A large teal graphic element consisting of a triangle pointing downwards from the top left, a vertical rectangle extending from the bottom left, and a trapezoidal shape connecting the top of the rectangle to the bottom of the triangle.

Anglian Water Drought Plan 2019

**Strategic Environmental Assessment Addendum
Environmental Report**

March 2020

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Abbreviations

AMP	Asset Management Period
AQMA	Air Quality Management Areas
BAP	Biodiversity Action Plan
CAMS	Catchment Abstraction Management Plan
DCLG	Department for Communities and Local Government
EAP	Environmental Action Plan
EAR	Environmental Assessment Report
EC	European Commission
EMP	Environmental Management Plan
EU	European Union
GDHI	Gross Domestic Household Income
GVA	Gross Value Added
HOF	Hands off Flow
km	Kilometres
LNR	Local Nature Reserve
LPA	Local Planning Authority
MAGIC	Multi-Agency Geographic Information for the Countryside
mm	Millimetres
NERC	Natural Environment and Rural Communities
NNR	National Nature Reserve
ODPM	Office of the Deputy Prime Minister
PRoW	Public Rights of Way
RBMP	River Basin Management Plan
RoWIP	Rights of Way Improvement Plan
RIGS	Regionally Important Geological Site
RoC	Review of Consents
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SMP	Shoreline Management Plan
pSPA	Potential Special Protection Area
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UKCP	United Kingdom Climate Projections

UKWIR	United Kingdom Water Industry Research
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRZ	Water Resource Zone
WTW	Water Treatment Works

Glossary

Baseline	A description of the present and future state of an area, in the absence of any development, taking into account changes resulting from natural events and from other human activities
Consultation Body	An authority which because of its environmental responsibilities is likely to be concerned by the effects of implementing plans and programmes and must be consulted under the SEA Directive. The Consultation Bodies designated in the SEA Regulations are Natural England, Historic England (formerly English Heritage) and the Environment Agency
Climate Change Adaptation	Involves adjustments to natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities
Climate Change Mitigation	Involves taking action to reduce the impact of human activity on the climate system, primarily through reducing greenhouse gas emissions
Mitigation Measures	Refers to measures to avoid, reduce or offset significant adverse effects
Objective	A statement of what is intended, specifying the desired direction of change in trends
Scoping	The process of deciding the scope and level of detail of a SEA, including the sustainability effects and options which need to be considered, the assessment methods to be used, and the structure and contents of the SA Report
SEA Directive	European Directive 2001/42/EC 'on the assessment of the effects of certain plans and programmes on the environment'. Transposed into UK law via The Environmental Assessment of Plans and Programmes Regulations 2004
Strategic Environmental Assessment	Generic term used internationally to describe environmental assessment as applied to policies, plans and programmes. In this report, 'SEA' is used to refer to the type of environmental assessment required under the SEA Directive
SEA Framework	This is the objectives and criteria developed for the project
SEA Objectives	These are specific objectives that have been developed for this project. They are also part of the SEA Framework, against which the project objectives and design have been tested for the purposes of this SEA

Non-Technical Summary

Introduction

Anglian Water is required to prepare and maintain statutory Drought Plans under the Water Industry Act 1991, as amended by the Water Act 2003, the Drought Plan Direction 2011, and Environment Agency guidelines. The purpose of Anglian Water's Drought Plan is to demonstrate what actions will be taken to protect public water supplies during a drought and how they intend to minimise any resulting environmental impacts.

Drought Plans are subject to Strategic Environmental Assessment (SEA) under the EU Directive 2001/42/EC, more commonly known as the SEA Directive. This is transposed into UK law via the Environmental Assessment of Plans and Programmes Regulations 2004. This SEA Environmental Report has been prepared for the Drought Plan 2019 and documents the outcomes of the SEA process.

Anglian Water

Anglian Water is the largest water and wastewater company in England and Wales by geographic area and is divided into 28 Water Resource Zones¹ (WRZs) (see Figure 1) including the South Humber Bank which is a non-potable WRZ that sits within Central Lincolnshire. It stretches from the Humber north of Grimsby, to the Thames Estuary and then from Buckinghamshire to Lowestoft on the east coast. It also covers the Hartlepool area (not shown in Figure 1).

