)*; Dace; Gudgeon *(Gobio gobio)*; Minnow (*Phoxinus phoxinus)*; and Roach.

European eel is recognised as a Species of Principal importance in the UK (NERC Act 2006, Section 41) and is a critically endangered as per the IUCN Red List, featured on the OSPAR Commission List of Threatened or Declining Species. European eel is present in the River Trent; however, populations have been decreasing in the river in recent years. Loss of habitat, presence of migration obstacles, entrainment and water pollution have been identified as key pressures for eel populations. There is potential that the changes in water level and flow as a result of the Drought Permit will affect eel migration, passage and entrainment in the Trent.

The River Trent support a naturally recruiting population of Atlantic salmon (Salmon salar), a species of European importance as listed in Annexes II and V of the EU Habitat Directive. There is potential that the changes in water level and flow as a result of the Drought Permit will affect salmon migration, passage and entrainment in the Trent.

River lamprey (Lampetra fluviatilis) and sea lamprey (Petromyzon marinus) are also present and there is evidence of lamprey spawning within the River Trent.

B.3 Climatic Factors

Atkins (2013) SEA Baseline

The baseline for the previous SEA used the UK Climate Projections (UKCP09) to determine the current and future prediction of climate change in the UK. These give greater spatial and temporal detail, and more information on uncertainty, than previous UK climate scenarios. They are due to be replaced with the UKCP18 in November 2018.

B.3.1 Current Trends in the UK

Annual mean precipitation over England has not changed significantly since records began in 1766. Seasonal rainfall is highly variable, however, and appears to have decreased in summer and increased in winter, although with little change in the latter over the last 50 years (Jenkins et al, 2009).

Over the past 45 years all regions of the UK have experienced an increase in the contribution to winter rainfall from heavy precipitation events; in summer all regions except North East England and North Scotland show decreases (Jenkins et al, 2009).

B.3.2 Projected changes

Updated Baseline for the Drought Plan 2019 SEA

The UK Climate Projections (UKCP) were updated for the first time since 2009 in December 2018 (UKCP18). The UKCP18 are largely the same as the previous projections where all areas of the UK are projected to be warmer, particularly during summer months. Rainfall is projected

to vary seasonally and at a regional scale, however the UK is projected to have wetter winters and drier summers.

The projected changes in temperature and precipitation for the Anglian River Basin by the 2050s (2040-2069), under the RCP8.5 scenario are detailed in Table B.11Table B.11**Error! Reference source not found.**. The 1981-2010 baseline period and the central estimate, representing 'as likely as not' probability of change (50th percentile), was used for the following projections.

Table B.11: Anglian River Basin UKCP18

Climatic Condition	Climate Projections
Temperature	Annual mean temperatures are projected to increase by 2.4°C. Summer temperatures are projected to see a 3.0°C increase whereas winter temperatures are project to increase by 2.1°C.
Precipitation	Annual mean precipitation rates are projected to increase by 2.8%. Precipitation is projected to increase by 11.7% in winter and decrease by 24.8% during summer.

Source: UKCP18 using the central probability estimate for a RCP8.5 scenario

B.4 Historic Environment

Updated Baseline for the Drought Plan 2019 SEA

The numbers of listed buildings, scheduled monuments, registered parks and gardens and conservation areas have been collected at local authority level for the SEA study area. As there are too many heritage sites to list on an individual basis the data is presented at a high level in Table B.12.

Table B.12: Conservation areas, listed buildings and scheduled monuments in the East of England

Local Authority	Listed Buildings			Scheduled Monuments	Registered Parks and Gardens	Conservation Areas
	Grade I	Grade II*	Grade II			
Bedford	50	40	1,236	69	8	28
Boston	20	24	457	14	1	11
Braintree	67	184	2,937	40	8	37
Breckland	112	102	1,335	132	9	52
Broadland	50	78	864	22	4	21
Central Bedfordshire	63	100	1,750	81	14	60
City of Peterborough	68	43	825	68	4	29
Colchester	41	104	1,412	45	4	22
Corby	8	10	198	5	1	10
Daventry	42	96	1,392	54	10	25
East Cambridgeshire	48	55	869	50	4	28
East Lindsey	79	115	1,247	151	6	17
East Northamptonshire	56	71	1,297	57	8	33
Fenland	10	41	596	20	1	10

Local Authority	Listed Buildings			Scheduled Monuments	Registered Parks and Gardens	Conservation Areas
	Grade I	Grade II*	Grade II			
Forest Heath	12	24	333	37	0	13
Great Yarmouth	13	46	357	13	1	18
Hartlepool	3	6	145	8	1	8
Huntingdonshire	62	129	2,011	81	5	60
Kettering	23	36	479	11	4	26
King's Lynn and West Norfolk	102	136	1,254	126	5	44
Lincoln	43	39	336	26	3	11
Maldon	15	52	963	21	1	13
Mid Suffolk	87	188	3,145	35	2	31
Milton Keynes	30	59	1,005	48	3	27
Newark and Sherwood	45	57	1,285	71	4	47
North East Lincolnshire	12	13	197	10	1	16
North Kesteven	50	48	900	65	5	38
North Lincolnshire	39	36	837	46	0	17
North Norfolk	94	203	1,971	82	16	82
Northampton	16	27	401	7	0	21
Norwich	62	124	844	23	9	17
Rutland	28	72	1,308	29	2	34
South Cambridgeshire	49	171	2,466	103	12	85
South Holland	25	36	461	29	1	13
South Kesteven	108	197	1,844	91	7	47
South Norfolk	101	152	2,660	37	7	54
South Northamptonshire	41	92	1,722	39	7	57
Suffolk Coastal	61	163	2,028	117	6	34
Tendring	19	45	905	27	3	20
Uttlesford	65	173	3,484	73	7	36
Waveney	50	70	1,137	29	3	16
West Lindsey	60	77	807	101	4	25

Source: Heritage Counts Report – Historic England, 2017

Updated Baseline for the Drought Plan 2019 SEA

In 2017, 213 archaeological sites were classed as currently at risk in the East of England. There are no designated areas of archaeological importance located within Anglian Water's region. Local Authorities have records of regional or local important archaeology which would be too much information to list here. Buried archaeology is particularly vulnerable to changes in water

levels and therefore areas which have known, or potential, buried archaeology will need to be carefully managed and specialist advice sought on the most appropriate action to pursue.

B.5 Population and Human Health

B.5.1 Population

Atkins (2013) SEA Baseline

The Atkins (2013) SEA obtained population statistics for the regions of England which cover the majority of the study area. The statistics from the 2001 and 2011 Census are shown in Table B.13, with the percentage change in population over 10 years. It is important to note that the above figures are calculated based on whole Local Planning Authority (LPA) Districts within the regions and the boundaries of the Anglian Water supply areas are not consistent with District boundaries. They are also based on projections for household formation, migration and development trends that are subject to change.

Anglian Water serves one of the fastest growing parts of the UK, with a predicted 34 percent growth in the number of households by 2031. This is reflected in the population data below, which shows increases in the resident population within the majority of Anglian Water's supply area. The increase for both these regions is 8.1%, which is slightly above the national average of 7.5%.

Table B.13: Population data by region and county

Region	Usual resident population				
	2001 Census	2011 Census	% change	Predicted population in 2019*	Predicted % change from 2011
Eastern region (England)	5,388,154	5,862,418	8.10	6,338,654	7.51
East Midlands region	4,172,179	4,537,448	8.10	4,854,516	6.53
England	49,138,831	53,107,169	7.50	56,822,690	6.53

Source: Drought Plan 2014 SEA (Atkins, 2013)

B.5.2 Health

Atkins (2013) Baseline

The percentage of respondents describing their general health as very good, good, fairly good, not good, and very bad is shown in Table B.14. The eastern region is slightly above that which is reported nationally in general, however the East Midlands region is slightly worse.

Table B.14: Population health by local authority areas

County, district, or unitary authority	General health very good (%)	General health good (%)	General health fairly good (%)	General health not good (%)	General health very bad (%)
Eastern region (England)	47.2	35.2	12.9	3.6	1.0
East Midlands region	45.3	35.1	14.0	4.3	1.2
England	47.2	34.2	13.1	4.2	1.2

Source: Drought Plan 2014 SEA (Atkins, 2013)

B.5.3 Economy

Updated Baseline for the Drought Plan 2019 SEA

B.5.3.1 East of England

The East of England has the third highest employment rate of any English region in the UK, following the South West and South East. The latest employment rate (February – March 2018) is 78.6% compared with a UK average of 75.6%.

In 2016 the gross disposable household income (GDHI) per head in the East of England was £20,275 and is also the third highest in England.

The latest figures from 2016 show that the East of England is responsible for 9% of the UK's Gross Value Added (GVA) with a total GVA of £150.1 million. The 2016 sub-regional data shows that Hertfordshire was the largest contributor to the East of England with a GVA at £36 million. Real estate activities accounted for the largest proportion of GVA in 2016 at 13.5% followed by wholesale and retail trade and repair of motor vehicles with 12.7%. The region was responsible for 13% of the UK's agriculture, forestry, and fishing GVA, making it the highest contributor for that sector in the UK.

B.5.3.2 East Midlands

The latest figures (February – March 2018) show that the East Midlands has an employment rate of 75.8% which is the fourth highest of the English regions.

The GDHI for the East Midlands in 2016 was £17,042 per head and was the fifth highest in the England.

The East Midlands had a GVA of £101.6 million in 2016, accounting for 6% of the UK's total GVA. Leicestershire and Rutland were responsible for the highest amount of GVA in the East Midlands in 2016 with £16.5 million. The highest proportion of the region's GVA in 2016 was a result of wholesale and retail trade and the repair of motor vehicles at 14% followed by real estate activities with 12%. The East Midlands is responsible for 13% of the UK's food, beverage, and tobacco manufacturing sector and 19% of the textiles and wearing apparel manufacturing sector. The region was the largest GVA contributor for those sectors in 2016 out of any of the English regions.

B.5.4 Recreation

Atkins (2013) SEA Baseline

The baseline for the previous Drought Plan 2014 (Atkins, 2013) highlights that the many waterways and lakes in Anglian Water's supply areas provide a wide range of recreational opportunities, from water-based activities such as rowing, sailing, and canoeing to waterside activities such as fishing, walking, and cycling. The region also encompasses a number of national parks, nature reserves, commons and local parklands which provide opportunities for a range of recreational activities; these areas are supplemented by golf courses, leisure centres and playing pitches.

Anglian Water actively promotes recreation at many of its reservoir sites, with formal water parks at Alton, Grafham, Pitsford and Rutland. These sites offer a mixture of informal recreation and formal activities such as fishing and water sports. Fishing and bird watching are also permitted at Ravensthorpe Reservoir and Taverham Mill; in addition, Ardleigh, Covenham,

Hollowell and Hartlepool Reservoirs and Costessey Lakes offer a mix of facilities including sailing, fishing and bird watching.

Updated Baseline for the Drought Plan 2019 SEA

The additional option to be included in the Drought Plan 2019, the River Trent, is used for some recreational activities which include fishing and boating.

B.6 Water

B.6.1 Water availability

Updated Baseline for the Drought Plan 2019 SEA

In England and Wales, the Environment Agency are responsible for the availability of water resources. They need to ensure that there is enough water for public water supply, industry and agriculture whilst also maintaining a healthy environment. One way in which the Environment Agency manage water resources is by regulating water abstraction licences. This is done through the catchment abstraction management strategy (CAMS) process and licensing strategies.

The availability of water varies throughout the SEA study area. The baseline information on the water availability in the study area is provided by the following documents:

- Broadland abstraction licensing strategy
- Cam and Ely Ouse abstraction licensing strategy
- Essex abstraction licensing strategy
- East Suffolk abstraction licensing strategy
- Lower Trent and Erewash abstraction licensing strategy
- Nene abstraction licensing strategy
- North Norfolk abstraction licensing strategy
- Old Bedford abstraction licensing strategy
- Steeping, Great Eau and Long Eau abstraction licensing strategy
- Upper Ouse and Bedford Ouse abstraction licensing strategy
- Welland abstraction licensing strategy
- Witham abstraction licensing strategy

B.6.2 Water Framework Directive

Updated Baseline for the Drought Plan 2019 SEA

The previous SEA baseline did not provide details of all the WFD water bodies within the wider Anglian Water supply area. Detailed information was only collected for specific water bodies (including rivers, lakes, and groundwater) that were identified as being within the zone of hydrological influence for each of Drought Permit options. This data is shown in Table B.15 to Table B.21.

Table B.15: River Colne Augmentation (Ardleigh Reservoir) WFD data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
Colne u/s Gt. Yeldham	River	Not designated artificial or heavily modified	Nitrates Directive	Poor	Good by 2027
Colne Gt. Yeldham – Doe's Corner	River	Heavily modified	Nitrates Directive	Poor	Moderate by 2027
Colne d/s Doe's Corner	River	Heavily modified	Nitrates Directive; Drinking Water Protected Area; Urban Waste Water Treatment Directive; Safeguard Zone	Moderate	Disproportionate burdens. No known technical solution is available
Pebmarsh Brook	River	Heavily modified	Nitrates Directive	Good	Good by 2015
Roman River	River	Heavily modified	Nitrates Directive	Moderate	Unfavourable balance of costs and benefits. Disproportionate burdens. Action to get biological element to good would have significant adverse impact on use

Source: EA Catchment Data Explorer

Table B.16: River Wensum: Costessey Groundwater Source WFD Data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
Wensum US Norwich	River	Heavily modified	Nitrates Directive; Drinking Water Protected Area; Habitats and Species Directive; Safeguard Zone; Urban Waste Water Treatment Directive	Moderate	Disproportionate burdens. No known technical solution is available
Wensum DS Norwich	River	Heavily modified	Nitrates Directive; Safeguard Zone; Drinking Water Protected Area; Urban Waste Water Treatment Directive	Moderate	Good by 2027
Tud	River	Heavily modified	Habitats and Species Directive; Nitrates DIrective	Moderate	Unfavourable balance of costs and benefits
Yare (Wensum to tidal)	River	Heavily modified	Habitats and Species Directive; Conservation of Wild Birds Directive; Nitrates Directive; Urban Waste Water Treatment DIrective	Moderate	No known technical solution is available
Spixworth (and Dobbs) Beck	River	Heavily modified	Habitats and Species Directive; Conservation of Wild Birds Directive; Nitrates Directive	Moderate	Good by 2027
Broadland Rivers Chalk	Groundwater Body	Not applicable	Nitrates Directive; Drinking Water Protected Area	Poor	Good by 2027

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
and Crag Groundwater Body					
Costessey Pits	Lake	Artificial	Drinking Water Protected Area; Safeguard Zone	Moderate	Good by 2027

Source: EA Catchment Data Explorer

Table B.17: River Great Ouse: Intake (Grafham Water) WFD Data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
Ouse (Roxton to Earith)	River	Heavily modified	Nitrates Directive; Urban Waste Water Treatment Directive; Drinking Water Protected Area; Conservation of Wild Birds Directive; Safeguard Zone; Habitats and Species Directive	Moderate	Moderate by 2015
Old West River	River	Heavily modified	Nitrates Directive; Urban Waste Water Treatment Directive	Moderate	Moderate by 2015
Ely Ouse South Level	River	Artificial	Nitrates Directive; Urban Waste Water Treatment Directive	Moderate	Moderate by 2015
Old Bedford River / River Delph (inc The Hundred Foot Washes)	River	Artificial	Nitrates Directive; Conservation of Wild Birds Directive; Habitats and Species Directive	Moderate	Good by 2027
River Great Ouse	Transitional Water	Heavily modified	Nitrates Directive; Urban Waste Water Treatment Directive; Conservation of Wild Birds Directive; Habitats and Species Directive; Shellfish Water Directive	Poor	Moderate by 2021
Wash Inner	Transitional Water	Not designated artificial or heavily modified	Shellfish Water Directive; Habitats and Species Directive; Conservation of Wild Birds Directive; Urban Waste Water Treatment Directive; Nitrates Directive	Moderate	Moderate by 2015
Wash Outer	Coastal Water	Not designated artificial or heavily modified	Shellfish Water Directive; Habitat and Species Directive; Conservation of Wild Birds Directive; Bathing Water Directive	Moderate	Moderate by 2015

Source: EA Catchment Data Explorer

Table B.18: River Nene: Intake (Pitsford Reservoir) WFD Data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
Nene (Brampton Branch)	River	Not designated artificial or heavily modified	Nitrates Directive	Poor	Disproportionate burdens. No known technical solution is available.
Nene (conf Whilton Branch to conf Brampton Branch)	River	Not designated artificial or heavily modified	Nitrates Directive; Safeguard Zone; Drinking Water Protected Area	Poor	Moderate by 2027
Nene (conf Brampton Branch to conf Ise)	River	Heavily modified	Nitrates Directive; Conservation of Wild Birds Directive; Urban Waste Water Treatment Directive	Moderate	Disproportionate burdens. No known technical solution is available. Background condition
Nene (conf Ise to Islip)	River	Heavily modified	Nitrates Directive; Conservation of Wild Birds Directive; Urban Waste Water Treatment Directive	Moderate	disproportionate burdens. No known technical solution available.
Nene (Islip to tidal)	River	Heavily modified	Conservation of Wild Birds Directive; Nitrates Directive; Safeguard Zone; Drinking Water Protected Area; Urban Waste Water Treatment Directive	Moderate	Unfavourable balance of costs and benefits. Disproportionate burdens

Source: EA Catchment Data Explorer

Table B.19: River Gipping: Intake (Alton Water) WFD Data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
River Gipping D/S of Stowmarket	River	Heavily modified	Nitrates Directive; Drinking Water Protected Area; Urban Waste Water Treatment Directive; Safeguard Zone.	Moderate	Disproportionate burdens. No known technical solution is available.
Orwell	Transitional Water	Heavily modified	Conservation of Wild Birds Directive; Nitrates Directive.	Moderate	Unfavourable balance of cost and benefits. Cause of adverse impact unknown
Harwich Approaches	Coastal Water	Heavily modified	Conservation of Wild Birds Directive; Bathing Water Directive.	Moderate	Unfavourable balance of cost and benefits

Source: EA Catchment Data Explorer

Table B.20: Wellington Wellfield: Intake WFD Data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
Wissey - Lower	River	Heavily modified	Nitrate Directive; Drinking Water Protected Area; Urban Waste Water Treatment Directive; Safeguard Zone	Moderate	Disproportionate burdens. No known technical solution is available
Stringside Stream	River	Heavily modified	Nitrates Directive	Poor	Good by 2027
Old Carr Stream	River	Not designated artificial or heavily modified	Nitrates Directive	Moderate	Good by 2021
Gadder	River	Not designated artificial or heavily modified	Habitats and Species Directive; Nitrates Directive	Poor	Good by 2027
Little Ouse River	River	Heavily modified	Nitrates Directive	Moderate	Disproportionate burdens. No known technical solution is available

Source: EA Catchment Data Explorer

Table B.21: River Nene: Intake (Rutland Water) WFD Data

Waterbody	Type	Hydromorph-ological designation	Protected areas (directives)	Overall classification (RBMP 2015)	Overall waterbody objective
Nene (Islip to tidal)	River	Heavily modified	Conservation of Wild Birds Directive; Nitrates Directive; Safeguard Zone; Drinking Water Protected Area; Urban Waste Water Treatment Directive	Moderate	Unfavourable balance of costs and benefits; Disproportionate burdens .
Mortons Leam	River	Artificial	Habitat and Species Directive; Conservation of Wild Birds Directive	Moderate	Good by 2027
Nene	Transitional Water	Heavily modified	Conservation of Wild Birds Directive; Habitat and Species Directive; Shellfish Water Directive	Moderate	Unfavourable balance of costs and benefits; Disproportionate burdens
Rutland Water	Lake	Artificial	Nitrates Directive; Conservation of Wild Birds Directive; Drinking Water Protected Area; Safeguard Zone; Urban Wastewater Treatment Directive.	Moderate	Unfavourable balance of costs and benefits; Disproportionate burdens.

Source: EA Catchment Data Explorer

New River Trent Baseline for the Drought Plan 2019 SEA

There are multiple WFD waterbodies that make up the River Trent, three of which are relevant to the River Trent abstraction point. These are:

- Trent ‘from Soar to the Beck’ which is upstream of the abstraction

- Trent ‘from Carlton-on-Trent to Laughton Drain’ (Humber River Basin Management Plan (RBMP), 2015)
- ‘Humber Upper’ where the River Trent enters to the Humber Estuary

The overall status for the three waterbodies is classed as ‘moderate’. The Environment Agency Catchment Data Explorer has been used to gather baseline data. The details regarding the designations, classification and objectives has been summarised in Table B.22.