Anglian Water supply water and water recycling services to more than six million customers in the East of England and Hartlepool. The East of England is one of the driest regions in the UK, with low rainfall (71% of the UK average) and high evaporation losses. Water supply is under pressure from population growth, climate change, sustainability reductions² and the need to increase the resilience of water supplies to severe drought.

¹ WRZs represent an area within which managing supply and demand for water resources is largely self-contained. The definition of a WRZ (from Water Resources Planning Tools (WR27), UKWIR, 2012) is: 'The largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers will experience the same risk of supply failure from a resource shortfall'.

² In some cases, water company abstractions have been found to cause, or have the potential to cause, environmental harm. As a result, the company may be required to reduce the amount of water they can abstract from the environment. If this reduces the amount of water available to put into supply, then it is known as a sustainability reduction.

Figure 1: Anglian Water Area and WRZs



Source: WRMP (Anglian Water, 2019)

The Updated Drought Plan 2019

The Drought Plan 2019 is an update to the previous iteration which was published in 2014. The Drought Plan 2019 will provide an account of how Anglian Water will ensure continued supply to customers when water resources may become depleted during periods of low rainfall.

The previous Drought Plan which was published in 2014 was also subject to SEA (Atkins, June 2013). A SEA screening exercise was undertaken for the draft Drought Plan 2019 to determine:

- Whether the Drought Plan 2019 is likely to have significant effects
- Whether there will be any new significant effects (beyond those covered in the previous 2014 Plan SEA)

- The level of SEA needed – full new SEA; update to the previous SEA; no SEA.

The screening exercise concluded that there is potential for significant effects from certain options, and therefore a SEA is required.

The scoping stage of the SEA process has been undertaken and a Scoping Report (Mott MacDonald, 2018) produced which sets the context and scope for the SEA and Environmental Report.

The SEA Screening Report and the Scoping Report (Mott MacDonald, September 2018) were issued to the Consultation Bodies (Environment Agency, Natural England, and Historic England) on the 5th of September 2018 for a five-week consultation period (further details on the consultation can be found in Section 3 of the main Environmental Report).

Drought Plan 2019 options

The majority of the options in the Drought Plan 2019 are the same as were included in the Drought Plan 2014. However, a new drought permit option has been included, as well as some changes to the previous drought permit options, and a new additional supply side option. A description of the Drought Plan 2019 including changes from the Drought Plan 2014 is presented in Table 1. The Drought Plan 2019 options cover three key drought management measures:

- Supply side management actions
- Additional supply side management options
- Demand side management actions

Anglian Water’s proposals for managing water supplies during a drought follow a ‘twin-track’ approach. In the first instance, Anglian Water will seek to manage demands on water before using any available supply side measures³.

Table 1: Changes from Drought Plan 2014

Drought Management Measures	Options the same as in the Drought Plan 2014	Options changed since the Drought Plan 2014
General	-	<ul style="list-style-type: none"> • The Drought Plan 2019 also considers a 1 in 200-year level of service, in line with the Water Resource Management Plan (WRMP) 2019
Supply side management actions (implemented through Drought Permits)	<ul style="list-style-type: none"> • River Nene: Intake (Rutland Water) • River Nene: Intake (Pitsford Reservoir) • Wellington Wellfield: Intake • River Colne Augmentation (Ardleigh Reservoir) • River Gipping: Intake (Alton Water) 	<ul style="list-style-type: none"> • River Wensum: intake relocated • River Great Ouse: Intake (Grafham Water) – new methodology for gauging low flows. The option also now proposes a two-stage Drought Permit. • River Trent: Abstraction (Hall Water Treatment Works) – new Drought Permit option
Additional supply side management options (do not require Drought Permits)	<ul style="list-style-type: none"> • Management of inter-company transfers (using existing infrastructure) • Road tankering of water to areas where supplies are low • Desalination of brackish water (using mobile plant) 	-

³ Supply side management actions are measures that may be taken to increase supplies of water during a drought, over and above ordinary activities

	<ul style="list-style-type: none"> 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 (using existing infrastructure) Bulk transfers of water from other water companies (using existing infrastructure) Conjunctive use⁴ 	
Demand side management actions	<ul style="list-style-type: none"> Publicity campaigns Meter optants Leakage Temporary water use (Hosepipe) bans Non-essential use ban restrictions 	<ul style="list-style-type: none"> Emergency Drought Orders (Severe Restrictions) – after the end of AMP7, these will only be required in a drought event with a return period greater than 1 in 200 years as a result of WRMP 2019 investment.