Table B.22: Waterbodies with potential to be affected by the Drought Permit

Waterbody	Type	Hydromorph designation	Protected areas (directives)	Overall classification (2015)	Overall waterbody objective
Trent from Soar to Beck	River	Heavily modified	Bathing Water Directive; Nitrates Directive; Urban Waste Water Treatment Directive	Moderate	Moderate by 2021
Trent from Carlton-on-Trent to Laughton Drain	River	Artificial	Drinking Water Protected Area; Nitrates Directive; Urban Waste Water Treatment Directive	Moderate	Moderate by 2021
Upper Humber	Transitional Water	Heavily modified	Conservation of Wild Birds Directive; Habitats and Species Directive; Nitrates Directive; Urban Waste Water Treatment Directive	Moderate	Moderate by 2021

Source: EA Catchment Data Explorer

B.6.3 Flood Risk

Updated Baseline for the Drought Plan 2019 SEA

The Anglian Water area is one of the lowest lying and flattest regions in the country and therefore coastal and river flood risk is a significant concern. The Fens, an artificially drained area, is located within the Anglian Water area, with Holme Fen being the lowest point in the UK at approximately 2.75m below sea level[2].

The majority of the area is designated as Flood Zone 1, however there is a large area located within Flood Zone 3 around the Ely, South Fenland, Bourne and East Lincolnshire Water Resource Zones (WRZ)[3]. There are also pockets of Flood Zone 2 across the Anglian Water area. The flood risk zones which related to fluvial and tidal flood risk are defined by the Environment Agency as:

- Flood Zone 1: Areas with low probability of flooding
- Flood Zone 2: Areas with medium probability of flooding
- Flood Zone 3: (a) Areas with high probability of flooding, (b) functional flood plain (where water regularly flows when overtopping river banks)

Climate change is projected to result in more extreme rainfall events, particularly during winter months, which has the potential to increase the risk of flooding to the area in the future.

[2] Cambridgeshire County Council, Flood Risk Strategy (2015)
[3] UK Government - Flood Map for Planning

B.7 Landscape

Updated Baseline for the Drought Plan 2019 SEA

There are five areas of outstanding natural beauty, including The Chilterns, Dedham Vale, Lincolnshire Wolds, Norfolk Coast, and Suffolk Coast and Heaths. In addition, it is the arable agricultural core of England and this aspect dominates the rural landscape. The Anglian region has a diverse and contrasting landscape, including extensive flat, open spaces of intensive arable farming as well as the vast coastal areas, including Norfolk, Suffolk and Essex.

National Character Areas (NCAs) are distinctive landscapes which make up the countryside character. The following NCAs are relevant for the Drought Plan 2019:

- 48: Trent and Belvoir Vales (NE429) - characterised by undulating, strongly rural and predominantly arable farmland, centered on the River Trent. A low-lying rural landscape with relatively little woodland cover, the NCA offers long, open views.
- 78 Central North Norfolk (NE526) - this is ancient countryside with a long-settled agricultural character, where arable land is enclosed by winding lanes and hedgerows, interspersed with woodland and remnant heath and dissected by lush pastoral river valleys. A patchwork of cultivated land, numerous church spires, distant wooded horizons and big skies dominates the landscape.
- 85 The Brecks (NE385) - also known as Breckland, lies at the heart of East Anglia, occupying much of south-western Norfolk and northwestern Suffolk, together with a small part of north-eastern Cambridgeshire. The area has an ages-old identity, a very particular land use history and a richly distinctive wildlife, which sets it apart from all surrounding landscapes.
- 86 South Suffolk and North Essex Claylands (NE515) - it is an ancient landscape of wooded arable countryside with a distinct sense of enclosure. The overall character is of a gently undulating, chalky boulder clay plateau, the undulations being caused by the numerous small-scale river valleys that dissect the plateau. There is a complex network of old species-rich hedgerows, ancient woods and parklands, meadows with streams and rivers that flow eastwards.
- 88 Bedfordshire and Cambridgeshire Claylands (NE555) - is a broad, gently undulating, lowland plateau dissected by shallow river valleys that gradually widen as they approach The Fens NCA in the east.
- 89 Northamptonshire Vales (NE527) - consists of a series of low-lying clay vales and river valleys, including the valleys of the rivers Nene and Welland and their tributaries. The area is 10 per cent urban, and settlement is often visually dominant.
- 92 Rockingham Forest (NE538) - is essentially a broad, low, undulating ridge underlain by Jurassic limestone which falls away from a prominent, steep northern scarp overlooking the Welland Valley. Large areas of woodland remain a significant feature of the landscape and, while not forming continuous belts, the blocks of woodland often coalesce visually with hedgerow trees and smaller copses to increase the perception of extensive woodland cover across the landscape.
- 111 Northern Thames Basin (NE466) - is an area rich in geodiversity, archaeology and history and diverse landscapes ranging from the wooded Hertfordshire plateaux and river valleys, to the open landscape and predominantly arable area of the Essex heathlands, with areas of urbanisation mixed in throughout.

B.8 Soils

Updated Baseline for the Drought Plan 2019 SEA

In 2009, 70% of the land (2.1 million ha) in the Anglian region was farmed, with 1.6 million ha used for crops and horticulture[4]. The region contains some of the best and most versatile agricultural land in England, and much of the soil is derived from silt and peat deposits providing highly fertile soils. This helps support agriculture, an important activity not only in terms of land use, but also for the economy of the region. Cereals, rapeseed and potatoes make up the majority of the arable crops grown.

In addition, there is an estimated 5,700ha of brownfield and contaminated land in the Anglian region, which is derelict, vacant or is in use with the potential for redevelopment[5].

B.9 Air

Updated Baseline for the Drought Plan 2019 SEA

Air quality in the region is generally good, although there are up to 38 declared Air Quality Management Areas (AQMAs). Motor vehicles, particularly on heavily trafficked roads, are the main source of air emissions. However, agriculture also contributes to the local air quality, as a result of housed livestock and the spreading of slurries and manures. Trends in annual average emissions of nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and particulate matter (PM_{10}) show the East of England is on track to meet the UK Air Quality Strategy Targets.

B.10 Material Assets

Updated Baseline for the Drought Plan 2019 SEA

Anglian Water operate 1,257 water and wastewater treatment works. Anglian Water has 112,833km of water and wastewater pipes supplying and transporting water across an area of 27,500km^2.

[4] Environment Agency, State of the Environment – Agriculture and Land Management, Page 1

[5] National Land use database, 2010. NLUD 2008 Mixed Vintage Dataset

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SEA Environmental Report
Appendix C - Screening and Scoping Consultation Log

March 2020

Anglian Water Services Limited

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
F +44 (0)1223 461007
mottmac.com

Anglian Water Services Limited

Anglian Water Drought Plan 2019

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March 2020

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Document reference: 399155 | 003 | D

Information class: Standard

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C. SEA Screening and Scoping Consultation Responses

Table C.1 presents the responses received from the Consultation Bodies during the SEA Screening and Scoping consultation period. The table also demonstrates how these responses have been taken into account in the SEA.

Table C.1: SEA Screening and Scoping Consultation Log

Report / Ref	Topic	Comment	Reponses/Action
Responses from Historic England			
Scoping Report	Policies, Plans and Programmes	Table 2 does not include reference to all relevant plans. Please see our guidance note referenced above.	Additional plans have been included in the Environmental Report and Appendix A as outlined in Historic England's guidance document.
Scoping Report	Baseline	Reference to grade II and III should be corrected to Grade II* and II. The reference at the end of the table (page 31) should be to 'Historic England' rather than 'English Heritage'	The historic environment baseline section has been updated in the Environmental Report.
Scoping Report	Baseline	On page 42, 'direct' as well as indirect impacts should be included, of designated and non-designated heritage assets, for clarity (the use of the term 'local' heritage assets could be interpreted as non-designated heritage assets).	The historic environment baseline trends and key issues section has been updated in the Environmental Report.
Scoping Report	Baseline and Key Issues	The issue of impacts on archaeology needs to be addressed within the document. In particular, the question of waterlogged archaeology is pertinent to drought plans. Buried archaeology is especially vulnerable, and specialist advice should be sought, as appropriate, in areas of known, or potential, archaeological significance. Buried waterlogged archaeology may be at particular risk in times of drought. Consideration should be given to the most appropriate course of action to protect buried waterlogged archaeology in a drought scenario. Waterlogged deposits, such as peat have the potential to preserve organic remains that are relatively rare in the archaeological record. They are of great importance for the information they provide about everyday objects such as drinking and eating vessels (wooden bowls, leather bottles, horn cups), clothing (fabric, shoes), modes of transport (boats, trackways) and equipment of subsistence (fish traps). To maintain the preservation of organic materials, it is essential that the conditions which contributed to their survival (waterlogged; anoxic) remain the same. While saturated with water, oxygen is excluded which limits the presence/action of most soil fauna (insects, moulds, and micro-organisms) and fungi which feed on organic matter. The lowering of the water table in an area could result in the remains becoming exposed to oxygen, which can enhance the degradation and loss of any remains that are present. We suggest that a strategy is therefore needed that discusses how these sorts of sites will be managed in the proposed Drought Management Plan, which makes reference to the Historic England 'Preserving Archaeological Remains' guidance (2016): https://historicengland.org.uk/images-books/publications/preserving-archaeologicalremains/ Appendix 3 of this document may be of particular relevance.	Effects on buried waterlogged archaeology have been added to the baseline and key issues and were taken into account during the options assessment.
Scoping Report	SEA Framework	The inclusion of the Historic Environment objective is welcomed. Scheduled Ancient Monuments should be referred to as Scheduled Monuments to reflect current NPPF terminology. Non-designated heritage assets should also be included.	Wording changed to Scheduled Monuments and non-designated heritage assets added.
Screening Report	Screening Assessment Table	There is insufficient reference to heritage within Table 4, even within the sections marked as having a positive or negative interaction.	More detail on the effect on heritage has been included in the Environmental Report in the SEA matrix for each option.

Report / Ref	Topic	Comment	Reponses/Action
Responses from Natural England			
Scoping Report	Policies, Plans and Programmes	Natural England has not reviewed all of the plans listed in the Policies, Plans, and Programmes Review. However, we advise that the following types of plans relating to the natural environment should be considered where applicable to your plan: • Green infrastructure strategies • Biodiversity plans • Rights of Way Improvement Plans • Shoreline management plans • Coastal access plans • River basin management plans • AONB and National Park management plans • Relevant landscape plans and strategies	Additional plans included in the Environmental Report as outlined, including: • Green infrastructure strategies for the relevant authorities • Anglian Water's Biodiversity Action Plan (BAP) alongside additional local authority BAPs • The relevant National Character Areas (NCAs) • Shoreline Management Plans (SMP) • Rights of Way Improvement Plans • England Coast Path: improving public access to the coast Anglian Water's River Basin Management Plan covers the area relevant to the Drought Permit options. AONB and National Park management plans are already included.
Scoping Report	River Trent Abstraction	Natural England's main concern of this option if the possible effects on fish populations (Humber Estuary SAC/SSSI features) and the need for HRA Stage II: Appropriate Assessment. The effects on River and Sea Lamprey will need to be considered, as well as potential impacts on habitats within the designated site through changes to freshwater discharges. The HRA and SEA should assess sensitivities and exposure of Lamprey as a result of potential for changes to physio-chemical environmental conditions from a reduction in the hands-off flow. Flow requirements, as well as consideration of effects on temperature, dissolved oxygen, salinity, velocity (there could be changes to exposure as a result of these factors) should be included. In the assessment of these interest features as a result of the River Trent Abstraction, we recommend the following studies are also considered: • ENTEC 2000a: River Eamont acceptable drought order flow regime recommendation: Suitability for British Lamprey (EA, Penrith) • ENTEC 2000b Generically acceptable Flows for British Lamprey (EA, Penrith) Recommendations that Lamprey monitoring is included, which would be beneficial due to a current lack of data and would be strongly supported by Natural England as part of the Drought Plan proposals. Invertebrates and flow monitoring would also be beneficial in indicating environmental effects associated with the plan.	Noted. A separate HRA has been undertaken for the River Trent option and the results used to inform the SEA. This has considered effects on River and Sea Lamprey, as well as potential impacts on habitats within the designated site through changes to freshwater discharges. Lamprey monitoring, and invertebrate and flow monitoring have been included in monitoring proposals in the EARs/HRAs, which reflect the SEA outcomes.
Scoping Report	River Nene	Recognises that abstraction from the River Nene in order to maintain water levels within Rutland Water Special Protection Area (SPA) could be beneficial, however a challenge during drought is that water quality tends to decrease as water quality is reduced. HRA must include an assessment of the likely impact of Phosphate loads in the Reservoir and how impacts will be mitigation. Anglian Water have already mitigated for drought with the new lagoons, however increased pollution in the SPA could result in longer term problems therefore we recommend that likely water quality impacts of this option are fully considered.	Noted. A separate HRA has been undertaken for the River Nene option and the results used to inform the SEA. This has considered effects on Rutland Water including phosphate loads.

Report / Ref	Topic	Comment	Reponses/Action
	River Wensum	The relocation of the abstraction point on the River Wensum will need to be considered/addressed in the HRA, due to potential impacts on SAC interest features.	Noted. A separate HRA has been undertaken for the River Wensum option and the results used to inform the SEA.
Scoping Report	SEA Framework Mitigation	Recognises that the objectives and assessment criteria include a wide range of environmental issues which covers Natural England's strategic environmental interests with regards to designated sites, as well as habitat creation and restoration, opportunities to improve fish migration and opportunities to increase recreational access, which they strongly encourage to be taken forward where possible.	Where possible opportunities have been recommended in the mitigation and enhancement measures.
Responses from Environment Agency			
Scoping Report	Policies, Plans and Programmes	A thorough review of relevant plans and programmes has been undertaken, with the updates captured in a table. The review could have been strengthened by including A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018), and the relevant Shoreline Management Plans and Flood Risk Management Plans.	The following have now been included in the Environmental Report: • A Green Future: Our 25 Year Plan to Improve the Environment • Relevant Shoreline Management Plans • Flood Risk Management Plans
Scoping Report	Baseline	The environmental baseline has been reviewed since the 2013 SEA Environmental Report, with clear updates having been provided. Key SEA topics including air, soils and landscape seem to have been omitted and it is unclear as to whether these have been scoped out of the SEA. Section 4.4. is titled "Historic Environment and Landscape" but landscape baseline such as landscape character and presence of AONBs hasn't been covered. Future baseline is described for each of the SEA topics considered in Table 25.	The baseline information in the Environmental Report and Appendix B now includes details on soil, air and material assets. Details on why they have been scoped out is also included. There is also more detail included on the landscape features within the study area.
Scoping Report	Compliance with other legislation	Although the Habitats, Birds and Water Framework Directives have been considered as part of the PPP review, it is not clear whether a Water Framework Directive assessment and Habitats Regulation Assessment will be completed for the Plan.	A section has been added to the introduction chapter regarding compliance with other legislation including HRA and WFD.
Scoping Report	Methodology	The methodology described is robust, however, it could be strengthened by adding information as to how the duration, frequency and reversibility of effects impact the magnitude of effect assigned.	More detail has been included around duration, frequency and reversibility of effects in Table 8 which defines the magnitude of effects.
Scoping Report	Cumulative Effects	Section 6.3.2 sets out how cumulative effects will be considered but doesn't outline the methodology to be used to undertake this assessment.	The Environmental Report contains a cumulative effects section which assesses the effects within the Drought Plan 2019 as well as with other Plans.
Scoping Report	Study Area	The spatial scope of the SEA is not clearly defined in the SEA.	A section has been added to Chapter 2 of the Environmental Report which contains details on the spatial study area of the SEA including a map.
Scoping Report	Baseline	Some SEA Topics have not been included in the baseline review and therefore it is not clear whether the scope has focused on the significant effects.	As above. The baseline information in the Environmental Report and Appendix B now includes details on soil, air and material assets. Details on why they have been scoped out is also included.
Scoping Report	Other	Check Table 25 for spelling and grammar issues.	Amended.

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SEA Environmental Report
Appendix D - Options Assessment

March 2020

Anglian Water Services Limited

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
F +44 (0)1223 461007
mottmac.com

Anglian Water Services Limited

Anglian Water Drought Plan 2019

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March 2020

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Document reference: 399155 | 003 | D

Information class: Standard

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D Drought Plan 2019 Options Assessment

D.1 Options Assessment Method

D.1.1 Identification and Prediction of Effects

The updated Environmental Assessment Reports (EARs) and Habitats Regulations Assessments (HRAs) (where relevant) for each of the supply side drought options (Drought Permits) contain detailed information that was used to inform the assessments undertaken as part of the SEA process. The results of the assessments of environmental risk identified by the EARs (high, medium, or low) was translated into potential magnitude of effect as used in the SEA methodology and described in Table D.2 below.

SEA topics and receptors that were not covered in the EARs or HRAs, i.e. those not relating to ecology, were assessed using the updated baseline information and the previous effects identified in the Atkins (2013) SEA.

D.1.2 Determining significance of Effects

The assessment was based on a qualitative seven-point scale as presented in Table D.1 to describe the significance of effects.

Moderately and strongly positive and negative effects were considered to be environmentally 'significant', whereas neutral and slightly positive and negative effects were considered non-significant.

Table D.1: Categorisation of Significance of Effects

Assessment Scale	Significance of Effect
+ + +	Major positive
+ +	Moderate positive
+	Slightly positive
	No effect identified
-	Slightly negative
- -	Moderate negative
- - -	Major negative
0	Negligible
	Mixed positive and negative impacts – significance of each individually identified

Source: Drought Plan 2014 SEA (Atkins, 2013)

The level of significance was assigned after considering the scale and magnitude of the identified effect against the importance of the receptor. Table D.2 shows how the scale/magnitude was considered against the importance of the receptor being considered. The list of receptors given in the table is not exhaustive but provides examples of how the magnitude of predicted effects was considered to determine the significance of impacts. The significance of impacts was not clear cut in each case, and professional judgement was used in some cases to determine overall significance.

Table D.2: Defining Magnitude of Effects

Magnitude	Description of Effect
High	Adverse effects would result in the complete loss of the receptor and/or severe damage to its integrity/quality/key characteristics/features/elements. Effects would be one of the following: definite, long term, permanent, direct or irreversible.
	Beneficial effects would result in a large-scale improvement, enhancement or restoration of a receptor, large scale improvements to integrity/quality, or creation of a new internationally/nationally important resource. Effects would be one of the following: definite, long term, permanent, direct or irreversible.
Medium	Adverse effects would result in some loss of or damage to the receptor, but not sufficient to adversely affect its overall integrity. Partial loss of or damage to quality/key characteristics/ features/elements. Effects would be one of the following: definite, medium term, semi-permanent or temporary, direct or indirect or reversible.
	Beneficial effects would result in some improvement, enhancement or restoration of a receptor, improvements to integrity/quality, or creation of a new regionally important resource. Effects would be one of the following: definite, medium term, semi-permanent or temporary, direct or indirect or reversible.
Low	Adverse effects would result in some measurable change to the receptor and/or change in quality or alteration of one or more key characteristics/ features/elements. Effects would be one of the following: short term, temporary, direct or indirect.
	Beneficial effects would result in a small improvement to or addition of one or more key characteristics/ features/elements. Creation of a new locally important receptor/resource. Effects would be one of the following: short term, temporary, direct or indirect.

In order to determine the significance of effects, the identified magnitude of specific effects was combined with the relative sensitivity of the receptor in question (the latter being determined through the review of more detailed baseline information for each option). The means of combining sensitivity and magnitude is illustrated in Table D.3.

Table D.3: Criteria for Determining Significance of Effects

Magnitude of Effect (adverse or beneficial			Sensitivity (Examples of receptors)
Low	Medium	High	
Moderate to Major Significance	Major Significance	Major Significance	**VERY HIGH sensitivity** **National/international importance** SPAs, SACs, Ramsar sites, Sites of Special Scientific Interest (SSSIs), Scheduled Monuments, Grade I Listed Buildings, National Nature Reserves (NNRs).
Moderate to Major Significance	Moderate to Major Significance	Major Significance	**HIGH sensitivity** **Regional importance** Regional Biodiversity Action Plan (BAP) habitats/ species, Regionally Important Geological Sites (RIGS), Water Framework Directive 'Good Ecological Status', National Trails, regionally important infrastructure.
Minor to Moderate Significance	Moderate to Major Significance	Moderate to Major Significance	**MEDIUM sensitivity** **Sub-regional importance** Agricultural Land Classification, Heritage Coasts, Grade II Listed Buildings, historic landscapes, Environment Agency (EA) River Quality Objectives, Groundwater quality, Groundwater Source Protection Zones, angling, and navigable watercourses.
Minor Significance	Minor to Moderate Significance	Minor to Moderate Significance	**LOW sensitivity** **Local importance** Local nature conservation designations, Local BAP habitats and species, Special Landscape Areas, historic parks and gardens, Conservation Areas, local townscape and visual amenity, locally important infrastructure, major development allocations, Public Rights of Way.