The following sections describe the different demand and supply side options included in the Drought Plan 2019. These options are likely to be implemented in a phased approach according to need.

Supply side management actions

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.

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. Although there are two Drought Orders outlined in the Drought Plan 2014 these are changes to Environment Agency licences and Anglian Water “would expect to discuss each of them with the Environment Agency to determine the requirements for an environmental assessment in advance of a Drought Order application”⁵. Therefore, only Drought Permits have been assessed as part of the SEA.

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 includes eight supply side options that would require a Drought Permit. All options, excluding the River Trent option and the changes described in Table 1, were included in the previous Drought Plan 2014, and therefore considered in the previous SEA:

- River Wensum: Costessey groundwater source - Increasing the amount of abstraction permitted from groundwater sources at Costessey.

⁴ Conjunctive use was included as a high-level option in the Drought Plan 2014 but was not included in the associated SEA.

⁵ Anglian Water Drought Plan 2014, page 90

- River Nene: Intake (Rutland Water) - Changing the current conditions attached to the abstraction from the River Nene, which would allow Anglian Water to take more of its licensed abstraction quantities. This will enable increased refilling of Rutland Water during a drought.
- River Nene: Intake (Pitsford Reservoir) - Changing the current conditions attached to the abstraction from the River Nene, which would allow Anglian Water to take more of its licensed abstraction quantities. This will enable increased refilling of Pitsford Reservoir during a drought.
- River Great Ouse: Intake (Grafham Water) - Changing the current conditions attached to the abstraction from the River Great Ouse, which would allow Anglian Water to take more of its licensed abstraction quantities. This will enable increased refilling of Grafham Water during a drought.
- Wellington Wellfield: Intake - Increasing the amount of abstraction permitted from groundwater sources at the Wellington Wellfield to reduce reliance on surface water intake.
- River Colne Augmentation (Ardleigh Reservoir) - Increasing abstraction from a groundwater source to supplement flows in the River Colne. This additional water would then be taken out of the river and used to refill Ardleigh Reservoir.
- River Gipping: Intake (Alton Water) - Changing the current conditions to allow increased abstraction from groundwater boreholes in the Suffolk area.
- River Trent: Abstraction (Hall Water Treatment Works (WTW)) – Temporarily reducing the hands-off flow (HOF), thereby allowing abstraction from the River Trent for Hall WTW to continue in conditions below the minimum permissible flow. This is a new option that wasn't included in the Drought Plan 2014. Further details on this option are presented in Section 2.3 of the main Environmental Report.

To support the Drought Plan 2019 individual environmental assessments have been carried out for each of the potential Drought Permit options using a structured approach that fits the three-stage process for the assessment of environmental risk, as described in Section H.1 of the Environment Agency's Drought Plan guidance (Environment Agency, 2011), and to provide the information required in relation to monitoring and mitigation. Where required Habitats Regulations Assessments (HRAs) have also been carried out to assess effects on Natura 2000 sites. These environmental assessments and HRAs were used to inform the SEA.

Additional supply side management options

There are some potential additional supply side management options that may be considered during a drought. The additional supply side management options have been assessed based on a broad approach which reflects the level of information available for these alternatives. Specific information of the location and scale of many of these options are unknown at this stage and will be investigated in more detail by Anglian Water on an ongoing basis.

The Drought Plan 2019 includes the same additional supply side options that were included in the Drought Plan 2014 and therefore considered in the previous SEA. There is one additional option, conjunctive use, which was not considered in the previous SEA. The additional supply side management options are:

- Management of inter-company transfers (using existing infrastructure)
- Road tankering of water to areas where supplies are low
- Desalination of brackish water (using mobile plant)
- 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 (using existing infrastructure)
- Bulk transfers of water from other water companies (using existing infrastructure)
- Conjunctive use (involves the co-ordinated use of surface water and groundwater and allows flexibility depending on the conditions).

A number of 'interim' supply side options are being considered for drought deficits identified in the Water Resources Management Plan (WRMP) 2019. These options are 'interim' solutions and are currently being developed. They have not been included in the assessment as part of the SEA as there are insufficient option details to undertake a meaningful assessment.