Source: Drought Plan 2014 SEA (Atkins, 2013)

D.2 Supply Side Management Actions Options Assessment

D.2.1 Option Type Description

The supply side options proposed within the Drought Plan 2019 are associated with the development of potential options to help improve outputs from existing water sources. Reservoir options seek to conserve or increase the amount of water stored (and therefore available for supply) during a drought period, and direct intakes seek to supplement water supply, and in some cases, to help conserve reservoir storage. Groundwater options seek to supplement water supply.

Some of the supply side drought measures outlined in the Drought Plan 2019 will need to be implemented through Drought Permits. Under drought conditions, where a serious deficiency of supplies threatens to occur, or already exists, Anglian Water may require recourse to Drought Permits in order to increase supplies to manage the supply-demand balance.

For existing water sources, Drought Permits are used to increase the amount of water that can be abstracted to supplement supplies and, where possible, to conserve reservoir storage. Anglian Water may also apply for Drought Permits to reduce winter compensation discharges or increase winter abstractions. If confirmed, Drought Permits may only be authorised for specified six-month (generally winter or summer) periods, subject to renewal only for further limited periods.

The Drought Plan 2019 will include eight supply side options that would require a Drought Permit:

- River Wensum: Costessey Groundwater Source
- River Nene: Intake (Rutland Water)
- River Nene: Intake (Pitsford Reservoir)
- River Great Ouse: Intake (Grafham Water)
- Wellington Wellfield: Intake
- River Colne Augmentation (Ardleigh Reservoir)
- River Gipping: Intake (Alton Water)
- River Trent: Abstraction (Hall Water Treatment Works)

All options, excluding the River Trent option, were included in the previous Drought Plan 2014, and therefore considered in the previous SEA. There have been changes to the abstraction location on the River Wensum and the methodology for gauging flows at the River Great Ouse intake has been reviewed. The previous assessments have therefore been reviewed and updated where appropriate. The River Trent Drought Permit option has been assessed for the first time as part of this SEA.

D.2.2 River Wensum: Costessey Groundwater Source

D.2.2.1 Option Description

Up to 2019, no abstraction was permitted from the River Wensum if flows at Costessey Mill gauge fall below 95Ml/d, with tiered maximum abstractions up to 120Ml/d when the flow exceeds 490Ml/d. The Costessey groundwater source can be used to supplement or replace abstraction from the river. This Drought Permit proposes to increase the maximum annual licensed rate from the Costessey groundwater source from 2,000Ml/yr to 4,800Ml/yr. As per current guidance, the drought permit would cover a six-month period[1], and it is understood that reapplication for a further six months would be permissible.

The Drought Permit for this option has been assessed under a summer and winter permit as the effects may be higher during summer.

The main abstraction point on the River Wensum was relocated from 1 April 2019. Therefore, this option has been updated since the previous Drought Plan 2014 and SEA (Atkins, 2013). The constraints on abstraction from the river at the new location are less onerous than the previous location, with a Hands-off Flow of 27Ml/d.

[1] https://www.gov.uk/guidance/apply-for-a-drought-permit

D.2.2.2 Assessment Matrix: Winter Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified potential for significant effects on the qualifying features (excluding White clawed crayfish) of the River Wensum SAC and SSSI, these include: • *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • Desmoulin's whorl snail, (*Vertigo moulinsiana*) • Brook lamprey, (*Lampetra planneri*) • Bullhead, (*Cottus gobio*) A HRA Stage II: Appropriate Assessment was therefore undertaken. The Stage II HRA indicates that Land Units 38-39 are no longer viable for snail populations, due to low water levels. The Stage 2 HRA identifies that Land Units 40-44 (Hellesdon Meadows) are suitable habitat for Desmoulin's whorl snail, and although there is uncertainty, it could at least become temporarily unsuitable for the species and could result in habitat deterioration to some degree attributed to a decrease in groundwater levels. It also identified water quality impacts on *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation and white-clawed crayfish. It is considered that the potential adverse effects on the integrity of the River Wensum SAC can be managed through the implementation of the monitoring and mitigation prescribed in the EAR. However, a separate study into water quality impacts is being undertaken. Provided that proposed monitoring and mitigation measures are implemented no further stage in the appropriate assessment process is considered necessary. The Environmental Assessment states that although the potential impact on river levels and water quality is predicted to be too minimal and/or temporary to affect macroinvertebrate or macrophyte communities, the reduction in river flow may detrimentally affect the macroinvertebrate or macrophyte community present within the River Wensum. This includes the Ranunculion fluitantis and Callitricho-Batrachion vegetation species, a qualifying feature of the River Wensum SSSI. Although the potential impact on river levels and water quality is predicted to be too minimal and/or temporary to affect macroinvertebrate communities, the reduction in river flow may detrimentally affect the macroinvertebrate community present within the River Wensum. Modelling results indicate a negligible impact on river flows in the River Tud, River Yare and Spixworth Beck, so macroinvertebrate and macrophyte species in these watercourses will not be affected by the drought permit. Water voles may also be affected during a winter permit as per the Environmental Assessment. Water voles are found in the Costessey Pits which may dry out.	Environmental surveys should be undertaken prior to implementing the Drought Permit. Appropriate management strategies should be implemented at SSSI units 38 and 39 to ensure suitable habitat for Desmoulin's whorl snail. Mitigation could also include spray or drip irrigation to increase the humidity of the habitat and maintain water levels. It is considered that through the implementation of the mitigation prescribed and that no further stage in the appropriate assessment process is necessary. Preparation of a Water Level Management Plan, including measures to retain suitable moisture conditions to sustain a population of Desmoulin's whorl snail. Potential for spray or drip irrigation to increase the humidity of the Desmoulin's whorl snail habitat and maintain water levels at SSSI Units 38-39. Consultation with NE suggests spray irrigation may not be the best solution for Land Parcels 40-44. Variable or cessation of abstraction if river flow or water quality drops below pre-agreed or acceptable levels, or ecological monitoring indicates a detrimental effect on the receptor.	VH	M	ST	Temporary	Slightly negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment identified that reduced flow in the Wensum, and levels in groundwater dependent watercourses, has the potential to affect fish population, including the brook lamprey species. The impact of lower river flows on white-clawed crayfish and bullhead may be compounded by low DO levels, but no significant impacts are expected as long as DO saturation is above 60%. Other issues could be caused by increased sedimentation and velocity changes. Pit 1 at Costessey Pits is expected to dry out, whilst the other pits and Taverham Lake may suffer a deterioration in water quality that could adversely affect the fish populations. Modelled changes to flows in the River Tud, River Yare and Spixworth Beck are negligible, and hence river level changes in these watercourses and associated impacts on fish are expected to be negligible.	Variable or cessation of abstraction if river flow or levels drop below pre-agreed levels, if DO levels drop below bullhead requirements or ecological monitoring indicates a detrimental effect on the receptor. Fish removal when monitoring indicates Costessey Pits and/or Taverham Lake are heading towards drying out. Groundwater dependent waterbodies: habitat work to improve general conditions in the waterbodies for lamprey species; a small amount discharge into the waterbodies during drought action to alleviate water levels.	M	H	ST	Temporary	Moderate negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown groundwater levels and river levels within the Rivers Tud and Yare and the Spixworth Beck. This could potentially affect nearby designations and buried archaeology, although this would be in the context of already low river and groundwater levels due to prolonged low rainfall. Further investigation should confirm the nature and magnitude of the impacts, as described above.	It is unlikely that there would be a prolonged additional reduction in groundwater levels and river flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	N/A
	To minimise impacts on businesses and local economy	There are eight licensed abstractors and six unlicensed abstractors which have been identified with a 5km radius of the Costessey groundwater source. There are potential impacts but without further information on the licences it is not possible to assess the extent of these impacts. However, mitigation measures may be required if there is additional drawdown of more than 0.7m. The Protected Rights identified were connected to mains supply and there are no Protected Rights on the current Costessey license. However, mitigation measures will be required if any of these are still in use, as impacts are more significant at these locations.	A key mitigation measure will be effective communication between Anglian Water and licence holders. Anglian Water will work with potentially affected users to understand the likely requirements / use of the licences and how these could be affected by the option. Consideration of pump lowering, borehole deepening or compensation to other abstractors, if required. These should be discussed with all abstractors with permitted rights within the potentially affected area to identify potential derogation issues.	M	M	ST	Temporary	Moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The Environment Assessment identified that there are no anticipated impacts on navigation as the change in depth is not expected to be significant. The modelled reduction in levels may affect Costessey Pits and Taverham Lake, which could negatively affect fishing stocks and recreational uses, particularly in Pit 1, which is expected to dry out. In the other pits and Taverham Lake, a reduction in levels may cause a deterioration in water quality, which could also negatively impact fishing stocks. Reduced river flow in the River Wensum may affect fish populations. Modelled changes to flows in the River Tud, River Yare and Spixworth Beck are negligible, and hence impact of the drought action on recreational activities is expected to be negligible in these watercourses.	Water quality and water level monitoring should take place. Fish removal when monitoring indicates Costessey Pits and/or Taverham Lake are heading towards drying out.	M	L-M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	The impact of drought permit implementation on water levels is perceived to be minimal (maximum 0.02m reduction). Flow in the River Wensum is predicted to reduce by up to 13.8% (upstream of the Heigham intake), and by up to 12.1% within the River Wensum SAC. A reduction of 19% in Q95 flows, compared to natural flows (without any abstraction from surface or groundwater), is predicted. This reduction exceeds the flow target to comply with Good status under the WFD and is not in the range of acceptable deviation from natural flows to comply with the flow targets of the River Wensum SAC.	Variable or cessation of abstraction if river flow drops below pre-agreed levels, or ecological monitoring indicates a detrimental effect on the receptor.	L-M	M	ST	Temporary	Moderate negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environmental Assessment identified that, during a winter drought permit, there is the potential for increased concentrations of pollutants, due to lower river flows and the associated decrease in dilution capacity. However, adverse effects on water quality (including phosphate concentrations) are predicted to be minor and temporary. It is predicted that peak BOD levels and severe low flows are temporally decoupled, so significantly high BOD concentrations may be avoided. Therefore, the predicted impact significance is low-moderate.	Variable or cessation of abstraction if water quality deteriorates below acceptable levels.	L	L-M	ST	Temporary	Slightly negative
	To protect and enhance groundwater quantity and quality	Groundwater levels will fall if the Costessey groundwater source was used in the event of an extreme drought. There is potential for a maximum additional drawdown of 4m to 5m within close vicinity of the groundwater source, however impacts would reduce with distance.	Monitoring of groundwater levels.	L	L	ST	Temporary	Slightly negative

D.2.2.3 Assessment Matrix: Summer Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified potential for significant effects on the qualifying features (excluding White clawed crayfish) of the River Wensum SAC and SSSI, these include: • *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • Desmoulin's whorl snail, (*Vertigo moulinsiana*) • Brook lamprey, (*Lampetra planneri*) • Bullhead, (*Cottus gobio*) A HRA Stage II: Appropriate Assessment was therefore undertaken. The Stage II HRA indicates that Land Units 38-39 are no longer viable for snail populations, due to low water levels. The Stage 2 HRA identifies that Land Units 40-44 (Hellesdon Meadows) are suitable habitat for Desmoulin's whorl snail, and although there is uncertainty, it could at least become temporarily unsuitable for the species and could result in habitat deterioration to some degree attributed to a decrease in groundwater levels. It also identified water quality impacts on *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation and white-clawed crayfish. It is considered that the potential adverse effects on the integrity of the River Wensum SAC can be managed through the implementation of the monitoring and mitigation prescribed in the EAR. However, a separate study into water quality impacts is being undertaken. Provided that proposed monitoring and mitigation measures are implemented no further stage in the appropriate assessment process is considered necessary. The Environmental Assessment states that Although the potential impact on river levels and water quality is predicted to be too minimal and/or temporary to affect macroinvertebrate or macrophyte communities, the reduction in river flow may detrimentally affect the macroinvertebrate and macrophyte community present within the River Wensum. This includes the Ranunculion fluitantis and Callitricho-Batrachion vegetation species, a qualifying feature of the River Wensum SSSI. These are predominantly found in summer months. Modelling results indicate a negligible impact on river flows in the River Tud, River Yare and Spixworth Beck, so macroinvertebrate species in these watercourses will not be affected by the drought permit. Water voles are found in the Costessey Pits, which may dry out under the drought permit.	Environmental surveys should be undertaken prior to implementing the Drought Permit. Appropriate management strategies should be implemented at SSSI units 38 and 39 to ensure suitable habitat for Desmoulin's whorl snail. Mitigation could also include spray or drip irrigation to increase the humidity of the habitat and maintain water levels. It is considered that through the implementation of the mitigation prescribed and that no further stage in the appropriate assessment process is necessary. Preparation of a Water Level Management Plan, including measures to retain suitable moisture conditions to sustain a population of Desmoulin's whorl snail. Potential for spray or drip irrigation to increase the humidity of the Desmoulin's whorl snail habitat and maintain water levels at SSSI Units 38-39. Consultation with NE suggests spray irrigation may not be the best solution for Land Parcels 40-44. Variable or cessation of abstraction if river flow or water quality drops below pre-agreed or acceptable levels, or ecological monitoring indicates a detrimental effect on the receptor.	VH	M	ST	Temporary	Moderate negative
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment identified that reduced flow in the Wensum, and levels in groundwater dependent watercourses, has the potential to affect fish population, including the brook lamprey species. The impact of lower river flows on white-clawed crayfish and bullhead may be compounded by low DO levels, but no significant impacts are expected as long as DO saturation is above 60%. Other issues could be caused by increased sedimentation and velocity changes. Pit 1 at Costessey Pits is expected to dry out, whilst the other pits and Taverham Lake may suffer a deterioration in water quality that could adversely affect the fish populations. Modelled changes to flows in the River Tud, River Yare and Spixworth Beck are negligible, and hence river level changes in these watercourses and associated impacts on fish are expected to be negligible.	Variable or cessation of abstraction if river flow or levels drop below pre-agreed levels, if DO levels drop below bullhead requirements or ecological monitoring indicates a detrimental effect on the receptor. Fish removal when monitoring indicates Costessey Pits and/or Taverham Lake are heading towards drying out. Groundwater dependent waterbodies: habitat work to improve general conditions in the waterbodies for lamprey species; a small amount discharge into the waterbodies during drought action to alleviate water levels.	M	M	ST	Temporary	Slightly negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown groundwater levels and river levels within the Rivers Tud and Yare and the Spixworth Beck. This could potentially affect nearby designations and buried archaeology, although this would be in the context of already low river and groundwater levels due to prolonged low rainfall. Further investigation should confirm the nature and magnitude of the impacts, as described above.	It is unlikely that there would be a prolonged additional reduction in groundwater levels and river flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	N/A
	To minimise impacts on businesses and local economy	There are eight licensed abstractors and six unlicensed abstractors which have been identified with a 5km radius of the Costessey groundwater source. There are potential impacts but without further information on the licences it is not possible to assess the extent of these impacts. However, mitigation measures may be required if there is additional drawdown of more than 0.7m. The Protected Rights identified were connected to mains supply and there are no Protected Rights on the current Costessey license. However, mitigation measures will be required if any of these are still in use, as impacts are more significant at these locations.	A key mitigation measure will be effective communication between Anglian Water and licence holders. Anglian Water will work with potentially affected users to understand the likely requirements / use of the licences and how these could be affected by the option. Consideration of pump lowering, borehole deepening or compensation to other abstractors, if required. These should be discussed with all abstractors with permitted rights within the potentially affected area to identify potential derogation issues.	M	M	ST	Temporary	Moderate negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	There are no anticipated impacts on navigation as the change in depth is not expected to be significant. The confluence with the River Tud before the Heigham intake minimise potential downstream impacts. Modelled changes to flows in the River Tud, River Yare and Spixworth Beck are negligible, and hence river level changes in these watercourses are expected to be negligible. Negative impacts on fisheries and recreation uses in the Costessey Pits, particularly Pit 1, may occur due to a reduction in water levels. There may also be impacts on water quality and therefore fisheries in Taverham Lake as a result of a reduction in water levels.	Water quality and water level monitoring should take place. Fish removal when monitoring indicates Costessey Pits and/or Taverham Lake are heading towards drying out.	L-M	M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	The impact of drought permit implementation on water levels is perceived to be minimal (maximum 0.02m reduction). Flow in the River Wensum is predicted to reduce by up to 13.8% (upstream of the Heigham intake), and by up to 12.1% within the River Wensum SAC. A reduction of 19% in Q95 flows, compared to natural flows (without any abstraction from surface or groundwater), is predicted. This reduction exceeds the flow target to comply with Good status under the WFD and is not in the range of acceptable deviation from natural flows to comply with the flow targets of the River Wensum SAC.	Variable or cessation of abstraction if river flow drops below pre-agreed levels, or ecological monitoring indicates a detrimental effect on the receptor.	L-M	M	ST	Temporary	Moderate negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	There is the potential for increased concentrations of pollutants, due to lower river flows and the associated decrease in dilution capacity. The impacts are expected to be greater in summer, due to lower residual flows than in winter.	Variable or cessation of abstraction if water quality deteriorates below acceptable levels.	L-M	M	ST	Temporary	Moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To protect and enhance groundwater quantity and quality	Groundwater levels will fall if the Costessey groundwater source was used in the event of an extreme drought. There is potential for a maximum additional drawdown of 4m to 5m within close vicinity of the groundwater source, however impacts would reduce with distance.	Monitoring of groundwater levels.	L	L	ST	Temporary	Slightly negative

D.2.3 River Nene: Intake (Rutland Water)

D.2.3.1 Option Description

The drought permit may take the form of a winter or summer authorisation to allow increased refilling of Rutland Water through a 50% reduction in the MRF. It has been assumed that maximum abstractions (763Ml/d; 180,000Ml/yr) would remain unchanged from those currently licensed, therefore the assessment is based on a reduction in MRF from 125Ml/d for December to April and 150Ml/d for May to November to 62.5Ml/d for December to April and 75Ml/d for May to November. For clarity, these periods are defined as winter and summer in this assessment.

Anglian Water would consider applying the drought plan actions in a severe, possibly multi-season drought, if there is a risk of compromising Anglian Water's ability to refill Rutland Water. Under the most likely scenario, a winter drought permit would be sought after a dry winter and summer. The potential impacts of a reduction in MRF have been considered using possible scenarios for both winter and summer low flow conditions however as it is recognised that under the most severe scenario a summer-winter-summer permit will be applied for, should drought conditions continue to present a significant risk to supply. It is recognised that the environmental sensitivity of the river will be higher during summer low flow conditions than during winter low flow conditions. Low flow conditions in winter typically correspond to a natural increase in flows (and hence water available for abstraction) and a reduced sensitivity for the majority of potential receptors.

D.2.3.2 Assessment Matrix: Winter Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified potential for likely significant effects on the Nene Washes SAC, SPA and Ramsar site as a result of nutrient enrichment. However, impacts are anticipated to be more significant during summer permit. A HRA Stage II: Appropriate Assessment was therefore undertaken to investigate the impacts of nutrient enrichment. It concluded that eutrophication of the Nene Washes could affect the spined loach population via reduced food availability, habitat loss and low dissolved oxygen concentrations at the sediment-water interface. Bird assemblages may also be impacted by the effects of eutrophication on food availability. No in-combination effects were identified. However, with implementation of mitigation and monitoring it is likely that the adverse effects on the River Nene and, by extension, the Nene Washes can be avoided. Any changes in winter flow would be unlikely to affect the macroinvertebrate community, as they are characteristic of slow flows. Impact on rare macrophyte species in the reach is considered low, as they are not constrained by flow changes and the impact of the permit on water quality is not expected to be substantial. As temperature and sunlight are the limiting factors in algal growth in winter, diatom communities would not be affected by the winter drought permit. There is unlikely to be any in-combination effects upon the European designated sites.	Adverse effects of Drought Permit implementation on the water quality of the Nene Washes can be mitigated against by introducing measures. Abstraction to be stopped or reduced if sampling data levels do not meet water quality requirements. Flows downstream of Wansford intake to be monitored against the MRF, and abstraction suspended if the flow drops below the temporary reduced MRF. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Reduction of phosphorous input to the river from WRCs and small point sources in the catchment. Consideration should also be given to the management of water levels in the Nene Washes. For example, inflow of water from the River Nene to Morton's Leam via Stanground Sluice should cease when nutrient levels are high in the river. A formal monitoring programme is also required to assess if any potential effects on critical thresholds for water quality parameters, especially phosphate. This should be developed following consultation with the EA.	VH	L	ST	Temporary	Slightly negative
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment states that a review of the 2011/12 drought indicates it is unlikely that there would be a detrimental impact on fish health in the River Nene in a future drought, as a result of a reduction in river flow or levels, associated with the drought permit. Structural controls on the main river would mean it is very unlikely that any of the back channels or backwaters would dry out under a proposed drought permit, with levels maintained in line with the main river. A decrease in flow associated with the drought permit could detriment winter migratory fish, such as silver eels and dace.	Abstraction to be stopped or reduced if sampling data levels do not meet water quality requirements, or flows drop below the temporary MRF. Determine required levels to maintain migration at fish passages and reduce abstraction to ensure this level is maintained. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Flows to isolated backchannels to be supplemented if necessary, with the possibility of "pump over" water into stranded backchannels at lower flows. Fish rescues if required, or aeration/bubblers in the channel (as last resort only) to protect fish.	L-M	L	ST	Temporary	Slightly negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes, as described above. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified.
	To minimise impacts on businesses and local economy	The Environmental Assessment states that most of the other abstraction licences are for spray irrigations, which have cessation restrictions based on an MRF at Orton flow gauge and are operational between December and April. The vast majority of the abstractions would already have ceased before the drought permit is in place, so the impacts of the permit on these abstractors is moderate. The impact is anticipated to be less significant during winter months. The downstream reaches of the River Nene are controlled by gates and sluices to regulate flows within the Middle Level; however, this is flow regulation is more significant in summer months.	A key mitigation measure will be effective communication between Anglian Water and licence holders. Variable MRF to ensure affected licence holders are not significantly impacted. Variable abstraction to allow occasional pulses of water throughout the system to flush out pollutants and prevent stagnation. Anglian Water will work with potentially affected users to understand the likely requirements / use of the licences and how these could be affected by the option. The previous Environmental Assessment (Atkins, 2015) report concluded there should be flexibility in a both summer and winter drought permits so that peaks and troughs in demand could be managed and utilised to the best effect for all parties involved.	M-H	M	ST	Temporary	Slightly negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The number of boat users in winter is lower than in summer, so the risk of the drought permit affecting navigation is low-moderate. Water levels should remain operational. Th Environmental Assessment states that a review of the 2011/12 winter drought permit concluded that there were some navigational issues associated with sediment deposition in the Nene estuary; the drought permit may have contributed to these issues, but it was not possible to separate the influence of the drought permit from the underlying dry hydrological conditions that led to the need for the permit. Winter participation in recreational activities along the River Nene is low. However, the build-up of silt and lower flows were an issue for anglers during the 2011/12 drought permit, although these may have been a result of the dry hydrological conditions.	Mitigation measures could include abstracting water gradually over a 24-hour period. Desilting around key structures such as navigation locks could be considered when flows are approaching the permit trigger, in order to maintain a navigable channel. Cease abstraction immediately if water levels drop more than expected amount, or if lock operation is compromised or restricted. Management of water levels on the Nene Navigation via control of locks, weirs, sluices etc. Adjustments made according to MRF and trigger levels. Additional Phosphorus removal in the spring /summer if a summer permit is required to reduce risk of algal blooms (would also help to address visual impacts).	L-M	L-M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental assessment states that a review of the 2011/12 winter drought permit by Atkins (2012) determined that river levels could be maintained through the correct management of control structures along the River Nene corridor and by adjusting the MRF when required. The WFD assessment undertaken as part of the Environmental Assessment concluded that the proposed Drought Permit will not have a permanent effect on the overall status of the River Nene at the intake. The WFD status is unlikely to achieve Good whilst the proposed Drought Permit is in operation at either MRF. However, the WFD status is also unlikely to achieve Good under the current MRF.	Use of a variable MRF with close monitoring of conditions downstream of the intake. Condition would be adjusted according to the environmental requirements of the river downstream.	M	L	ST	Temporary	Slightly negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environmental Assessment states that a review of the 2011/12 winter drought permit found that DO, ammonia and iron concentrations increased slightly in the Nene, but this did not lead to a WFD deterioration. The greater duration of the proposed permit means its impact on water quality could be more significant than that implemented in 2011/12. Phosphate, DO, ammonia and iron concentrations may increase, and siltation may occur with reduced flows. It is anticipated that impacts on water quality will be less significant in winter than summer. Maintaining water levels in Rutland Water during drought periods will have an incidental benefit of reducing the risk of reduced water quality and algal blooms in the reservoir. However, during a drought this could be a challenge as water quality reduces as water quantity decreases.	Phosphate stripping at specific sections of the river. Cessation rules should be put in place to halt abstraction if water quality deteriorates below acceptable levels. Variable abstraction during one or two 'spate' flow events to allow occasional pulses or water, resulting in the flushing of pollutants and sediment. Maintenance of sewage network to reduce the risk of spillage/overfall into the river. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation.	L-M	L	ST	Temporary	Mixed impact: Slightly positive and slightly negative
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified.

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.3.3 Assessment Matrix: Summer Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified potential for likely significant effects on the Nene Washes SAC, SPA and Ramsar site. This is due to water quality deterioration, specifically an increase in phosphate concentration, arising from implementation of the drought permit under summer conditions which may have a significant effect on some interest features of the Nene Washes European sites. A HRA Stage II: Appropriate Assessment was therefore undertaken to investigate the impacts of nutrient enrichment. It concluded that eutrophication of the Nene Washes could affect the spined loach population via reduced food availability, habitat loss and low dissolved oxygen concentrations at the sediment-water interface. Bird assemblages may also be impacted by the effects of eutrophication on food availability. No in-combination effects were identified. However, with implementation of mitigation and monitoring it is likely that the adverse effects on the River Nene and, by extension, the Nene Washes can be avoided. As per the Environmental Assessment, there may also be impacts on macroinvertebrate and diatom communities due to reduced water quality. Increased phosphate levels and reduced flows significantly increase the risk of algal blooms in summer months when temperature and sunlight are not limiting factors. DO sags, stagnation and algal blooms may impact species of interest that have a high oxygen demands. Impact on rare macrophyte species in the reach is considered low, as they are not constrained by flow changes and the impact of the permit on water quality is not expected to be substantial. There is unlikely to be any in-combination effects upon the European designated sites.	Adverse effects of Drought Permit implementation on the water quality of the Nene Washes can be mitigated against by introducing measures. Abstraction to be stopped or reduced if sampling data levels do not meet water quality requirements. Flows downstream of Wansford intake to be monitored against the MRF, and abstraction suspended if the flow drops below the temporary reduced MRF. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Reduction of phosphorous input to the river from WRCs and small point sources in the catchment. Consideration should also be given to the management of water levels in the Nene Washes. For example, inflow of water from the River Nene to Morton's Leam via Stanground Sluice should cease when nutrient levels are high in the river. A formal monitoring programme is also required to assess if any potential effects on critical thresholds for water quality parameters, especially phosphate. This should be developed following consultation with the EA.	VH	L-M	ST	Temporary	Moderate negative
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment states that a review of the 2011/12 winter drought permit indicates it is unlikely that there would be a detrimental impact on fish health in the River Nene in a future drought, as a result of a reduction in river flow or levels, associated with the drought permit. Increases in temperature in summer may exacerbate water quality issues and thus stress on fish populations. Structural controls on the main river would mean it is very unlikely that any of the back channels or backwaters would dry out under a proposed drought permit, with levels maintained in line with the main river. Changes to flow are likely to be proportional to changes in the main channel, which may have an effect on flow velocities. The impact on fish spawning may be greater in summer, only due to the importance of these channels for spawning grounds and juvenile recruitment during these months. There are several structures without fish passes along the Nene that create a barrier to fish under normal summer conditions. Reductions in 'trigger' flows that initiate eel and trout migration from the estuary may cause mortalities. Deterioration in flow velocities and hence water quality may also impede salmonid migration.	Abstraction to be stopped or reduced if sampling data levels do not meet water quality requirements, or flows drop below the temporary MRF. Determine required levels to maintain migration at fish passages and reduce abstraction to ensure this level is maintained. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Flows to isolated backchannels to be supplemented if necessary, with the possibility of "pump over" water into stranded backchannels at lower flows. Fish rescues if required, or aeration/bubblers in the channel (as last resort only) to protect fish.	L-M	L-M	ST	Temporary	Moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes, as described above. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified.
	To minimise impacts on businesses and local economy	The Environmental Assessment states that there are potential impacts on other abstractors with licences (mainly for spray irrigation). The impacts associated with a drought permit are likely to be more significant than a winter permit. The vast majority of the abstractions would already have ceased before the drought permit is in place, so the impacts of the permit on these abstractors is moderate. The impact is anticipated to be more significant during summer months. The downstream reaches of the River Nene are controlled by gates and sluices to regulate flows within the Middle Level, which is important for flow regulation in summer months.	A key mitigation measure will be effective communication between Anglian Water and licence holders. Variable MRF to ensure affected licence holders are not significantly impacted. Variable abstraction to allow occasional pulses of water throughout the system to flush out pollutants and prevent stagnation. Anglian Water will work with potentially affected users to understand the likely requirements / use of the licences and how these could be affected by the option. The previous Environmental Assessment (Atkins, 2015) report concluded there should be flexibility in a both summer and winter drought permits so that peaks and troughs in demand could be managed and utilised to the best effect for all parties involved.	M-H	M	ST	Temporary	Moderate negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The Environmental Assessment states that navigation of the River Nene is not likely to be impacted by changes in water levels as a result of the Drought Permit. Water levels should be maintained in both winter and summer, meaning navigation should remain functional, although the risk of a decrease in levels is higher in summer due to increased lock usage. The risk of algal blooms could cause weed choking in summer. This could also affect the aesthetic value of the river and thus recreational activities including angling, walking and cycling. The review of the 2011/12 drought permit concluded that there were some navigational issues associated with sediment deposition in the Nene estuary; the drought permit may have contributed to these issues, but it was not possible to separate the influence of the drought permit from the underlying dry hydrological conditions that led to the need for the permit.	Mitigation measures could include abstracting water gradually over a 24-hour period. Desilting around key structures such as navigation locks could be considered when flows are approaching the permit trigger, in order to maintain a navigable channel. Cease abstraction immediately if water levels drop more than expected amount, or if lock operation is compromised or restricted. Management of water levels on the Nene Navigation via control of locks, weirs, sluices etc. Adjustments made according to MRF and trigger levels. Additional Phosphorus removal in the spring /summer if a summer permit is required to reduce risk of algal blooms (would also help to address visual impacts).	L-M	M	ST	Temporary	Moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Water	To protect and where possible enhance river flows and groundwater resources	Impacts on flows in the River Nene due to the reduced MRF and consequent increase in abstraction. It should be possible to retain water levels in the summer by similar means, so long as the water used in lock operation and leakage downstream does not exceed the volume of water entering the reach above the locks It is not expected that the proposed drought permit would permanently affect the overall status of the River Nene at Wansford, although the WFD status is unlikely to achieve Good during the drought scenario modelled, regardless of the implementation of the drought permit. It is possible that the WFD status could deteriorate for the duration of the drought but would begin recovery as soon as non-drought conditions resumed.	Use of a variable MRF with close monitoring of conditions downstream of the intake. Condition would be adjusted according to the environmental requirements of the river downstream.	M	M	ST	Temporary	Moderate negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environmental Assessment states that a review of the 2011/12 drought permit found that DO, ammonia and iron concentrations increased slightly in the Nene, but this did not lead to a WFD deterioration. The greater duration of the proposed permit means its impact on water quality could be more significant than that implemented in 2011/12. Phosphate, DO, ammonia and iron concentrations may increase, and siltation may occur with reduced flows. Impacts on water quality during summer months are thought to be higher than in winter, due to lower flows, increased biological activity and higher temperatures. Changes to water quality in the Nene could affect the Nene Washes SPA when Stanground Sluice is open in summer months. No water quality impacts are expected at any designated sites downstream of the Nene Washes, due to the relatively small influence of freshwater. Maintaining water levels in Rutland Water during drought periods will have an incidental benefit of reducing the risk of reduced water quality and algal blooms in the reservoir. However, during a drought this could be a challenge as water quality reduces as water quantity decreases.	Phosphate stripping at specific sections of the river. Cessation rules should be put in place to halt abstraction if water quality deteriorates below acceptable levels. Variable abstraction during one or two ‘spate’ flow events to allow occasional pulses or water, resulting in the flushing of pollutants and sediment. Maintenance of sewage network to reduce the risk of spillage/overfall into the river. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation.	L-M	M	ST	Temporary	Mixed impact: Slightly positive and moderate negative
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified.

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.4 River Nene: Intake (Pitsford Reservoir)

D.2.4.1 Option Description

The proposed drought permit will take the form of a winter authorisation to allow increased filling of Pitsford Reservoir through a reduction of up to 50% in the MRF. There is also potential that a summer permit with the same conditions may be required and, although a summer permit may not be supported by the EA, the environmental impact of this option has also been assessed. Duston Mill has a daily maximum licensed rate of 181.8Ml/d, with an annual maximum of 38,500Ml (which is equivalent to a daily average of 105Ml/d). It has been assumed that instantaneous, hourly, daily and annual totals would remain unchanged from those currently licensed, therefore the assessment is based on a reduction in MRF from the current 34.1Ml/d to 17.05Ml/d within the period from October to March (inclusive) for a winter permit and April to September (inclusive) for a summer permit.

Anglian Water would only consider applying for the drought permit in a severe, possibly multi-season, drought, if there is a risk of compromising Anglian Water's ability to refill Pitsford Reservoir. Under the most likely scenario, a winter drought permit would be sought after a dry winter and summer, enabling Anglian Water to refill the reservoir during the following winter. This typically corresponds to a natural increase in flows (and hence water available for abstraction) and a reduced sensitivity for the majority of potential environmental receptors. However, should drought conditions continue to present a significant risk to supply, a summer drought permit may also be considered as an option.

D.2.4.2 Assessment Matrix: Winter Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment for this option has concluded that there would be no likely significant effects of any of the European designated sites in hydrological continuity with the intake. Risk of sedimentation and reduced flows already stressors for the macroinvertebrate community. Reduction in water quality may impact communities but impacts on water quality are less significant in winter. Reduction in water quality may affect macrophyte communities, but this is less of an issue in winter, when temperature and sunlight hours are limiting factors. There is less risk of algal blooms in winter therefore impacts on diatoms are low.	Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Cessation rules if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts.	L-M	L	ST	Temporary	Slightly negative
	To maintain and where possible improve freshwater fisheries	There is potential for deterioration in water quality may impact fish communities. Effects are less pronounced in winter. The Environmental Assessment states that flow and levels in backchannels should not be affected by the winter drought permit, due to the structural controls on the main river that control flow into these channels. If flow does decrease in the backchannels, this could affect sediment deposition and hence gravel spawners. The risks are lower in winter as most fish species in the Nene spawn from March to April. Eel migration may be affected during winter drought. It is likely that, even at low flows, fish species would be able to swim over the fish passes at in-channel structures between Duston Mill and Peterborough.	Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Cessation rules if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts. Supplementing flows to isolated backchannels, with the possibility to “pump over” water into stranded backchannels at lower flows. Ensure structural controls maintain flow into backchannels.	L	L-M	ST	Temporary	Slightly negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified.
	To minimise impacts on businesses and local economy	No perceived significant impacts on other abstractors during winter.	None required.	N/A	N/A	N/A	N/A	No effects identified.

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Water levels controlled by locks, tilting gates and weirs. Navigation peaks in summer months, lock operations and demand for water will be higher. Algal blooms and weed choking may impact navigation. Boat user numbers are lower in winter, reducing the impact of the permit on navigation. The lack of significant level or water quality impacts means that visual features of the river are unlikely to be affected during the winter period.	Consider dredging, de-silting or weed clearing at know problem locations on the main navigation channel.	L	L	ST	Temporary	Negligible
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Assessment states that impacts on flows in the River Nene due to the reduced MRF and consequent increase in abstraction. Flows are higher in winter therefore it is anticipated impacts of a winter permit on river flows and levels will be lower. It is not expected that the proposed drought permit would permanently affect the overall status of the River Nene at Duston Mill, although the WFD status is unlikely to achieve Good during the drought scenario modelled, regardless of the implementation of the drought permit.	Cessation rules should be put in place to halt abstraction if water quality falls below acceptable levels, or if water levels are affected by greater than expected amounts. Checks of water quality might also lead to a reduced abstraction, i.e. the MRF being reduced but not by the full 50%.	L	L	ST	Temporary	Slightly negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environmental Assessment states that a review of the 2011/12 drought permit identified increases in orthophosphate, ammonia and DO in the Nene under permit conditions. This is expected to remain the case under the proposed drought permit. Impacts are less significant in winter, as river flow, and hence the capacity for dilution, are expected to be higher. Maintaining water levels in Pitsford Reservoir during drought periods will have an incidental benefit of reducing the risk of reduced water quality and algal blooms in the reservoir.	Undertaken phosphate removal if require, however likely to be low during winter. Cessation rules should be put in place to halt abstraction if water quality falls below acceptable levels, or if water levels are affected by greater than expected amounts. Checks of water quality might also lead to a reduced abstraction, i.e. the MRF being reduced but not by the full 50%.	M	M	ST	Temporary	Mixed impact: Slightly negative and slightly positive
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.4.3 Assessment Matrix: Summer Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment for this option has concluded that there would be no likely significant effects of any of the European designated sites in hydrological continuity with the intake. Reduction in water quality may impact macroinvertebrate and macrophyte communities. Risk of sedimentation and reduced flows already stressors for community. Impacts on water quality more significant in summer as an increase in temperature and sunlight increases the risk of algal blooms and consequential DO sags.	Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Cessation rules if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts. Agreed with EA that it is unlikely mitigation measures for diatoms (e.g. algal blooms) would be required.	M	M	ST	Temporary	Moderate negative
	To maintain and where possible improve freshwater fisheries	Deterioration in water quality and increased algal activity may impact fish communities. Effects are more pronounced in summer as per the Environmental Assessment. Flow and levels in backchannels should not be affected by the drought permit, due to the structural controls on the main river that control flow into these channels. If flow does decrease in the backchannels, this could affect sediment deposition and hence gravel spawners. The risks are greater in summer as most fish species in the Nene spawn from March to April. Reductions in 'trigger' flows that initiate eel and trout migration from the estuary may cause mortalities. Restricted migration in summer due to higher temperatures and lower DO levels resulting in increased risk of algal blooms, stagnation or choking of river sections. It is likely that, even at low flows, fish species would be able to swim over the fish passes at in-channel structures between Duston Mill and Peterborough.	Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Cessation rules if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts. Supplementing flows to isolated backchannels, with the possibility to "pump over" water into stranded backchannels at lower flows. Ensure structural controls maintain flow into backchannels.	M	M	ST	Temporary	Moderate negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified.

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To minimise impacts on businesses and local economy	Spray irrigators could be affected by reduced water levels in summer months.	Key mitigation measure will be effective communication between Anglian Water and licence holders. Note that abstraction would automatically be stopped or reduced if flows would otherwise drop below the temporary MRF. Variable MRF to ensure affected licence holders are not significantly impacted.	L	M	ST	Temporary	Slightly negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Water levels controlled by locks, tilting gates and weirs. Navigation peaks in summer months, lock operations and demand for water will be higher. Algal blooms and weed choking may impact navigation. Recreational activities such as walking, cycling and fishing is also likely to increase during summer months. The increase in algal blooms may affect the aesthetic value and make the recreational activities less enjoyable. The predicted negative impact on fish health and migration has the potential to affect anglers.	Reduce abstraction during busy navigation periods. Also consider dredging, de-silting or weed clearing at know problem locations on the main navigation channel Agreed with EA that it is unlikely mitigation measures for diatoms (e.g. algal blooms) would be required.	L-M	M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Assessment identified impacts on flows in the River Nene due to the reduced MRF and consequent increase in abstraction. Flows are lower in summer therefore the impacts of flows during a summer drought permit is anticipated to be worse. It is not expected that the proposed drought permit would permanently affect the overall status of the River Nene at Duston Mill, although the WFD status is unlikely to achieve Good during the drought scenario modelled, regardless of the implementation of the drought permit.	None specifically identified	M	M	ST	Temporary	Moderate negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	A review of the 2011/12 drought permit identified increases in orthophosphate, ammonia and DO in the Nene under permit conditions. This is expected to remain the case under the proposed drought permit. As flows are lower and temperatures higher in summer, the associated impact of water quality on environmental receptors is greater in summer months. Maintaining water levels in Pitsford Reservoir during drought periods will have an incidental benefit of reducing the risk of reduced water quality and algal blooms in the reservoir.	Undertaken phosphate removal if require, however likely to be low during winter. Cessation rules should be put in place to halt abstraction if water quality falls below acceptable levels, or if water levels are affected by greater than expected amounts. Checks of water quality might also lead to a reduced abstraction, i.e. the MRF being reduced but not by the full 50%.	M	M	ST	Temporary	Mixed impact: Moderate negative and slightly positive
	To protect and enhance groundwater quantity and quality	No impacts identified.	Cessation rules should be in place to halt abstraction if water quality deteriorates below acceptable levels, or if water levels are affected more than currently predicted	N/A	N/A	N/A	N/A	No effects identified

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.5 River Great Ouse: Intake (Grafham Water)

D.2.5.1 Option Description

This option proposes abstraction from the River Great Ouse at the intake, in order to fill Grafham Water. During drought conditions, Anglian Water may seek a Drought Permit which may take the form of a winter or summer authorisation to allow increased refilling of Grafham Reservoir through a 50% reduction in the MRF or an increase in the proportion of flow above the MRF that can be abstracted. This is a change from the previous drought permit assessment which considered only the MRF reduction. The current licence allows abstraction of 75% of flow in excess of the MRF, subject to licence and pump capacity constraints. It is proposed that a drought permit would be considered in two stages:

Stage 1: Existing MRF, abstraction at up to 100% of the flow in excess of the MRF

Stage 2: Reduced MRF, abstraction at up to 75% of the flow in excess of the MRF

The reduced MRF would still be in excess of the EA guidance that recommends 500l/s (43Ml/d) residual flow at Offord to ensure there is sufficient flow at Earith to support fish.