Demand side management actions

Anglian Water can also introduce a number of demand side measures during a period of drought. The Drought Plan 2019 includes the same six demand side management actions which were included in the Drought Plan 2014 and therefore considered in the previous SEA. These are:

- 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 Orders (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 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.

The SEA Process

A SEA is required for the Anglian Water Drought Plan 2019 under the SEA Directive and the Environmental Assessment of Plans and Programmes Regulations 2004, which requires an assessment of the effects of certain plans and programmes on the environment.

The SEA also works to inform the decision-making process through the identification and assessment of significant and cumulative effects a plan or programme may have on the

environment. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders.

To support the development of the Drought Plan, Anglian Water commissioned Mott MacDonald to conduct a SEA.

This Environmental Report presents the results of the SEA process for the Drought Plan 2019 including:

- A summary of the SEA Scoping stage
- The results of the Drought Plan 2019 options assessment which was undertaken to assess the options using the SEA Framework and develop appropriate mitigation measures
- Details of monitoring proposals to be implemented by Anglian Water during the Drought Plan 2019 period

SEA Scoping Stage Results

The scoping stage of the SEA process sets the context and scope for the SEA and Environmental Report. The SEA Screening Report and the Scoping Report (Mott MacDonald, September 2018) were issued to the Consultation Bodies (Environment Agency, Natural England, and Historic England) on the 5th of September 2018 for a five-week consultation period. A log of consultation comments and report updates is provided in Appendix C of the main Environmental Report.

The scoping process identified the relevant plans and programmes at International, National, Regional, and Local level and their implications for the SEA and Drought Plan 2019. Scoping also set the environmental, social, and economic baseline context for the Anglian Water area, and identified key environmental and sustainability challenges and opportunities.

A key stage in the SEA process is the development of the SEA Framework which includes SEA objectives and indicators. The previous SEA Framework used in the 2013 SEA has been reviewed and used for the Drought Plan 2019 because it is relevant for the 2019 SEA, it has been refined through previous consultation, and it will maintain a consistent approach.

The SEA objectives for the Drought Plan 2019 are:

- To protect and where feasible enhance biodiversity including designated and other important habitats and species
- To maintain and where possible improve freshwater fisheries
- To reduce greenhouse gas emissions
- To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings
- Minimise adverse impacts on communities and households especially the most vulnerable groups
- To minimise impacts on businesses and local economy
- Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside
- To protect and where possible enhance river flows and groundwater resources
- To protect and where feasible enhance the quality of surface, transitional and coastal waters
- To protect and enhance groundwater quantity and quality

Options Assessment

The assessment approach follows the same methodology used for the previous SEA of the Drought Plan 2014. The overall approach to the SEA is objective-led and the Drought Plan 2019 options have been assessed against the SEA objectives using the assessment questions developed as part of the SEA Framework.

The assessment was based on a qualitative seven-point scale as presented in Table 2 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 2: 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)

Assessment of the Drought Plan 2019 Options

Summary of Effect of Supply Side Management Options

The assessment results for the supply side management options are summarised in Table 3.

The main issues which have been identified for the supply side management options are as follows:

- The impacts associated with summer Drought Permits tend to be more significant than if they were implemented during winter months.
- The majority of the adverse effects identified for the surface water intake options are secondary impacts and relate to reductions in water quality and flows associated with increased abstraction. Mitigation measures have been proposed for the majority of the potential impacts.
- The best performing option against the objectives is one of the groundwater options due to positive effects on water levels and quality.
- There is no material difference to the impacts of the groundwater options whether they are used in summer or in winter.

Summary of Effects of Additional Supply Side Management Options

The assessment results for the additional supply side management options are summarised in Table 4.

The additional supply side management options perform relatively well against the SEA Framework with slight positive effects identified for many of the objectives. To maintain the security of water supply during a drought, these options involve the transfer of water from areas with higher resource availability or use sources that do not directly come from rivers or aquifers. This helps to support 'natural flows' in rivers and reduces the need for abstraction which also reduces pressure on the various environmental parameters.

However, there is also the potential for negative effects from these options. The option for tankering water poses risks for the community due to added inconvenience and the possibility of facing further restrictions as well as disruption to the local economy and effects on climatic factors from increased vehicle movements. There is also the potential for moderate negative effects on climatic factors due to energy intensive processes for brackish water desalination and the return of tidal effluent. Desalination options also have the potential for negative effects on biodiversity and water quality through brine discharge. Conjunctive use options have the potential for negative effects on biodiversity and heritage assets through changes in ground and surface water levels. Other negative effects could occur from the introduction of water from different sources into surface water systems, potentially effecting surface water quality and biodiversity, flora and fauna.

Summary of Effect of Demand Management Options

The assessment results for the demand management options are summarised in Table 5.

The demand side options perform relatively well against the SEA objectives with many of the options having slightly positive effects. A number of these options involve reducing water demand which therefore reduces the amount of abstraction required, retaining water in the natural environment. This helps to secure water supply during a period of drought whilst also helping to alleviate risks for the various environmental parameters.

There are also slight and major negative effects which have been identified for a number of the demand side options. Both the meter options and leakage reduction options will likely result in a reduction in the amount of water lost from leakages, however there are increased costs associated with finding and fixing leaks which could be passed on to the customer. There is also the potential for the non-essential use ban to negatively affect certain types of businesses as well as recreation amenities and facilities. Major negative effects on communities and the local economy have been identified as a result of the Emergency Drought Order (Severe Restrictions) due to the high level of restriction that would be required.

Summary of Cumulative Effects

An assessment of the potential cumulative effects of the Drought Plan 2019 has also been undertaken. This has included an assessment of the effects within the Drought Plan 2019 (between the Drought Plan 2019 options), and of the potential effects of the Drought Plan 2019 with other plans and programmes of particular relevance.

The cumulative assessment identified potential for cumulative effects for the Pitsford Reservoir and Rutland water options, which both abstract from the River Nene. It is considered that additive effects could occur if both options were deployed during the summer months. However, potentially affected abstractors are independent of each abstraction point and would not be subject to any cumulative effects. There are no pathways for additive effects between river flows and water quality. The impacts identified for winter permits do not share many common overlaps.

The assessment of the potential for cumulative impacts between the Drought Plan 2019 and other neighbouring water company Drought Plans, and the Anglian Water WRMP 2019, identified no specific pathways for cumulative impacts.

Mitigation and Monitoring

Mitigation has been integrated throughout both the Drought Plan 2019 and SEA processes. The SEA has only reported the likely residual environmental effects of the Drought Plan 2019 options following mitigation. The mitigation measures considered within the residual impacts include those that have been identified as part of the Environmental Assessments, and any additional mitigation that has been identified as part of the SEA option appraisals. The latter has been proposed where impacts may fall outside of the specific remit of the Environmental Assessments but is required to address any specific issues identified through the SEA process.

Provision for monitoring of the effects of Anglian Water's Drought Plan 2019 is provided for by an Environmental Monitoring Plan (EMP), which is appended to the Drought Plan 2019. This sets out the monitoring that has been proposed within the individual Environmental Assessment Reports.

The mitigation and monitoring measures outlined within the most recent Environmental Assessment Reports largely coincide with the recommendations within the SEA Environmental Report.

How Environmental Considerations Influenced the Development of the Drought Plan

The majority of the options have been taken forward from the Drought Plan 2014 and were assessed through the 2013 SEA Environmental Report, therefore, there were limitations with regards to the extent that environmental considerations influenced the development of the Drought Plan 2019. There was more opportunity to influence mitigation and monitoring for the Drought Permit options and through the EARs, HRAs and SEA, a comprehensive set of mitigation measures and monitoring requirements have been set out to minimise effects on the environment and communities.

Consultation

The SEA Environmental Report was published for consultation, alongside the draft Drought Plan 2019. Following consultation, the SEA Environmental Report was updated to reflect consultation comments and any changes between the draft and final Drought Plan 2019. A log of consultation comments and report updates is included in Appendix E of the main Environmental Report.