Stage 2 allows greater abstraction than Stage 1 when the flow is below 340Ml/d (the “crossover” point at which the two options give the same allowable abstraction of 204Ml/d), so would be applied for in the later stages of a drought. Usage would be expected to revert to Stage 1 when sufficient flow recovery has occurred.

Anglian Water would be likely to consider applying for the drought permit in a severe, possibly multi-season, drought, if there is a risk of compromising their ability to refill Grafham Water. Under the most likely scenario, a winter drought permit would be sought after a dry winter and summer, enabling Anglian Water to refill Grafham Water during the following winter. This typically corresponds to a natural increase in flows (and hence water available for abstraction) and a reduction in the sensitivity of physico-chemical and biological receptors to impact. However, should drought conditions continue to present a significant risk to supply, a summer drought permit may also be considered as an option. Note that summer is defined as April to September (inclusive) and winter as October to March (inclusive).

D.2.5.2 Assessment Matrix: Winter Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified potential for likely significant effects on the Ouse Washes SAC, SPA and Ramsar site. However, the Environmental Assessment identified effects as a result of the implementation of the drought permit under summer conditions. A HRA Stage II: Appropriate Assessment was therefore carried out. It concluded that the implementation of the proposed Drought Permit will not result in an adverse effect on the integrity on the Ouse Washes SAC, SPA and Ramsar sites with the implementation of appropriate programme of monitoring and mitigation. There is unlikely to be any in-combination effects upon the European designated sites. The Environmental Assessment determined that water quality deterioration due to flow reductions under a winter permit are unlikely to result in permanent changes for macroinvertebrate communities. Predicted increases in orthophosphate concentrations and decreases in flow have the potential to change the community structure of macrophytes and algae. Increased risk of eutrophication could potentially affect rare species. Predicted increase in phosphate and nitrate concentrations could cause diatom or algae blooms, or changes in diatom communities. Effects are anticipated to be less in winter than in summer.	A monitoring programme has been devised to ensure that in the event that effects on water quality parameters are recorded within the European designated sites, abstraction is stopped. Implementation of a robust mitigation package has also been devised to provide a high degree of confidence that no adverse effects to the integrity of the designated sites will occur. Water quality mitigation measures (pollutants and DO levels outlined below) also apply here in regard to macroinvertebrate communities. Flows to isolated backchannels to be supplemented if necessary, with the possibility of “pump over” water into stranded backchannels at lower flows. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Aerators on standby if DO levels drop below an agreed threshold. This is considered a last resort.	VH	L	ST	Temporary	Slightly negative
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment identified that changes in water level will be limited because of the structural controls that are currently present to maintain navigation. Deterioration in water quality (BOD, ammonia and temperature increases) and algal communities may affect fish communities. However, effects are less pronounced in winter. Some fish species may be spawning as early as February. These species will be affected by a change in water level which could expose eggs to desiccation stress, whilst a reduction in flow could cause sedimentation of spawning gravels. There is potentially a greater reduction in flows during winter but there are more fish spawning in the summer. Water quality changes are not expected to be substantial enough to affect migratory eel and lamprey species during winter months, but it is possible that they may be affected by the predicted reduction in flow.	Winter permit covers October to March (inclusive). Pulsing of flows should be incorporated during March (until June) with alternating weeks on and off. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts, or if flow drop below the temporary MRF. Aerators on standby if DO levels drop below an agreed threshold. This is considered a last resort. Possibility of 'pump over' water into stranded backchannels at lower flows. Should fish becomes stranded, an action plan could be implemented setting out the logistics and timing of relocation.	L-M	L	ST	Temporary	Slightly negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There is no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes, as described above. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	The Environmental Assessment has identified no impacts on other licensed abstractors as the winter Drought Permit is not likely to impact water levels. During winter, there is no flow demand for spray irrigation from other abstractors.	None required.	N/A	N/A	N/A	N/A	No effects identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Navigation reduces during winter meaning the EA's ability to maintain the navigable water depth should improve. The Environmental Assessment identified that changes to river levels can also affect stationary boats along the River Great Ouse, many of which are focussed in two marinas between Godmanchester and Houghton. Boats are prone to tipping when river levels fall below the minimum draught, causing appliances and services to stop working correctly. The predicted negative impact on fish health and migration has the potential to affect anglers. Recreational usage of the river is reduced in winter. The occurrence of algal blooms, which may degrade the aesthetic quality of the River Great Ouse and potentially affect walkers and cyclists, are less likely in the winter.	Coordination with EA team with regard to their mitigation measures for residential and navigational users (signage, navigation notices). Dredging or weed clearance at known problem locations on the main navigation channel if required - e.g. around locks. Remedial work to any of the lock structures between Offord and Hermitage Lock which cannot provide adequate draught to be evaluated. Water to be abstracted gradually over a 24-hour period and reduce abstraction during busy navigation times Take steps to reduce lock usage. Abstraction to cease immediately if water levels drop below 11.12mAOD or below the temporary reduced MRF.	L	L	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Assessment identified that the impacts of the proposed Stage 2 drought permit are considered to be more severe than those of the proposed Stage 1 drought permit on river flows. Flows will be affected during the winter drought permit, and it is possible that a reduction in flows will be greater in winter than summer. It is not expected that either Stage of the proposed drought permit would permanently affect the overall status of the River Great Ouse at Offord through a change in flows. Although the predicted flows do not fall into the range of acceptable flows proposed by the WFD to maintain Good status, the assessment has shown that the flows at the current MRF fall outside this range also. Given the temporary nature of the predicted reduction in flows, it is likely that the effects on WFD status would cause deterioration to the Moderate category for the duration of the drought, but this would also be temporary.	Continuous monitoring should be implemented through the Drought Permit with a cessation rules if associated receptors' parameters fall below pre-agreed levels.	M	M	ST	Temporary	Moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environmental Assessment concluded there is potential for phosphate, orthophosphate and ammonia concentrations risk increasing to a level that has potential to impact the WFD status of the water body. Water quality deterioration also has the potential to result in likely significant effects on some interest features of the Ouse Washes European sites. Increases in nitrate are not perceived to have a significant impact on freshwater stretches as nitrate is unlikely to be a limiting factor and the tidal volumes of water are considered to reduce the impact on tidal stretches. Maintaining water levels in Grafham Water during drought periods will have an incidental benefit of reducing the risk of reduced water quality and algal blooms in the reservoir.	Phosphate and ammonia removal at specific locations to ensure they fall below target concentrations. Cessation rules if water quality parameters fall below pre-agreed levels. Review Planned Preventative Maintenance (PPM) and ensure steps are taken to complete actions identified in PPM review. Implementing variable abstraction to allow occasional pulses of water to allow flushing of pollutants and prevent stagnation of water. Aerators on standby to increase DO levels.	L	M	ST	Temporary	Mixed impact - Slightly negative and slightly positive
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.5.3 Assessment Matrix: Summer Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified potential for likely significant effects on the Ouse Washes SAC, SPA and Ramsar site. This is a result of water quality deterioration (notably ammonia and orthophosphate) arising from reduced flows as a result of the implementation of the drought permit under summer conditions. A HRA Stage II: Appropriate Assessment was therefore carried out. It concluded that the implementation of the proposed Drought Permit will not result in an adverse effect on the integrity on the Ouse Washes SAC, SPA and Ramsar sites with the implementation of appropriate programme of monitoring and mitigation. There is unlikely to be any in-combination effects upon the European designated sites. The Environmental Assessment identified that reduced flows and increase in orthophosphates and nitrates may cause increased algal growth and eutrophication, which in turn may increase the risk of DO sags, thus affecting macroinvertebrate, macrophyte, rare species and algae communities. Predicted increase in phosphate and nitrate concentrations could cause diatom or algae blooms, or changes in diatom communities. Diurnal DO sags in the backchannels connected to the Great Ouse, could affect macroinvertebrate species with high oxygen demands.	A monitoring programme has been devised to ensure that in the event that effects on water quality parameters are recorded within the European designated sites, abstraction is stopped. Implementation of a robust mitigation package has also been devised to provide a high degree of confidence that no adverse effects to the integrity of the designated sites will occur. Water quality mitigation measures (pollutants and DO levels outlined below) also apply here in regard to macroinvertebrate communities. Flows to isolated backchannels to be supplemented if necessary, with the possibility of “pump over” water into stranded backchannels at lower flows. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts. Variable abstraction to be employed to allow occasional pulses of water to aid in flushing of pollutants and prevent stagnation. Aerators on standby if DO levels drop below an agreed threshold. This is considered a last resort.	VH	L	ST	Temporary	Moderate negative
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment identified that changes in water level will be limited because of the structural controls that are present to maintain navigation. Deterioration in water quality (BOD, ammonia and temperature increases) and algal communities may affect fish communities. Effects are more pronounced in summer. The majority of the fish species present will be spawning in the summer period. These species will be affected by a change in water level which could expose eggs to desiccation stress, whilst a reduction in flow could cause sedimentation of spawning gravels. There is potentially a greater reduction in flows during winter but there are more fish spawning in the summer. Reductions in ‘trigger’ flows that initiate eel and trout migration from the estuary may cause mortalities. Deterioration in water quality may also impede migration in the channel.	Between March and June: pulsing flow with alternating weeks on and off. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, or if water levels are affected by greater than expected amounts, or if flow drop below the temporary MRF. Aerators on standby if DO levels drop below an agreed threshold. This is considered a last resort. Possibility of 'pump over' water into stranded backchannels at lower flows. Should fish becomes stranded, an action plan could be implemented setting out the logistics and timing of relocation.	M	L-M	ST	Temporary	Moderate negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There is no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes, as described above. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	During summer, water is abstracted from a tidal reach of the river into the Counter Drain for IDBs to abstract for spray irrigation. Reduced flow may mean the demand cannot be met.	Cessation rules should be applied if associated receptors' parameters fall below pre-agreed levels.	L-M	M	ST	Temporary	Slightly negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	During a summer permit, the EA's ability to maintain the required navigable water depth will be reduced due to lower flows and evaporation. Lock operations may be limited, which may restrict boat movements. Algal blooms may cause the river to choke, inhibiting navigation. Changes to river levels can also affect stationary boats along the River Great Ouse, many of which are focussed in two marinas between Godmanchester and Houghton. Boats are prone to tipping when river levels fall below the minimum draught, causing appliances and services to stop working correctly. The predicted negative impact on fish health and migration has the potential to affect anglers. The occurrence of algal blooms may degrade the aesthetic quality of the River Great Ouse, which has the potential to affect walkers and cyclists.	Reduce abstraction during busy navigation times. Further measure such as dredging or weed clearance could be implemented and remedial work to lock structures could be undertaken. Coordination with EA team with regard to their mitigation measures for residential and navigational users (signage, navigation notices). Undertake dredging or weed clearance at known problem locations on the main navigation channel if required - e.g. around locks. Remedial work to any of the lock structures between Offord and Hermitage Lock which cannot provide adequate draught to be evaluated. Take steps to reduce lock usage. Water to be abstracted gradually over a 24-hour period and reduce abstraction during busy navigation times Abstraction to cease immediately if water levels drop below 11.12mAOD or below the temporary reduced MRF.	L-M	M	ST	Temporary	Moderate negative
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Assessment identified that the impacts of the proposed Stage 2 drought permit are considered to be more severe than those of the proposed Stage 1 drought permit on river flows. There is potentially a lesser reduction in flows during summer months compared to winter months. It is not expected that either Stage of the proposed drought permit would permanently affect the overall status of the River Great Ouse at Offord through a change in flows. Although the predicted flows do not fall into the range of acceptable flows proposed by the WFD to maintain Good status, the assessment has shown that the flows at the current MRF fall outside this range also. Given the temporary nature of the predicted reduction in flows, it is likely that the effects on WFD status would cause deterioration to the Moderate category for the duration of the drought, but this would also be temporary.	Continuous monitoring should be implemented through the Drought Permit with a cessation clause or a reduction in local usage if water levels reach the minimum navigation levels.	L	L	ST	Temporary	Slightly negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environment Assessment identified that phosphate, orthophosphate and ammonia concentrations risk increasing to a level that has potential to impact the WFD status of the water body. Water quality deterioration also has the potential to result in likely significant effects on some interest features of the Ouse Washes European sites. Increases in nitrate are not perceived to have a significant impact on freshwater stretches as nitrate is unlikely to be a limiting factor and the tidal volumes of water are considered to reduce the impact on tidal stretches. When modelled BOD and metal concentrations showed a temporary deterioration, but they are not thought to deteriorate below the Environmental Quality Standards (EQS) for Good Ecological Potential. Compared to the winter, impacts of a drought permit in a summer dry period are thought to be similar although likely to be higher, particularly with sustained reduction in dilution capabilities. Maintaining water levels in Grafham Water during drought periods will have an incidental benefit of reducing the risk of reduced water quality and algal blooms in the reservoir.	Phosphate and ammonia removal at specific locations to ensure they fall below target concentrations. Implementing variable abstraction to allow occasional pulses of water to allow flushing of pollutants and prevent stagnation of water. There is also scope to reduce abstraction during busy navigation times. Review Planned Preventative Maintenance (PPM) and ensure steps are taken to complete actions identified in PPM review. Cessation rules should be applied if associated receptors' parameters fall below pre-agreed levels. Aerators on standby to increase DO levels.	M	M	ST	Temporary	Mixed impact - Moderate negative and slightly positive
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.6 Wellington Wellfield: Intake

D.2.6.1 Option Description

Anglian Water currently abstract from Wellington Wellfield to generally substitute for abstraction from the River Wissey during periods when flows are high and water quality is reduced. This can operate at any time of the year and is abstracted directly into the Water Treatment Works (WTW).

This option proposes a Drought Permit to increase the daily licence quantity from 15 to 25Ml/d to support the WTW. The abstraction will be split between Wellington Wellfield and the Denton Lodge groundwater source. It will be used when existing water resources require topping up during drought conditions. Once abstracted, the water would go directly to the WTW where it would be blended with surface water from the River Wissey for public water supply.

The Drought Permit for this option is not assessed under a winter and summer as they are considered to effectively be the same, whenever the Drought Permit is applied for. As per current guidance, the drought permit would cover a six-month period[2], and it is understood that reapplication for a further six months would be permissible.

[2] https://www.gov.uk/guidance/apply-for-a-drought-permit

D.2.6.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	There are no anticipated changes to biodiversity or designated sites as flow, river levels and water quality changes as a result of this Drought Permit are expected to be negligible. There are water-dependent BAP habitats along the River Wissey and River Little Ouse but the impacts on these are likely to be negligible, as there is no predicted impact from this option on river flows or flooding.	None required.	N/A	N/A	N/A	N/A	Negligible
	To maintain and where possible improve freshwater fisheries	There are no anticipated changes on fisheries health, spawning or passage in the River Wissey and Little Ouse as flow, river levels and water quality changes as a result of this Drought Permit are expected to be negligible.	None required.	N/A	N/A	N/A	N/A	No effects identified
Climatic Factors	To reduce greenhouse gas emissions	No significant impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. There is considered to be negligible impact on those alongside the rivers Wissey and Little Ouse as no impacts on surface waters have been identified. Slight risk associated with the drawdown in groundwater levels potentially affecting nearby Scheduled Monuments and listed buildings, although this would be in the context of already low groundwater levels due to prolonged low rainfall.	None required	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	There may be an additional 1m drawdown in ground water as a result of the Drought Permit. Five other groundwater abstractors within a 3.5km radius could potentially be affected. However, impacts are uncertain as there is no further knowledge on the surface water abstraction licence conditions or infrastructure.	Further information regarding the conditions of this licence will be sought, and the possibility of impacts reviewed. Anglian Water should also effectively communicate with licence holders.	L	L-M	ST	Temporary	Slightly negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	There is expected to be negligible changes in water levels or flows as a result of this Drought Permit, therefore impacts of navigation is considered to be negligible. Water quality is not expected to deteriorate as a result of the Drought Permit therefore it is unlikely angling or aesthetics will be affected.	None required.	N/A	N/A	N/A	N/A	No effects identified

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Water	To protect and where possible enhance river flows and groundwater resources	It is anticipated that the Drought Permit's impact on flows or levels in the River Wissey and River Little Ouse is negligible. Additional pumping at Wellington Wellfield will result in additional drawdown in the groundwater body. The WFD assessment undertaken as part of the Environmental Assessment concluded that as the impacts of the potential drought action on river levels and flows and water quality are thought to be negligible, there is no perceived impact on the WFD status of the potentially affected waterbodies.	Prior to the implementation of a drought permit Anglian Water would write to all abstractors with permitted rights within the potentially affected area in proximity to the Wellington Wellfield explaining the plans for implementation and providing a contact in case problems are experienced abstracting during the operation of the permit.	L-M	Negligible	ST	Temporary	Slightly negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	It is anticipated that the impact of the Drought Permit on flows is negligible, therefore potential impacts on water quality is expected to be negligible.	None required.	L-M	Negligible	ST	Temporary	Negligible
	To protect and enhance groundwater quantity and quality	No impacts on groundwater quality are anticipated. Possible impacts on groundwater levels in the Chalk within the radius of influence of the option.	None required.	L	L-M	ST	Temporary	Slightly negative

D.2.7 River Colne Augmentation (Ardleigh Reservoir)

D.2.7.1 Option Description

Anglian Water currently holds a groundwater abstraction licence (8/37/23/*G/0071) to abstract from groundwater sources at Aldham, Balkerne and Cook's Mill. The abstracted water is used for the purposes of public water supply and/or augmenting the River Colne at two specified augmentation points (one near Cook's Mill at TL 946 271, and a second near Balkerne at TL 993 256) to increase the yield of the East Mills intake for Ardleigh Reservoir. A total combined quantity of 10,000Ml of water can be abstracted from the boreholes over a five-year period. In addition, there are also conditions on maximum quantities which can be abstracted in any 24-hour period (6Ml/d each at Aldham, Balkerne and Cook's Mill). However, due to the use of a five-year licence limit the total daily licensed quantity is not regularly used.

The purpose of the proposed Drought Permit would be to temporarily increase the licensed abstraction at the Aldham and Balkerne groundwater sources by 3Ml/d each to provide additional augmentation to the River Colne. The abstracted groundwater is piped to Cook's Mill, where 4Ml/d goes directly to public water supply, and the remaining volume is discharged to the River Colne. Based on the fully licensed abstraction profile during a drought period, the permit would increase the peak daily abstraction from groundwater from 16 (6Ml/d at Aldham and Balkerne, 4Ml/d at Cook's Mill) to 22Ml/d (9Ml/d at Aldham and Balkerne, 4Ml/d at Cook's Mill), with the associated peak river augmentation increasing from 12 to 18Ml/d.

The Drought Permit would be applied for a period of three months and could be used at any time of the year when drought conditions require topping up of Ardleigh Reservoir. There would be no change in the total quantity of water that can be abstracted in a five-year period. The Drought Permit for this option is not assessed under a winter and summer as they are considered to effectively be the same, whenever the Drought Permit is applied for.