Table 3: Summary of Performance of Supply Side Management Options

Option	River Gipping: Intake (Alton Water)	River Colne Augmentation (Ardleigh Reservoir)	River Wensum: Costessey groundwater source		River Great Ouse: Intake (Grafham Water)		River Nene: Intake (Pitsford Reservoir)		River Nene: Intake (Rutland Water)		Wellington Wellfield: Intake	River Trent: Abstraction (Hall WTW)
	Winter		Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter		
	East Suffolk & Essex	East Suffolk & Essex	Norwich & The Broads	Norwich & The Broads	Ruthamford	Ruthamford	Ruthamford	Ruthamford	Ruthamford	Ruthamford	Norfolk Rural	Central Lincolnshire
1 Biodiversity	-	0	--	-	--	-	--	-	--	-	0	0
2 Fisheries	-	+	-	--	--	-	--	-	--	-		-
3 Climatic Factors												
4 Historic Environment	0	0	0	0	0	0	0	0	0	0	0	0
5 Communities												
6 Economy	-	-	--	--	-		-		--	-	-	
7 Recreation	-	+	-	-	--	-	-	0	--	-		
8 Water Resources	-	0	--	--	-	--	--	-	--	-	-	-
9 SW Quality	-	+	--	-	+/-	+/-	+/-	+/-	+/-	+/-	0	0
10 GW Quality	-	-	-	-							-	

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

Table 4: Summary of Performance of Additional Supply Side Options

Option Objective	Management of inter-company transfers	Road tankering	Brackish desalination	Return of tidal effluent	Inter-catchment transfers	Bulk transfers from other water companies	Conjunctive use
1. Biodiversity	+		-- AND +	- / - - AND +	-- / - - - AND +	+	- - AND +
2. Fisheries	+		+	- / - - AND +	-- / - - - AND +	+	+
3. Climatic factors		-	--	--			
4. Historic Environment							- -
5. Communities	+	--	+	+	+	+	+
6. Economy		-					
7. Recreation	+		+	+	+	+	+
8. Water resources	+		+	+	+	+	+
9. Surface water quality	+		-- AND +	- / - - AND +	- / - - AND +	+	+
10. Groundwater quality	+		+	+	+	+	+ AND -

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

Table 5: Summary of Performance of Demand Management Options

Option Objective	Publicity Campaigns	Meter Optants	Leakage Reduction	Hosepipe Bans	Non-Essential Use Bans	Emergency Drought Order (Severe Restrictions)
1. Biodiversity	+	+	+	+	+	+
2. Fisheries	+	+	+	+	+	+
3. Climatic factors	+	+	+			
4. Historic Environment						
5. Communities	+	- AND +	- AND +			- - -
6. Economy	+	+	+		-	- - -
7. Recreation					-	-
8. Water resources	+	+	+	+	+	+
9. Surface water quality	+	+	+	+	+	+
10. Groundwater quality	+	+	+	+	+	+

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

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)

1 Introduction

1.1 Introduction

Water companies in England and Wales are required to prepare and maintain statutory Drought Plans under the Water Industry Act 1991, as amended by the Water Act 2003, the Drought Plan Direction 2011, and Environment Agency guidelines. The purpose of Anglian Water's Drought Plan is to demonstrate what actions will be taken to protect public water supplies during a drought and how they intend to minimise any resulting environmental impacts.

Drought Plans are subject to Strategic Environmental Assessment (SEA) under the EU Directive 2001/42/EC, more commonly known as the SEA Directive. This is transposed into UK law via the Environmental Assessment of Plans and Programmes Regulations 2004. This SEA Environmental Report has been prepared for the Drought Plan 2019 and documents the outcomes of the SEA process.

1.2 Background to the Drought Plan 2019 and SEA

The Drought Plan 2019 is an update to the previous Drought Plan which was published in 2014. The Drought Plan 2014 was subject to SEA (Atkins, June 2013). The majority of the options in the Drought Plan 2019 are the same as were included in the Drought Plan 2014. However, a new drought permit option has been included, as well as changes to the previous drought permit options. A description of the Drought Plan 2019 including changes from the Drought Plan 2014 are presented in Chapter 2.

A SEA screening exercise was undertaken to determine:

- Whether the Drought Plan 2019 is likely to have significant effects
- Whether there will be any new significant effects (beyond those covered in the previous Drought Plan 2014 SEA)
- The level of SEA needed – full new SEA; update to the previous SEA; no SEA.

The screening exercise concluded that there is potential for significant effects from certain options and therefore, a SEA is required.

The scoping stage of the SEA process has been undertaken and a Scoping Report produced which sets the context and scope for the SEA and Environmental Report.

The SEA Screening Report and the Scoping Report (Mott MacDonald, September 2018) were issued to the Consultation Bodies (Environment Agency, Natural England, and Historic England) on the 5th of September 2018 for a five-week consultation period (further details on the consultation can be found in Section 3).

1.3 The SEA Process

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

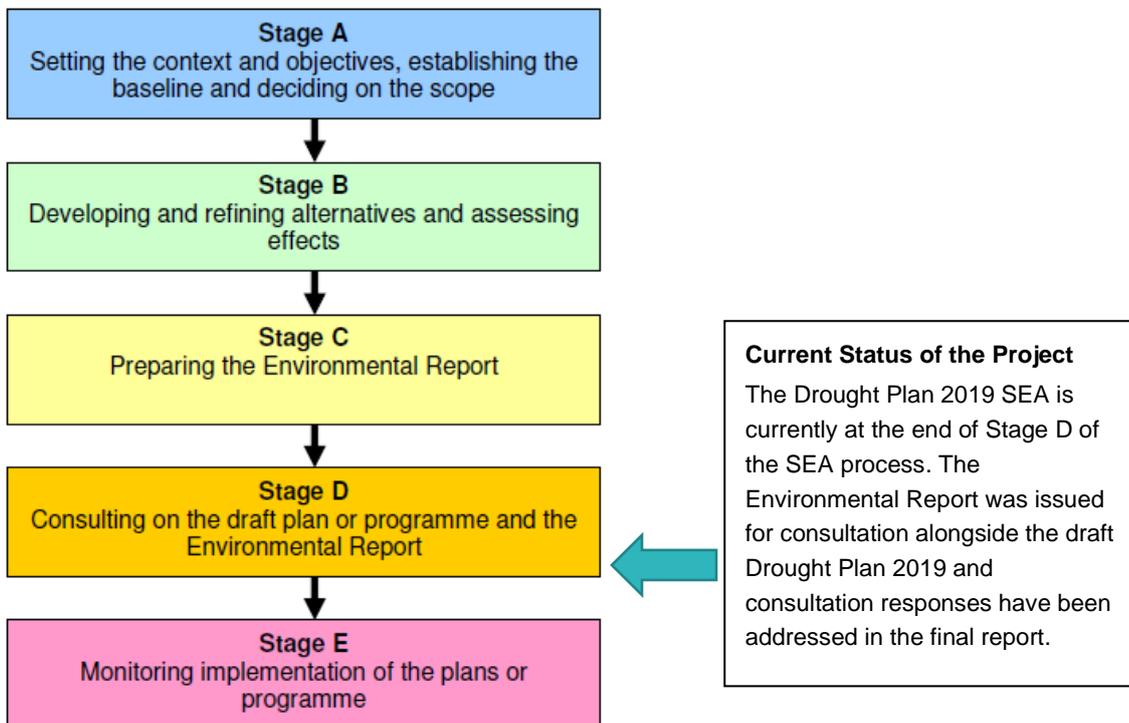
The SEA also works to inform the decision-making process through the identification and assessment of significant and cumulative effects a plan or programme may have on the

environment. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders. Figure 2 shows the different stages in the SEA process.

The Anglian Water Drought Plan 2019 SEA will be carried out in accordance with the following guidance:

- UKWIR (2012) Strategic Environmental Assessment and Habitat Regulations Assessment – Guidance for Water Resources Management Plans and Drought Plans (ref. 12/WR/02/7);
- Office of Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) (September 2005) A Practical Guide to the Strategic Environmental Assessment Directive;
- Environment Agency (August 2011) Strategic Environmental Assessment and Climate Change: Guidance for Practitioners; and
- Historic England (December 2016) Sustainability Appraisal and Strategic Environmental Assessment – Historic England Advice Note 8.

Figure 2: SEA Process Stages



1.4 The purpose of the Assessment Stage and Environmental Report

The purpose of the Assessment Stage (Stage B of the SEA process) and Environmental Report (Stage C of the SEA process) (see Figure 2 for the SEA process stages) was to review the options for the Drought Plan 2019 and identify any potential effects (positive and negative). The following key tasks have been undertaken as part of this process:

- Review of the Anglian Water Drought Plan 2019 Scoping Report
- Review of the Anglian Water Drought Plan 2014 Environmental Report (Atkins, 2013)