D.2.7.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	There have been no likely significant effects identified for internationally or nationally designated sites. The Environmental Assessment identified that flows, levels and water quality are unlikely to be significantly, permanently affected as a result of the drought permit. Although flows will increase during the drought permit, the extent and duration of flow increase due to augmentation with groundwater is unlikely to be great enough to instigate a shift in macroinvertebrate community composition towards species with a preference for high flows. Upstream and downstream of the augmented reach, and within other rivers in the zone of influence, the predicted impact of the groundwater abstraction on river flow is negligible, so the associated reduced dilution capacity is negligible. Thus, impacts on the macroinvertebrate and macrophyte community is considered negligible.	None required. However, if a negative impact is identified as a result of monitoring, Anglian Water could implement Gradual discharge from augmentation points into River Colne to avoid causing rapid variations in channel flow and water levels. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, or if river flow changes significantly, could also be implemented.	L	Negligible	ST	Temporary	Negligible
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment identified that through the mechanisms of increased flows and dilution capacity, the drought permit is considered to have negligible to low, non-permanent positive impacts on fish in the River Colne. Upstream and downstream of the augmented reach, and within other rivers in the zone of influence, the predicted impact of the groundwater abstraction on river flow is negligible, so the associated reduced dilution capacity is negligible. Hence, there is no predicted impact on fish populations. The Environmental Assessment also identified that flow augmentation in the summer with abstracted groundwater may limit the stress on spawning fish species and eggs. In the winter, there is not anticipated to be effects on fish spawning as most species are spring and summer and it not anticipated that the winter spawning fish (for example, trout) will be affected. Flow augmentation will have a negligible impact on fish passage due to the weir structure at East Mills.	None required	L	Negligible	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	No significant impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. There is considered to be negligible impacts on those alongside the River Colne as no negative impacts on surface water have been identified. Slight risk associated with the drawdown in groundwater levels potentially affecting nearby Scheduled Monuments and listed buildings, although this would be in the context of already low groundwater levels due to prolonged low rainfall. Furthermore, the Chalk aquifer is confined by 10-40m of overlying London Clay and impacts in terms of groundwater drawdown are not predicted in the water table or the river flows outside the augmented reach.	None required	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	The Environmental Report identifies that additional groundwater abstraction for the drought permit's flow augmentation scheme is predicted to cause a groundwater drawdown of 0.2m in a localised area of the Chalk aquifer, approximately 3km from the Lower Colne boreholes. Fourteen groundwater abstraction licences fall within the radius of influence (two industrial, one other potable use and 11 agricultural), and it is possible that these abstractors may be adversely impacted by the drought action. However, without further knowledge of the abstraction licence conditions or infrastructure it is not possible to quantify this potential impact. The Environmental Assessment also identified that there is a low risk that the proposed drought action will adversely impact the permitted rights to abstract surface water from the River Colne within the zone of influence.	Key mitigation measure will be effective communication between Anglian Water and licence holders. Anglian Water will work with potentially affected users to understand the likely requirements / use of the licences and how these could be affected by the option. Cessation rules if groundwater levels fall below pre-agreed levels. Groundwater discharge into the River Colne currently already restricted if groundwater quality is poor (based on concentrations of chloride, sodium and iron and temperature), as per the conditions of the standard groundwater abstraction licence.	L-M	Negligible-M	ST	Temporary	Slightly negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The Environmental Assessment states that the River Colne is not navigable in the affected reach therefore there would be no effects on navigation as a result of the Drought Permit. However, it used by canoeists and rowing boats, as well as being a popular destination for anglers. These recreational activities may become more viable when the proposed drought permit is in action than they would otherwise be during periods of low flow due to augmentation by abstractions from groundwater. Upstream and downstream of the augmented reach, and within other rivers in the zone of influence, the predicted impact of the groundwater abstraction on river flow is negligible, so recreational activities should not be affected.	None required. However, if a negative impact is identified as part on monitoring, Anglian Water could implement gradual discharge from augmentation points into River Colne to avoid causing rapid variations in channel flow and water levels. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, or if river flow changes significantly, could also be implemented.	L	Negligible	ST	Temporary	Slightly positive

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Report concluded that impacts on surface water flows and levels due to the drought action in comparison to the modelled baseline flows are largely negligible within the augmented reach of the River Colne. Flows will be increased by up to 6Ml/d between Cook's Mill and the East Mills intake during the operation of the proposed drought permit. While river flows increase accordingly with increased augmentation, the effects are most pronounced during periods when the baseline flow is very low (e.g. < 30Ml/d). The WFD status of the potentially affected waterbodies would likely be impacted through a change in flows or a change in water quality. However, as the impacts of the potential drought action on river levels and flows and water quality are thought to be temporary and negligible, no permanent impacts on the WFD status of the potentially affected waterbodies are perceived.	None required.	L	L	ST	Temporary	Negligible
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	There is the potential for surface water quality improvements due to augmented flow enabling greater dilution of nutrients and other pollutants. However, there is also potential for a decrease in surface water quality if groundwater quality is low, but this should be prevented by cessation of groundwater abstraction if groundwater quality is poor. Overall, the potential for a detrimental effect on surface water quality is low. Upstream and downstream of the augmented reach, and within other rivers in the zone of influence, the predicted impact of the groundwater abstraction on river flow is negligible, so the associated reduced dilution capacity is negligible.	None required. However, if there is a negative impact identified as a result of monitoring, Anglian Water could implement Gradual discharge from augmentation points into River Colne to avoid causing rapid variations in channel flow and water levels. Cessation rules to halt abstraction if water quality deteriorates could also be incorporated.	L	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Updated assessment of groundwater impacts was not conducted for the current assessment. The Environmental Assessment identified that the modelled drought action scenario revealed a clear drawdown relative to groundwater levels under a normal (non-drought) abstraction scenario, which was attributed to the additional abstraction at the Aldham and Balkerne sources. An additional 1.4m and 1.2m drawdown was predicted at the respective sources. The abstraction effects are expected to be relatively localised, with a radius of approximately 3km, where there was a localised drawdown of 0.2m. No predicted change in groundwater-surface interaction due to increase in abstraction following the application of the proposed Drought Permit for a three-month period. It is possible that there would be greater changes if the drought permit were to be in operation for 6 or 12 months, but in view of the limited change for a 3-month period it is unlikely that changes over a longer period would be significant.	None required.	L	L	ST	Temporary	Slightly negative

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.8 River Gipping: Intake (Alton Water)

D.2.8.1 Option Description

The proposed drought permit will take the form of a winter authorisation to allow increased abstraction from groundwater boreholes in the Suffolk area.

Anglian Water would consider applying for the drought permit in a severe, possibly multi-season drought, if there is a risk of compromising their ability to meet demands on Alton Water. Under the most likely scenario, a winter drought permit would be sought after a dry winter and summer, enabling Anglian Water to refill the reservoir during the following winter. This typically corresponds to a natural increase in flows (and hence water available for abstraction) and a reduced sensitivity for the majority of potential receptors in winter. As per current guidance, the drought permit would cover a 6-month period, and it is understood that reapplication for a further 6 months would be permissible.

D.2.8.2 Assessment Matrix: Winter Permit

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment concluded there would be no likely significant effects on designated sites. The Environmental Assessment identified that the potential impact on the macroinvertebrate community is low. The low flows as a result of the Drought Permit could lead to a reduction in the dilution of phosphate and therefore a deterioration in water quality. However, given the reduction in flow is anticipated to be minimal, the impacts on the macrophyte community is likely to be low.	Variable abstraction, allowing occasional pulses of water through the system to improve water quality. Undertake operational/maintenance issues to improve water quality. This may include temporary phosphorous stripping at the wastewater treatment works. Consideration could also be given to potential modification of routine summer flood defences as they may cause sedimentation and phosphate mobilisation.	L	L	ST	Temporary	Slightly negative
	To maintain and where possible improve freshwater fisheries	The Environmental Assessment identified that there is likely to be limited impacts on fish populations within the River Gipping and River Deben. However, there is potential for impacts on the River Fynn, Mill and Belstead brook where lower levels could impact the spawning of flow sensitive species. There is potential that low flows in the back channels in the region will be vulnerable and therefore fish spawning may be affected. However, the magnitude of the impact is likely to be reduce given it is a winter Drought Permit due to increased surface precipitation reaching the surface flows at cessation of drought event, before spawning starts in the Spring. It is anticipated that fish passage will not be affected.	Variable abstraction, allowing occasional pulses of water through the system to improve river flows and water quality. Water level monitoring upstream of the intake. Possible pumping of additional flows to support the backwater channels and maintain spawning conditions. Fish rescues if required, or aeration/bubblers in the channel (as last resort only) to protect fish.	L	L	ST	Temporary	Slightly negative
Climatic Factors	To reduce greenhouse gas emissions	No significant impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence, including listed buildings on the riverside which may be vulnerable to changes to their setting and context. The Environmental Assessment for this option has concluded that given the existing degree of modification to the structure of the River Gipping channel (largely for flood defence purposes) and adjacent land use, and that a reduction in the MRF would occur during a period when flows are already low, any incremental change in visual appearance associated with a lowering of the MRF is unlikely to be significant. It also concludes that any indirect impacts would be mitigated and therefore significant impacts on the historic environment or archaeology are unlikely.	None required	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	The Environmental Assessment identified that there is potential for a change in flow rates and in the groundwater, as a result of the Drought Permit, which could impact other abstractors. However, the depth of abstractions unknown, therefore impossible to confirm exact impact.	Further information regarding the conditions of this licence will be sought, and the possibility of impacts reviewed. Anglian Water should also effectively communicate with licence holders.	L	?	ST	Temporary	Unknown/uncertain

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The Environmental Assessment identified that the Drought Permit will have limited change in water levels within the navigable rivers compared to their overall levels and flows. There is potential for algal blooms and weed choking to negatively impact navigation and the aesthetic appearance of the River Gipping, which potentially will reduce enjoyment and the pursuance of recreational activities. There is also potential for impacts on fish populations which could impact anglers.	Variable abstraction, allowing occasional pulses of water through the system to improve water quality. This should be targeted at periods when the risk of stagnation or dissolved oxygen problems is considered high. Allow spate flows to pass through the system unimpeded. This will help to flush the system, removing plant debris and nutrient containing sediments.	L	L-M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Assessment identifies that there is limited reduction in flows as a result of the Drought Permit. There is potential for groundwater drawdown. There is unlikely to be a deterioration on the overall WFD status as a result of the Drought Permit and it is not anticipated that it would prevent the waterbodies achieving their goals in the future.	Variable abstraction, allowing occasional pulses of water through the system to improve flows. Water level monitoring upstream of the intake. 'Pump over' water into stranded backchannels at lower flows.	L	L	ST	Temporary	Slightly negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The Environmental Assessment concluded that there is potential for high levels of phosphate with the watercourses (which is currently driving failure of WFD status), and also some with low levels of dissolved oxygen. This could be exacerbated by decreases in flow as a result of the Drought Permit, although the reduction in flow is anticipated to be minimal.	Variable abstraction, allowing occasional pulses of water through the system to improve water quality. Undertake operational/maintenance issues to improve water quality. This may include temporary phosphorous stripping at the wastewater treatment works. Consideration could also be given to potential modification of routine summer flood defences as they may cause sedimentation and phosphate mobilisation.	L	L	ST	Temporary	Slightly negative
	To protect and enhance groundwater quantity and quality	The Environmental Assessment identified that groundwater drawdown could cause the oxidation and mobilisation of pyrite within the Lower London Tertiary at Playford and Tuddenham St Martin. There are also concerns of a potential saline intrusion at Belstead.	None required.	L	L	ST	Temporary	Slightly negative

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.2.9 River Trent: Abstraction (Hall Water Treatment Works)

D.2.9.1 Option Description

Anglian Water abstract from the River Trent at Newton-on-Trent for Hall Water Treatment Works (WTW). The scheme includes a bankside storage reservoir of capacity 300Ml which is equivalent to 15 days' supply at the scheme's design rate of 20Ml/d. The licence allows abstraction at a rate of up to 64Ml/d to allow refill of the reservoir after a period of reduced or zero abstraction. The higher rate is also relevant under normal conditions when the tidally influenced water level only allows abstraction for part of the day; by pumping at up to 64Ml/d during these periods a daily total of 20Ml can be achieved. The licence conditions include a hands-off flow (HOF) of 1700Ml/d and a hands-off level (HOL) of 2.0mAOD. The HOF is defined at the upstream gauging station of North Muskham because the flow cannot readily be measured in the tidally influenced reach. The HOL is designed to ensure that the abstraction does not adversely impact navigation.

Anglian Water may seek a drought permit that temporarily reduces the HOF (to 1450Ml/d) during periods of low flow, thereby allowing abstraction to continue in conditions below the current minimum permissible flow.

D.2.9.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The Environmental Assessment identified the Humber Estuary SAC, SPA, Ramsar site and SSSI as the only designated site within hydrological continuity of the abstraction point. It is expected that the minimal changes in flow from the Drought Permit is unlikely to affect one or more of the Humber Estuary sites. Given the sensitivity of sea and river lamprey species, a HRA Stage II: Appropriate Assessment was carried out to investigate the effects of the Drought Permit on lamprey populations, particularly the impacts of flow and water level changes, and entrainment at the Hall WTW intake. This identified that the likelihood of negative impacts occurring from the Drought Permit on river and sea lamprey entrained is not significant and the reduction in flow will not impact their natural migration pattern. Spawning is not likely to impacted by flow reductions. There is uncertainty regarding the current passage of migratory fish through Crowell weir. The predicted water level decrease could therefore not be satisfactorily eliminated as a potential threat to lamprey populations. It is therefore recommended that a survey is conducted to identify the suitability of the weir for lamprey species. It is also not expected the Drought Permit will result in any changes to salinity, DO concentration or temperature of the River Trent downstream of the abstraction point. It is not likely that there will be a significant adverse effect on the macroinvertebrate, macrophyte and Phytobenthos, and diatom populations of the River Trent downstream of Hall WTW abstraction point as the minimal and temporary reduction in flow will not impact water quality.	Water quality monitoring and macroinvertebrate sampling is recommended before, during and after a drought event and an initial review into the passability of Cromwell weir by migratory fish species is recommended. If the review suggests that there are likely to be issues with fish passage, or further investigation such as visual observation is unable to ensure continued passage for migratory species, it is recommended that the initial review is complemented by fish tagging surveys for lamprey species. It is also recommended that a formal plan is developed for the monitoring of flows, water quality and biological elements in the Humber Estuary and River Trent in the periods before, during and after drought permit implementation to identify any unforeseen impacts on the interest features of designated sites. Invertebrates and flow monitoring is also recommended to indicate environmental effects associated with the plan. Cessation rules to halt abstraction if water quality deteriorates below acceptable levels, if river flow changes significantly, or monitoring results indicate a detrimental impact on receptors. Variable abstraction to allow occasional pulses of water throughout the system to aid in the flushing of pollutants and prevent stagnation.	VH	L	ST	Temporary	Slightly negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To maintain and where possible improve freshwater fisheries	The River Trent supports salmonids, eels and lamprey, as well as brown trout and many coarse fish species. It is unlikely that attraction flows and reduced water levels in the River Trent as a result of the Drought Permit will have significant effects on salmon migration. The Drought Permit is also not expected to have an effect the flows at Cromwell weir, therefore it is likely that salmon passability will not be affected. However, without the undertaking of a full study, there is some uncertainty in this assumption. There is also not likely to be any impacts on salmon entrainment as the screen at the abstraction point is suitable for this species. Lamprey are not likely to initiate migration in periods of low flow, in which the Drought Permit will be applied, therefore it is not expected lamprey migration will be impacted. The risk of the Drought Permit affecting lamprey spawning is expected to low as they are most likely to spawn in the middle reaches of the Trent which will not be affected by the Drought Permit. If they were to spawn in areas affected by the Permit, impacts are expected to negligible as minimal reduction in flows are predicted. It is also expected that the passability at Cromwell weir will not be affected by the Drought Permit, however there is still some uncertainty as mentioned above for Salmon. There should also not be any effects on entrainment as flows are not likely to be affected and the screen at the abstraction point is suitable for lamprey protection. The predicted temporary reduction in water levels and flows are not likely to increase pressures on European eel. It is considered unlikely that the reduction in levels will further affect reduced passage at Cromwell weir. Eel migration and entrainment are also not likely to be affected by the Drought Permit.	Initial review into the passability of Cromwell weir by migratory fish species is recommended. If the review suggests that there are likely to be issues with fish passage, or further investigation such as visual observation is unable to ensure continued passage for migratory species, it is recommended that the initial review is complemented by fish tagging surveys for lamprey species. Cessation rules to halt abstraction if water levels are affected by greater than expected amounts.	L-M	L	ST	Temporary	Slightly negative
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified. There would be no additional infrastructure required and significant additional energy requirements are considered unlikely.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	There are numerous historic environment remains and features within the potential zone of influence. Key risk would be associated with a further short-term drawdown in river levels potentially affecting riverside designations and buried archaeology, although this would be in the context of already low river flows due to prolonged low rainfall.	Flows and levels would need to be controlled for environmental and navigation purposes, as described above. Given this, it is unlikely that there would be a prolonged additional reduction in flows such that archaeological features would be affected over and above the existing drought situation.	M-VH	Negligible	ST	Temporary	Negligible
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	No impacts on communities and households are anticipated as a result of the option. No physical works are required. The option aims to reduce the effects of a drought on householders by maintaining security of supply but would not reduce the need for restrictions on household / domestic use.	None required.	N/A	N/A	N/A	N/A	No effects identified.

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
	To minimise impacts on businesses and local economy	The Drought Permit could have an impact on other downstream abstractors. However, given the small of the reduction, it is considered highly unlikely that there would be any adverse impact. Two of the abstractors listed in (British Steel and Keadby power station) are so far downstream that any impact is unlikely to be measurable; the others are near Torksey where the reduction in water level would be less than at Newton but more than at Gainsborough, possibly a maximum of 1-2cm. There is no reason to expect that these abstractors would be adversely affected.	None required.	N/A	N/A	N/A	N/A	No effects identified.
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The Environmental Assessment identified that a slight reduction in water levels and flows as a result of the Drought Permit is not expected to negatively impact on water quality. Therefore, it is unlikely there will be impacts for navigation or other recreational activities.	None required.	N/A	N/A	N/A	N/A	No effects identified.
Water	To protect and where possible enhance river flows and groundwater resources	The Environmental Assessment identified that the abstraction does not affect the flow at North Muskham (where the HOF is defined), so continuation of abstraction when below the current HOF will have no impact on flow recovery there. Flow conditions downstream of the abstraction will revert to their non-drought permit condition as soon as the drought permit stops being used. The abstraction does reduce water levels in the vicinity of the abstraction, and for some distance upstream and downstream, but the effect is small. The WFD assessment undertaken as part of the Environmental Assessment concluded that it is not expected that the proposed drought permit would affect the overall status of the Humber estuary WFD waterbodies, and unlikely that the proposals would prevent the Humber estuary in achieving their overall goal of GES in the future.	The suitability of flow thresholds or other triggers for applying for a drought permit should be investigated. Triggers might include the rate of decline in river flow. Broader considerations such as accumulated rainfall deficits may also be relevant.	M	L	ST	Temporary	Slightly negative
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	It is possible that the reduction in flow from the Drought Permit could exacerbate phosphate levels in the River Trent, which is they key water quality concern for the river. However, the reduction in flow is predicted to be minimal and temporary therefore it is not expected that the Drought Permit will have a significant effect on water quality. It also not expected the Drought Permit will result in any changes to salinity, DO concentration or temperature of the River Trent downstream of the abstraction point.	None required. However, cessation rules to halt abstraction if water quality deteriorates below acceptable levels, if river flow changes significantly, or monitoring results indicate a detrimental impact on receptors. Variable abstraction to allow occasional pulses of water throughout the system to aid in the flushing of pollutants and prevent stagnation.	M	Negligible	ST	Temporary	Negligible
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified.

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3 Additional Supply Side Management Actions Options Assessment

D.3.1 Option Type Description

There are some potential additional supply side management options that may be considered during a drought. It is assumed that the Drought Plan 2019 will include the same six additional supply side options that were included in the 2014 Plan and therefore considered in the previous 2014 SEA:

- Management of inter-company transfers
- Road tankering of water to areas where supplies are low
- Desalination of brackish water
- Return of effluent to different discharge points on rivers to supplement river flows and allow increased abstraction
- Transfers of water from one river catchment to another, to supplement flows for abstraction
- Bulk transfers of water from other water companies

D.3.2 Management of inter-company transfers

D.3.2.1 Option description

There are no specific details available for what this option would entail, but it is anticipated that this will involve water companies providing mutual assistance to one another during a drought. This option would be dependent on the nature of a drought and the relative availability of water resources and treated supply.

D.3.2.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The use of supplies from other areas with more available resources or surplus of treated would potentially reduce pressure on other rivers or surface bodies, and therefore benefit habitats and flora/fauna. The impact is uncertain and would depend of location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	The use of supplies from other areas with more available resources or surplus of treated would potentially reduce pressure on other rivers or surface bodies, and therefore fisheries. The impact is uncertain and would depend of location of drought and source of water	None required.	L	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	It is assumed that as this option involves changing existing transfer arrangements and infrastructure, there will be no or only minimal energy requirements.	None required.	N/A	N/A	N/A	N/A	No effect identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	The option to have access to additional supplies from areas of surplus would help to maintain the security of public water supplies during a drought.	None required.	L	L	ST	Temporary	Slightly positive
	To minimise impacts on businesses and local economy	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers or surface water bodies used for recreation. The impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
Water	To protect and where possible enhance river flows and groundwater resources	The use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other water bodies and river flows/groundwater. The impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers and surface water bodies. The impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	The use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other groundwater sources. The impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3.3 Road Tankering

D.3.3.1 Option Description

There are no details of what this option would entail, including the circumstance under which this option would be used, the quantity of water involved, where the water would be sourced from or over what distances it would be transported. A generic assessment has therefore been undertaken for this option assuming that water would be tankered at least out of individual Water Resource Zones.

D.3.3.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
	To maintain and where possible improve freshwater fisheries	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
Climatic Factors	To reduce greenhouse gas emissions	The level of impact is uncertain as the exact number of tanker movements and distances to be covered be each is unknown, but there would be additional emissions associated with the road transport of water across the supply area.	Planning of delivery routes, recommendations on best driving practices to minimise emissions.	L	L	ST	Temporary	Slightly negative
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	The option to have access to additional supplies from areas of surplus would contribute to maintaining the security of public water supplies during droughts. However, it is likely that this option would provide relatively little water and could result in communities facing further restrictions. There would also be added inconvenience for customers receiving tankered water rather than directly supply. It is assumed that this option does not replace mains supply for customers.	None required.	L	L	ST	Temporary	Moderate negative
	To minimise impacts on businesses and local economy	There may be slight disruption to local roads due to additional vehicle movements to transport water. The likelihood and level of impact is uncertain but is expected to be of low magnitude.	Good practice where required, timing of tanker movements where possible.	L	L	ST	Temporary	Slightly negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
Water	To protect and where possible enhance river flows and groundwater resources	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
	To protect and enhance groundwater quantity and quality	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3.4 Brackish Desalination

D.3.4.1 Option Description

There are no specific details available for this option, however it is assumed that mobile desalination would be used, and no permanent plant would be required.

D.3.4.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The use of desalination would potentially reduce abstraction pressure on other rivers or surface water bodies, and consequently on habitats and flora/fauna. Impact is uncertain and would depend on location of drought. Brine discharge from the desalination process has the potential to effect ecology through water quality changes and increased salinity. Effects may be more pronounced during drought conditions when flows are reduced.	Further investigation of effect of brine discharge. Can only be undertaken if location is known.	M	M	ST	Temporary	Mixed impact: slight positive and moderate negative
	To maintain and where possible improve freshwater fisheries	The use of desalination would potentially reduce abstraction pressure on other rivers or surface water bodies, and consequently on fisheries. Impact is uncertain and would depend on location of drought.	None required.	L	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	Desalination requires a high level of energy use and therefore there will be an increase in localised emissions, although it would be temporary.	Mitigation is limited for energy use, but plant should use 'clean' energy where possible. Potential future renewable technologies could reduce emissions.	L	H	ST	Temporary	Moderate negative
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impact identified as it is assumed that the location of the temporary desalination plant would avoid heritage sites.	None required.	N/A	N/A	N/A	N/A	No effect identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	The desalination plan would supply additional water resources, helping to maintain the security of public water supplies during a drought.	None required.	L	L	ST	Temporary	Slightly positive
		Depending on the location of the desalination plant there could be impacts for local residents due to noise or emissions.	Consideration to be given on location of plant and distance from sensitive receptors.					
	To minimise impacts on businesses and local economy	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	The use of desalination would potentially reduce abstraction pressure on other rivers or surface water bodies used for recreation. Impact is uncertain and would depend on location of drought.	None required.	L	L	ST	Temporary	Slightly positive
Water	To protect and where possible enhance river flows and groundwater resources	The use of desalination would potentially reduce abstraction pressure on other rivers or surface water bodies used for recreation. Impact is uncertain and would depend on location of drought.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Use of desalination would potentially reduce abstraction pressure on other water bodies and river flows/groundwater. Impact is uncertain and would depend on location of drought. Brine discharge from the desalination process has the potential to effect water quality and increase salinity. Effects may be more pronounced during drought conditions when flows are reduced.	Further investigation of effect of brine discharge. Can only be undertaken if location is known.	M	M	ST	Temporary	Mixed impact: slightly positive and moderate negative
	To protect and enhance groundwater quantity and quality	Use of desalination would potentially reduce abstraction pressure on other rivers or surface water bodies, and consequently on water quality. Impact is uncertain and would depend on location of drought.	None required.	L	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3.5 Return of Tidal Effluent

D.3.5.1 Option Description

There are no specific details available for this option, however it is assumed to involve the diversion of effluent from a normal discharge point on the tidal reaches to another discharge point on the river, upstream of the tidal section. This additional volume of water could then be abstracted downstream of the effluent input point for use in supply.

D.3.5.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Depending on the quality of the effluent being discharged and the location of the option, here could be a risk to aquatic habitats and species. There could also be impacts on water quality in the receiving catchment that indirectly affect habitats and species. The scale/level of impact is uncertain without further information.	Effluent would need to be treated to an appropriate standard prior to release in the receiving waters.	L-VH (unknown)	L-H (uncertain)	ST	Temporary	Slightly moderate negative (uncertain)
		Use of supplies from areas with more available resources or surplus of treated water would theoretically support flows and potentially reduce pressure on other rivers or surface water bodies, and consequently on habitats and flora/fauna. Impact is uncertain and would depend on location of drought and source of water.	None required.		L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	Depending of the quality of effluent being returned, there could also be impacts on water quality in the receiving catchment that indirectly affect fisheries. The likelihood or scale/level of impact is uncertain.	Effluent would need to be treated to an appropriate standard prior to release in the receiving waters.	L-VH (unknown)	L-H (uncertain)	ST	Temporary	Slightly moderate negative (uncertain)
		Use of supplies from areas with more available resources or surplus of treated water would theoretically support flows and potentially reduce pressure on other rivers or surface water bodies, and consequently on habitats and flora/fauna. Impact is uncertain and would depend on location of drought and source of water	None required.		L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	Arrangements for transfer of effluent and requirements for any treatment are unknown at this stage. There could be energy use requirements associated with pumping and treatment to a required standard (possible high energy needs).	Seek renewable or 'clean' sources of energy where possible.	L	H	ST	Temporary	Moderate negative
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	The return of tidal effluent would provide additional water supplies during a drought, helping to maintain the security of public water supplies.	None required.	L	L	ST	Temporary	Slightly positive
	To minimise impacts on businesses and local economy	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effect identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	It is assumed there would be no impacts on the levels in the tidal research due to the dominance of tidal influence. Support of flows upstream could also have some benefits for recreation, depending on the distance from the abstraction point.	None required.	L	L	ST	Temporary	Slightly positive
Water	To protect and where possible enhance river flows and groundwater resources	Augmentation of flows would potentially reduce pressure on other water bodies and river flows/groundwater. Impact is uncertain and would depend on how the scheme and other local resources are used.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Depending of the quality of water being transferred, there could be impacts on water quality in the receiving catchment. The likelihood or scale/level of impact is uncertain.	Effluent would need to be treated to an appropriate standard prior to release in the receiving waters.	L-M	L-M (uncertain)	ST	Temporary	Slightly moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
		Augmentation of flows would potentially reduce pressure on other rivers or surface water bodies, and consequently on water quality. Impact is uncertain and would depend on location of drought and source of water.	None required.		L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other groundwater sources. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3.6 Inter-catchment Transfers

D.3.6.1 Option Description

There are no specific details available for what this option would entail, however it is anticipated that this would involve the transfer of water between catchments with available resources or with surplus resources using existing infrastructure.

D.3.6.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Depending on whether the source water is raw or treated, there could be a risk of causing the spread of invasive species. Depending of the quality of water being transferred, there could also be impacts on water quality in the receiving catchment that indirectly affect habitats and species. The scale/level of impact is uncertain.	Transfer treated water rather than raw or use appropriate treatment prior to release in the receiving catchment.	L-VH (unknown)	L-H (uncertain)	LT	Permanent	Moderate-Major negative (uncertain)
		Use of supplies from areas with more available resources or surplus of treated water would theoretically support flows and potentially reduce pressure on other rivers or surface water bodies, and consequently on habitats and flora/fauna. Impact is uncertain and would depend on location of drought and source of water.	None required.		L	ST	Temporary	Mixed impacts Slightly positive
	To maintain and where possible improve freshwater fisheries	Depending on whether the source water is raw or treated, there could be a risk of causing the spread of invasive species. Depending of the quality of water being transferred, there could also be impacts on water quality in the receiving catchment that indirectly affect fisheries. The scale/level of impact is uncertain.	Transfer treated water rather than raw or use appropriate treatment prior to release in the receiving catchment.	L-VH (unknown)	L-H (uncertain)	LT	Permanent	Moderate-Major negative (uncertain)
		Use of supplies from areas with more available resources or surplus of treated water would theoretically support flows and potentially reduce pressure on other rivers or surface water bodies, and consequently on fisheries. Impact is uncertain and would depend on location of drought and source of water.	None required.		L	ST	Temporary	Mixed impacts Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	It is assumed that this option involves use of existing infrastructure and there will be no or only minimal energy requirements. This assessment may change if extensive treatment of the donor water is required.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	Inter-catchment transfers would provide additional supplies from areas of surplus, helping to maintain the security of public water supplies during a drought.	None required.	L	L	ST	Temporary	Slightly positive
	To minimise impacts on businesses and local economy	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers or surface water bodies used for recreation. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
Water	To protect and where possible enhance river flows and groundwater resources	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other water bodies and river flows/groundwater. Impact is uncertain and would depend on location of drought and source of water	None required.	L	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Depending of the quality of water being transferred, there could be impacts on water quality in the receiving catchment. The likelihood or scale/level of impact is uncertain.	Transfer treated water rather than raw or use appropriate treatment prior to release in the receiving catchment.		L-M (uncertain)	ST	Temporary	Slightly moderate negative

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
		Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers or surface water bodies, and consequently on water quality. Impact is uncertain and would depend on location of drought and source of water.	None required.	L-M	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other groundwater sources. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3.7 Bulk Transfers from other Water Companies

D.3.7.1 Option Description

There are no specific details available for what this option would entail. However, it is assumed that this would involve bulk transfers of water from neighbouring water companies using existing infrastructure, depending on the relative availability of water resources and treated water supplies.

D.3.7.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers or surface water bodies, and consequently on habitats and flora/fauna. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers or surface water bodies, and consequently on fisheries. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	It is assumed that as this option involves changing existing transfer arrangements and infrastructure, there will be no or only minimal energy requirements.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	Provision of additional supplies from areas of surplus would help to maintain security of public water supplies during a drought.	None required.	L	L	ST	Temporary	Slightly positive
	To minimise impacts on businesses and local economy	No impacts identified	None required.	N/A	N/A	N/A	N/A	No effects identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other rivers or surface water bodies used for recreation. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
Water	To protect and where possible enhance river flows and groundwater resources	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on other water bodies and river flows/groundwater. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on water quality. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Use of supplies from areas with more available resources or surplus of treated water would potentially reduce pressure on groundwater sources. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.3.8 Conjunctive Use

There are no specific details available for what this option would entail. However, it is assumed that this would involve the intelligent combined operation of surface and groundwater assets to maximise Anglian Water's potential water available for use (WAFU) with only limited amount of investment. This co-ordinated use of surface water and groundwater allows flexibility depending on the conditions e.g. surface water can be used in wet periods, and groundwater can be used in dry periods.

D.3.8.1 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Use of supplies from groundwater during dry periods would potentially reduce pressure on rivers or other surface water bodies, and consequently on habitats and flora/fauna. Impact is uncertain and would depend on the location. Water dependent ecological sites may be affected by changes in groundwater and surface water levels.	None required.	M	M	ST	Temporary	Mixed impacts – slightly positive and moderate negative
	To maintain and where possible improve freshwater fisheries	Use of supplies from groundwater during dry periods would potentially reduce pressures on rivers and other surface water bodies, and consequently on fisheries. Impact is uncertain and would depend on the location.	None required.	L	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	Conjunctive use options typically require minimal infrastructure as they propose to make use of existing assets, therefore no or only minimal energy will be required.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	Heritage assets and archaeology could have hydrological links that could be affected by changes in groundwater levels.	Identify potential vulnerable heritage assets and archology once location of the scheme is known and undertaken assessment and mitigation strategy where required.	M	M	ST	Temporary	Moderate negative
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	The option improves the resilience of water supplies as it proposes to increase surface water abstraction at times of high surface flow to allow groundwater to only be used during drier/drought surface water periods.	None required.	L	L	ST	Temporary	Slightly positive
	To minimise impacts on businesses and local economy	No impacts identified	None required.	N/A	N/A	N/A	N/A	No effects identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Use of supplies from groundwater during dry periods would potentially reduce pressure on rivers or surface water bodies used for recreation. Impact is uncertain and would depend on the location.	None required.	L	L	ST	Temporary	Slightly positive
Water	To protect and where possible enhance river flows and groundwater resources	Use of supplies from areas with more available resources, whether that is surface or groundwater, will potentially reduce pressure on other water bodies and river flows/groundwater. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Use of supplies from groundwater during dry periods would potentially reduce pressure on water quality. Impact is uncertain and would depend on location of drought and source of water.	None required.	L	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Use of supplies from surface water during in wet periods would potentially reduce pressure on groundwater sources. However, during dry periods, pressures placed on groundwater resources would increase and will potentially effect quality and quantity if it is for prolonged period. Impact is uncertain and would depend on the location.	None required.	L	L	ST	Temporary	Mixed impacts - slightly positive and slightly negative

D.4 Demand Side Management Actions Options Assessment

D.4.1 Option Type Description

Anglian Water can also introduce a number of demand side measures during a period of drought. It is assumed that the Drought Plan 2019 will include the same five demand side management actions which were included in the 2014 Plan and therefore considered in the previous 2014 SEA:

- Publicity campaigns – This is the promotion of water-efficiency via a continuous programme of direct and indirect communication with domestic use customers to encourage them to reduce their water use. Communication and awareness would be increased during a potential drought in advance of any restrictions.
- Meter optants - These are customers who opt voluntarily to have a meter installed in their property. The measure would target meter installation in areas that are most at risk of impacts of a drought.
- Leakage reduction - Efforts to reduce leakage losses would be increased during periods of potential and actual drought, by increasing the workforce in the field, reducing the time taken to ‘find and fix’ leaks in addition to continuing the regular programme of leakage reduction works.
- Temporary water use (Hosepipe) bans - Hosepipe bans primarily affecting domestic customers.
- Non-essential use bans - Restrictions on water use by domestic customers, commercial customers, and businesses.
- Emergency Drought Order (Severe Restrictions) - These are the most severe customer restrictions that can be imposed in a drought, which would only be considered in the event that water supplies were severely depleted due to an exceptional shortage of rain. In this situation Anglian Water may apply to the Secretary of State to limit or prohibit the use of water for any purpose considered appropriate, or the introduction of standpipes and rota cuts to conserve water supplies. The management of Emergency Drought Orders (Severe Restrictions) has changed for the Drought Plan 2019. In alignment with its Water Resource Management Plan (WRMP) 2019, Anglian Water are investing so that by the end of Asset Management Period 7 (AMP7) customers will not be at risk of Emergency Drought Orders (Severe Restrictions) in drought events up to 1 in 200-year severity.

D.4.2 Publicity Campaigns

D.4.2.1 Option Description

This is the promotion of water-efficiency via a continuous programme of direct and indirect communication with domestic use customers to encourage them to reduce their water use. Communication and awareness would be increased during a potential drought in advance of any restrictions.

D.4.2.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The publicity campaigns are unlikely to have a direct impact on biodiversity. However, they have the potential to reduce demand (and therefore the amount of abstraction required) which could lead to slight positive secondary effects for biodiversity, flora and fauna. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	L	L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	The publicity campaigns are unlikely to have a direct impact on fisheries. However, they have the potential to reduce demand (and therefore the amount of abstraction required) which could lead to slight positive secondary effects for fisheries. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	L	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	The publicity campaigns may have some slight positive secondary effects in terms of reducing the amount of energy required to treat and supply water as there would be reduced demand.	None required.	L	L	ST	Temporary	Slightly positive
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	Reduced demand for water, as a result of the publicity campaigns, could help to avoid the need for more restrictive measures such as temporary use bans during the drought. Therefore, the potential for slightly positive effects has been identified. However, this would entirely depend on the severity of the drought itself, so the impact is uncertain. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	L-M	L	ST	Temporary	Slightly positive
	To minimise impacts on businesses and local economy	Reduced demand for water could help to avoid the need for more restrictive measures such as temporary use bans during the drought. Therefore, the potential for slightly positive effects has been identified for other abstractors. However, this would entirely depend on the severity of the drought, so the impact is uncertain. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	L-M	L	ST	Temporary	Slightly positive
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Water	To protect and where possible enhance river flows and groundwater resources	The publicity campaigns have the potential to reduce demand (and therefore the amount of abstraction required) which could have some slight positive secondary effects for river flows and groundwater resources. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	M-H	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The publicity campaigns have the potential to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for surface water quality. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	M-H	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	The publicity campaigns have the potential to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for groundwater. There is potential that the publicity campaigns could have a permanent effect on changing customer behaviour, however changes may peak during the campaigns.	None required.	M-H	L	ST	Temporary	Slightly positive

D.4.3 Meter Optants

D.4.3.1 Option Description

These are consumers who voluntary opt in to having a water meter installed in their property. The measure would target the delivery of Anglian Water's household meter installation programme in areas that are most at risk of impacts of a drought.

D.4.3.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	The household meters would be a permanent fixture and as such could act to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for biodiversity, flora and fauna.	None required.	L	L	Lt	Permanent	Slightly positive
	To maintain and where possible improve freshwater fisheries	The household meters would be a permanent fixture and as such could act to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for fisheries.	None required.	L	L	Lt	Permanent	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	The household meters would be a permanent fixture and as such could act to reduce demand. This could have some slight positive secondary effects in terms of reducing the amount of energy required to treat and supply water. There may be additional vehicle emissions associated with the installation of the meters, however this is likely to be minimal.	None required.	L	L	LT	Permanent	Slightly positive
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	Reduced demand for water could help to avoid the need for more restrictive measures such as temporary use bans during the drought – however this would entirely depend on the severity of the drought itself, so the impact is uncertain.	None required.	L-M	L	ST	Temporary	Slightly positive
		There may be some temporary and localised increases in traffic associated with meter installation works, but it is anticipated that this could be managed through good practice and is unlikely to be strategically significant.	None available.	L-M	L	ST	Temporary	Mixed impacts
								Slightly negative
	To minimise impacts on businesses and local economy	Reduced demand for water could help to avoid the need for more restrictive measures such as temporary use bans during the drought. However, this would entirely depend on the severity of the drought, so the impact is uncertain.	None required.	L-M	L	ST	Temporary	Slightly positive
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Water	To protect and where possible enhance river flows and groundwater resources	The household meters would be a permanent fixture and as such could act to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for river flows and groundwater resources.	None required.	M-H	L	LT	Permanent	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	The household meters would be a permanent fixture and as such could act to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for surface water quality.	None required.	M-H	L	LT	Permanent	Slightly positive
	To protect and enhance groundwater quantity and quality	The household meters would be a permanent fixture and as such could act to reduce demand (and therefore the amount of abstraction required) over the long term, which could have some slight positive secondary effects for groundwater.	None required.	M-H	L	LT	Permanent	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.4.4 Leakage Reduction

D.4.4.1 Option Description

This option is an action to intensify leakage reduction efforts in periods of potential and actual drought by increasing the workforce in the field, reducing ‘find and fix’ times and prioritising workloads which continue the main activities in the Anglian Water’s leakage programme.

D.4.4.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Reduced leakage could act to reduce demand (and therefore the amount of abstraction required) over the medium term (beyond the drought period), which could have some slight positive secondary effects for biodiversity, flora and fauna. However, it is unlikely that this level of leakage reduction effort would be continued indefinitely.	None required.	M-H	L	MT	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	Reduced leakage could act to reduce demand (and therefore the amount of abstraction required) over the medium term (beyond the drought period), which could have some slight positive secondary effects for fisheries. However, it is unlikely that this level of leakage reduction effort would be continued indefinitely.	None required.	M-H	L	MT	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	Some additional energy and emissions would be associated with the physical works required to repair leaks. Reduced leakage could act to reduce demand (and therefore the amount of abstraction required) over the medium term (beyond the drought period), which could have some slight positive effects in terms of reduced energy demand (judged to outweigh the energy requirements of fixing leaks). However, it is unlikely that this level of leakage reduction effort would be continued indefinitely.	None required.	M-H	L	MT	Temporary	Slightly positive
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	Reduced leakage (and therefore demand for water) could help to avoid the need for more restrictive measures such as temporary use bans during the drought – however this would entirely depend on the severity of the drought itself, so the impact is uncertain.	None required.	L-M	L	ST	Temporary	Slightly positive
		As there is an increased cost associated with an increased effort in finding and fixing leaks, the option could result in an increase in average customer bills, which could adversely affect those less able to pay water bills.	None available.	L-M	M	LT	Permanent	Mixed impacts
	To minimise impacts on businesses and local economy	Reduced leakage (and therefore demand for water) could help to avoid the need for more restrictive measures such as temporary use bans during the drought – however this would entirely depend on the severity of the drought itself, so the impact is uncertain. There may be some temporary and localised increases in traffic associated with leakage reduction works, but it is anticipated that this could be managed through good practice and is unlikely to be strategically significant.	None required.	L-M	L	ST	Temporary	Slightly negative Slightly positive
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Water	To protect and where possible enhance river flows and groundwater resources	Reduced leakage could act to reduce demand (and therefore the amount of abstraction required) over the medium term (beyond the drought period), which could have some slight positive secondary effects on river flows and groundwater resources. However, it is unlikely that this level of leakage reduction effort would be continued indefinitely.	None required.	M-H	L	MT	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Reduced leakage could act to reduce demand (and therefore the amount of abstraction required) over the medium term (beyond the drought period), which could have some slight positive secondary effects on surface water quality. However, it is unlikely that this level of leakage reduction effort would be continued indefinitely.	None required.	M-H	L	MT	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Reduced leakage could act to reduce demand (and therefore the amount of abstraction required) over the medium term (beyond the drought period), which could have some slight positive secondary for groundwater sources. However, it is unlikely that this level of leakage reduction effort would be continued indefinitely.	None required.	M-H	L	MT	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.4.5 Temporary Water Use (Hosepipe) Bans

D.4.5.1 Option Description

This option involves banning the use of hosepipes for a temporary period of time to conserve water resources. Hosepipe bans would primarily affect domestic customers.

D.4.5.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for biodiversity, flora and fauna.	None required.	L-VH	L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for fisheries.	None required.	L-VH	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	There would be some minor impacts on households (e.g. use in gardens, car washing etc.), however in terms of health and communities as a whole, a hosepipe ban is not expected to have any adverse effects.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Water	To protect and where possible enhance river flows and groundwater resources	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for river flows and/or groundwater resources.	None required.	L-H	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for surface water quality.	None required.	L-H	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for groundwater quality.	None required.	L-H	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.4.6 Non-essential Water Bans

D.4.6.1 Option Description

This option involves restricting water use by domestic customers, commercial users and business in order to conserve water resources.

D.4.6.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for biodiversity, flora and fauna.	None required.	L-VH	L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for fisheries.	None required.	L-VH	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	There would be some minor impacts on households (e.g. use in gardens, swimming and paddling pools, car washing etc.), however in terms of health and communities as a whole, a non-essential use ban is not expected to have any adverse effects.	None required.	N/A	N/A	N/A	N/A	No effects identified
	To minimise impacts on businesses and local economy	There would be impacts on certain types of businesses such as commercial window cleaning and car washes, with localised effects.	Publicity and consultation with the affected businesses in the run up to and during the drought.	L	M	ST	Temporary	Slightly negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	There may be impacts on the quality of recreation/amenity facilities as water will be banned. Sports pitches and swimming pools could be affected by the ban.	Publicity and consultation with the affected facilities in the run up to and during the drought.	L	M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for river flows and/or groundwater resources.	None required.	L-H	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for surface water quality.	None required.	L-H	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of Drought Permit options, which could have some slight positive secondary effects for groundwater quantity.	None required.	L-H	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

D.4.7 Emergency Drought Orders (Severe Restrictions)

D.4.7.1 Option Description

This option is the most severe customer restrictions that can be imposed in a drought and would only be considered in the event that water supplies were severely depleted due to an exceptional shortage of rain. In this situation Anglian Water may apply to the Secretary of State to limit or prohibit the use of water for any purpose considered appropriate, or the introduction of standpipes and rota cuts to conserve water supplies. The management of Emergency Drought Orders (Severe Restrictions) has changed for the Drought Plan 2019. In alignment with its WRMP 2019, Anglian Water are investing so that by the end of Asset Management Period 7 (AMP7) customers will not be at risk of Emergency Drought Orders (Severe Restrictions) in drought events up to 1 in 200-year severity.

D.4.7.2 Assessment Matrix

SEA Topic	Objective	Description of Effect	Mitigation	Characteristics of Residual Effect				Significance of Residual Effect
				Sensitivity (VH / H / M / L)	Magnitude (H / M / L)	Timescale (ST / MT / LT)	Permanence	
Biodiversity, Flora and Fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for biodiversity, flora and fauna.	None required.	L-VH	L	ST	Temporary	Slightly positive
	To maintain and where possible improve freshwater fisheries	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of Drought Permit options, which could have some slight positive secondary effects for fisheries.	None required.	L-VH	L	ST	Temporary	Slightly positive
Climatic Factors	To reduce greenhouse gas emissions	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	No impacts identified.	None required.	N/A	N/A	N/A	N/A	No effects identified
Population and Human Health	Minimise adverse impacts on communities and households especially the most vulnerable groups	The impacts on the public would vary according to the measures that were included in the ban but could be widespread and have a significant effect on daily lives. Impacts on particularly vulnerable groups (e.g. the elderly and disabled) would need to be managed if extreme measures (e.g. standpipes) were used.	Widespread publicity and consultation would be required in advance of the Emergency Drought Order. Measures to protect vulnerable groups would need to be considered in developing the Drought Order.	M-VH	H	ST	Temporary	Major negative
	To minimise impacts on businesses and local economy	The restrictions on use are likely to have widespread impacts on local businesses and the economy of the area affected by the Emergency Drought Order. However, the exact nature of the effects would depend on the nature of the measures implemented/applied for at the time.	Publicity and consultation with the affected businesses would be required during the drought and in advance of the Emergency Drought Order.	M-VH	H	ST	Temporary	Major negative
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	There would be impacts on the quality of recreation/amenity facilities as water would be banned. Sports pitches and swimming pools would be affected by the ban.	Publicity and consultation with the affected facilities would be required during the drought and in advance of the Emergency Drought Order	L	M	ST	Temporary	Slightly negative
Water	To protect and where possible enhance river flows and groundwater resources	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for river flows and/or groundwater resources.	None required.	L-H	L	ST	Temporary	Slightly positive
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for surface water quality.	None required.	L-H	L	ST	Temporary	Slightly positive
	To protect and enhance groundwater quantity and quality	Reduced demand could reduce the need for abstraction during the drought or avoid the need for use of other Drought Permit options, which could have some slight positive secondary effects for groundwater quantity.	None required.	L-H	L	ST	Temporary	Slightly positive

Source: Adapted from the Drought Plan 2014 SEA (Atkins, 2013)

MOTT MACDONALD

Anglian Water Drought Plan 2019

SEA Environmental Report
Appendix E – Environmental Report Consultation Log

March 2020

Anglian Water Services Limited

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
F +44 (0)1223 461007
mottmac.com

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Anglian Water Drought Plan 2019

SEA Environmental Report
Appendix E – Environmental Report Consultation Log

March 2020

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	29.10.18	S Robinson	N Levy	P Ede	First draft for client comment
B	13.11.18	S Robinson	N Levy	P Ede	For Issue incorporating client comments
C	22.11.18	S Robinson	N Levy	P Ede	For Issue – revised following further client comments
D	06.03.20	S Robinson	N Levy	P Ede	Updated following consultation period

Document reference: 399155 | 003 | D

Information class: Standard

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E. SEA Environmental Report Consultation Responses

Table E.1 presents the responses received from the Consultation Bodies during the consultation period on the draft Drought Plan and SEA Environmental Report. The table also demonstrates how these responses have been taken into account in the SEA.

Table E.1: SEA Screening and Scoping Consultation Log

Topic	Comment	Reponses/Action
Responses from Natural England		
SEA Compliance	We believe that the approach to the assessment set out in the report meets the requirements of the Environmental Assessment of Plans and Programmes Regulations 2004 (the 'SEA Regulations'). We are generally satisfied that the report provides a thorough assessment of the effects of the draft Drought Plan 2019 on aspects of the natural environment within Natural England's remit including biodiversity, geodiversity, landscape, green infrastructure, soils, access and climate change mitigation and adaptation.	No action required.
Assessment and evaluation of impacts	The report generally considers that the draft Drought Plan, alone and in-combination, will not have significant impacts on biodiversity, including designated sites, soils, landscape and the ability to mitigate and adapt to climate change. Natural England welcomes the assessment of each of the supply side drought options and the detailed information provided about each one. However, we refer to the comments made in parts 2 and 3 of this Annex in relation to some of the site-specific Habitats Regulations Assessments (HRAs) that have been undertaken. Specifically, there is a lack of detail about the in-combination assessment with other plans or projects for some options.	The cumulative impacts section has been updated in line with the updated site-specific HRAs.
Cumulative effects	The report has not identified any cumulative effects between any of the demand management options, or between the demand management and supply side options proposed for inclusion in the draft Drought Plan 2019. We note that as there are currently insufficient details available about the additional supply side options, these have been excluded at this stage. When further information is available these options will be assessed.	Noted.
Mitigation and monitoring	Natural England supports the mitigation measures that have been identified as part of the Environmental Assessments to prevent, reduce or off-set any significant adverse environmental effects, and welcome those measures aimed at enhancing positive effects. We note that monitoring of the proposed mitigation measures will be implemented through an Environmental Action Plan. It will be vital to take remedial action should the monitoring suggest that sites are unexpectedly impacted by permit operations.	Noted.
	We support proposals for each strategy action to be subject to separate environmental impact assessment which will identify any specific mitigation or monitoring measures required. Natural England agrees that overall, the actions will make a positive contribution to delivering a sustainable draft Drought Plan 2019.	No action required.
Responses from Environment Agency		
Scoping topics	The company's Strategic Environmental Assessment (SEA) does not clearly identify whether key topics, such as landscape, are scoped in or out. It is therefore not clear whether these key topics have been missed and if so whether the impacts have been captured. We suggest that the company: • Provides a statement to clarify whether landscape features have been scoped in or out with the reasons why and update Tables 8 and 9 to reflect this statement • Strengthens the statement made with regard to soils and moves the statements made about scoping in/out SEA topics into the main text of the SEA.	Table 8 updated to reflect that landscape has been scoped and the reasons why. The statement made with regards to soils has been strengthened. An additional column has been added to Table 8 to make it clearer which topics are scoped in or out and the justification.
Influence on Plan development	It is not clear how environmental considerations have influenced the development of the plan. The company should provide a statement to identify how the environmental considerations have influenced the plan development OR acknowledge the limitations around this because the majority of options have been taken forward from the 2014 Drought Plan and were assessed through the 2013 SEA Environment Report.	A new section, section 9.7 'How Environmental Considerations Influenced the Development of the Drought Plan' has been added to Chapter 9 'Summary'. This section has also been included in the non-technical summary.

Topic	Comment	Reponses/Action
Baseline Information	The baseline information does not include flood risk which is of specific concern to the Environment Agency. The company should update the baseline information to incorporate flood risk.	The baseline has been updated to include flood risk under the 'Water' heading in Appendix B and Section 4.4.
Appendix D – Drought Permit Assessments	Appendix D – Page 4 re: Wensum – The report states "*The Drought Permit for this option is not assessed under a winter and summer permit as they are considered to effectively be the same, whenever the Drought Permit is applied for*." The risks in summer are likely to be higher within the summer.	The assessment for the River Wensum: Costessey groundwater source has been updated to differentiate between summer and winter effects.
Appendix D – Drought Permit Assessments	Appendix D – Page 17 re: 19 Colne. The following paragraph is also in the EAR and needs further explanation as discussed in the comments of the EAR. *"This option proposes to temporarily increase the current licenced abstraction at the Aldham and Balkerne groundwater sources by 3Ml/d each to provide additional augmentation to the River Colne. The abstracted groundwater would be piped to Cook's Mill where it would be discharged into the River Colne. The daily abstraction from groundwater would be increased from 16 to 22Ml/d, although 4Ml/d goes directly into public water supply therefore peak river augmentation would increase from 12 to 18Ml/d. There would be no change in the total quantity of water that can be abstracted in a five-year period."*	The paragraph identified on the River Colne Augmentation (Ardleigh Reservoir) has been amended in line with the updated description in the EAR.

MOTT MACDONALD

Anglian Water Drought Plan 2019

Strategic Environmental Assessment
Appendix F - Habitats Regulations Assessment Cumulative Effects

6 March 2020

Mott MacDonald
Ground Floor West
19A Canning Street
Edinburgh EH3 8EG
United Kingdom

T +44 (0)131 221 2300
mottmac.com

Anglian Water Services Ltd.

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Strategic Environmental Assessment
Appendix F - Habitats Regulations Assessment
Cumulative Effects

6 March 2020

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F Cumulative Effects

This document presents the cumulative effects as identified in the Habitats Regulations Assessment (HRA) for the following Drought Permit options:

- River Great Ouse: Intake (Grafham Water)
- River Nene: Intake (Rutland Water)
- River Trent: Abstraction (Hall WTW)
- River Wensum: Costessey Groundwater Source

Drought Permit Option	Cumulative Effects				
	Local Planning Applications	Environment Agency Drought Plans	Other Water Company Drought Plans	Water Company Water Resource Management Plans (WRMP)	Other Plans and Projects
River Great Ouse: Intake (Grafham Water)	**None.** No relevant local planning applications identified.	**None.** There is no overlap in European Sites considered for the Grafham Water, River Great Ouse and the Lincolnshire and Northampton or the East Anglia (East) Environment Agency drought plans.	**None.** There is no overlap in European Sites considered for the Grafham Water, River Great Ouse and the Cambridge Water, Affinity Water, Yorkshire Water or Essex and Suffolk Water drought plans. There is not expected of overlap with the Wensum and Severn Trent drought plans.	**None.** The HRA screening assessment identified likely significant effects for six options in the Anglian Water WRMP 2019. There is potential for cumulative effects for the Fenland Option, Kings Lynn Water Reuse and Kings Lynn desalination options of the WRMP with the Grafham Water, River Great Ouse. However, with implementation of appropriate mitigation presented as part of both the WRMP 2019 and Drought Plan 2019, it is considered that these will not be significant. There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Affinity Water, Severn Trent Water, Yorkshire Water, Cambridge Water or the Essex and Suffolk WRMPs.	**None.** There is no overlap in European Sites considered for Grafham Water, River Great Ouse and the Anglian Water River Basin Management Plan (RBMP) National Policy State – Sizewell C, A14 Update, Cam-MK-Ox corridor or the East West Rail.
River Nene: Intake (Rutland Water)	**Uncertain.** There is potential that some of the developments identified are under construction during the Drought Permit period	**None.** There is no overlap in European Sites considered for Rutland Water and East Anglia Area, Lincolnshire or the	**None.** There is no overlap in European Sites considered for Rutland Water and the Cambridge Water, Affinity	**None.** The HRA screening assessment identified likely significant effects for six options in the Anglian Water	**None.** Cumulative effects cannot be assessed for the WRE plan as there is currently no HRAs. There is no overlap in in

Drought Permit Option	Cumulative Effects				
	Local Planning Applications	Environment Agency Drought Plans	Other Water Company Drought Plans	Water Company Water Resource Management Plans (WRMP)	Other Plans and Projects
	(2019 to 2024) which could affect water quality of the Nene Washes European Sites. However, it is not possible to identify cumulative effects at this stage. It is likely any scheme of significant scale with potential to impact the Nene Washes will need to undertake a HRA.	Northampton, East Anglian (East) Environment Agency drought plans.	Water, Yorkshire Water or Essex and Suffolk Water drought plans. There is not expected of overlap with Rutland Water and Severn Trent drought plans.	WRMP 2019. There is potential for cumulative effects for the Kings Lynn Water Reuse and Kings Lynn Desalination options of the WRMP with Rutland Water. However, with implementation of appropriate mitigation presented as part of both the WRMP 2019 and Drought Plan 2019, it is considered that these will not be significant. There is no overlap in European Sites considered for Rutland Water and the Affinity Water, Severn Trent Water, Yorkshire Water, Cambridge Water or the Essex and Suffolk WRMPs.	European Sites considered for Rutland Water and the Anglian Water RBMP National Policy State – Sizewell C, A14 Update, Cam-MK-Ox corridor or the East West Rail.
River Trent: Abstraction (Hall WTW)	**Uncertain.** There is potential that some of the developments identified are under construction during the Drought Permit period (2019 to 2024) which could affect water quality of the Humber Estuary European Sites. However, it is not possible to identify cumulative effects at this stage. It is likely any scheme of significant scale with potential to impact the	**Uncertain.** There is potential that the Environment Agency will apply for a drought order to increase the peak transfer of water from the River Trent as part of the Lincolnshire and Northampton drought plan. Therefore, there is potential for cumulative effects of the European Sites considered for the Hall WTW, however this would need further consideration at an appropriate time.	**Uncertain.** There is uncertainty regarding the impact that predicted water level decreases associated the Hall WTW option will have on lamprey populations in the Humber Estuary European Sites. The Yorkshire Water option also considers the impact on the Humber Estuary European Sites, although no likely significant effects were identified a reduction in freshwater flows could	**None.** The HRA screening assessment identified likely significant effects for six options in the Anglian Water WRMP 2019. There is potential for cumulative effects for the Pyewipe Water Reuse option of the WRMP with the Hall WTW. However, there are no likely significant effects identified for the Pyewipe Water Reuse option due to appropriate mitigation. There is	**None.** Cumulative effects cannot be assessed for the WRE plan as there is currently no HRAs. There is no overlap in in European Sites considered for the Hall WTW and the Anglian Water RBMP National Policy State – Sizewell C, A14 Update, Cam-MK-Ox corridor or the East West Rail.

Drought Permit Option	Cumulative Effects				
	Local Planning Applications	Environment Agency Drought Plans	Other Water Company Drought Plans	Water Company Water Resource Management Plans (WRMP)	Other Plans and Projects
	Humber Estuary will need to undertake a HRA.	There is no overlap in European Sites considered for the Hall WTW and the East Anglia Area or the East Anglian (East) Environment Agency drought plans.	potentially affect river and sea lamprey. Due to the uncertainty in the effect on the European sites of Anglian Water's drought plan and the potential of both plans to have an effect on lamprey populations, in-combination LSEs cannot be ruled out. There is no overlap in European Sites considered for the Hall WTW and the Cambridge Water, Affinity Water or Essex and Suffolk Water drought plans. There is not expected of overlap with the Wensum and Severn Trent drought plans.	uncertainty surrounding the passability of two Lamprey species at Crowell Weir in relation to the Hall WTW, however likely significant effects on the European Sites were screened out. There is no overlap in European Sites considered for the Hall WTW and the Affinity Water, Severn Trent Water, Yorkshire Water, Cambridge Water or the Essex and Suffolk WRMPs.	
River Wensum: Costessey Groundwater Source	**None.** There is not anticipated to be any cumulative effects with the identified granted planning permission (Application No: 20171035) due to the temporary nature of the proposed works.	**None.** There is no overlap in European Sites considered for the Costessey Boreholes and the East Anglia, Lincolnshire and Northampton or the East Anglian (East) Area Environment Agency drought plans.	**None.** There is no overlap in European Sites considered for the Costessey Boreholes and the Cambridge Water, Affinity Water, Yorkshire Water or Essex and Suffolk Water drought plans. There is not expected of overlap with the Wensum and Severn Trent drought plans.	**None.** There is no overlap in European Sites considered between any of the options within the Anglian Water WRMP and Costessey Boreholes. There is no overlap in European Sites considered for the Costessey Boreholes and the Severn Trent Water, Affinity Water, Yorkshire Water, Cambridge Water or the Essex and Suffolk Water WRMPs.	**None.** Cumulative effects cannot be assessed for the WRE plan as there is currently no HRAs. There is no overlap in in European Sites considered for the Costessey Boreholes and the Anglian Water RBMP National Policy State – Sizewell C, A14 Update, Cam-MK-Ox corridor or the East West Rail.

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