- Review of the updated drought permit options including the new Environmental Assessment Reports (EARs) and Habitats Regulations Assessment (HRA) Reports (where these were required)
- Identification and evaluation of the predicted effects of the Drought Plan 2019 options through assessment using the SEA Framework
- Identification and evaluation of the cumulative effects of the Drought Plan 2019
- Identification of mitigation measures and opportunities to maximise benefits
- Development of monitoring proposals to be implemented by Anglian Water during the Drought Plan 2019 period
- Preparation of a SEA Environmental Report for public consultation
- Address consultation comments and finalise Environmental report for submission

The SEA Environmental Report was published for consultation, alongside the draft Drought Plan 2019. Following consultation, the SEA Environmental Report was updated to reflect consultation comments and any changes between the draft and final Drought Plan 2019. A log of consultation comments and report updates is included in Appendix E of this SEA Environmental Report.

In order to produce this SEA Environmental Report, Mott MacDonald has relied on published data and information provided by Anglian Water and from third party organisations. The baseline information collected in the SEA Scoping Report was the most up-to-date information available; however, it is possible that conditions described in this report may change over time. This dataset was reviewed and updated as appropriate throughout the SEA process, as new information becomes available. The consultation process aimed to address and minimise any gaps in information to ensure all potential environmental effects have been considered with regard to the Drought Plan 2019.

1.5 Compliance with the SEA Directive

This Environmental Report has been prepared in accordance with the requirements of the SEA Directive. Table 6 indicates where the specific requirements in the SEA Directive relating to the Environmental Report (SEA Directive Annex I) can be found within this report.

Table 6: SEA Directive Requirements Signposting Table

SEA Directive Environmental Report Requirements	Section of Environmental Report where Requirement is found
An outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes	Chapter 2, Section 4.2, Section 7.2, Appendix A
The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme	Section 4.4, Appendix B
The environmental characteristics of areas likely to be significantly affected	Section 4.4, Appendix B
Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC	Section 4.4, Appendix B
The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation	Section 4.2 – 4.3, Appendix A
The likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil,	Chapter 5, Chapter 6, Appendix D

water, air, climatic factors, material assets, historic environment ⁶ , landscape and the interrelationship between the above factors	
The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme	Chapter 8, Appendix D
An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information	Chapter 5
A description of the measures envisaged concerning monitoring in accordance with Article 10	Chapter 8
A non-technical summary of the information provided under the above headings	Non-technical summary at start of report

Source: SEA Directive Annex I

1.6 Environmental Report Structure

This Environmental Report is structured as follows:

- Chapter 1 – Introduction to the Drought Plan 2019 and SEA process and requirements
- Chapter 2 – Description and context of the Drought Plan 2019
- Chapter 3 – Consultation
- Chapter 4 – Summary of the Scoping Stage tasks (from the Scoping Report), including the plans and programmes review, baseline, key issues and opportunities, and the SEA Framework
- Chapter 5 – Options assessment methodology
- Chapter 6 – Description and assessment of the Drought Plan 2019
- Chapter 7 – Cumulative effects within the Drought Plan 2019 and with other plans
- Chapter 8 – Proposals for mitigation and monitoring of effects of the Drought Plan 2019
- Chapter 9 – Summary
- Appendix A – Plans and programmes review
- Appendix B – Baseline information, and Key issues and opportunities
- Appendix C – Screening and Scoping Report consultation log
- Appendix D – SEA Options Assessment
- Appendix E – Environmental Report consultation log

1.7 Compliance with other legislation

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

⁶ Historic environment covers the SEA Directive topic cultural heritage including architectural and archaeological heritage

The Drought Plan 2019 area contains a number of European sites, and some of the options for the Drought Plan 2019 have the potential, either alone or in combination, to result in significant effects on one or more European sites. HRAs have been undertaken for the relevant drought permit options in the Drought Plan 2019. These HRAs are presented in separate reports but have been used to inform the SEA.

The Water Framework Directive (WFD) (2000/60/EC) aims to protect, restore and enhance Europe's aquatic ecosystems. The overall objective of the WFD is to ensure all inland, transitional, coastal and groundwaters achieve a good status based on a number of parameters. If a project or plan has the potential to have an impact on WFD parameters, then an assessment is required to determine the extent of these effects. The Drought Plan 2019 contains a number of Drought Permit options which could potentially affect the WFD status for the waterbody in which they are located, therefore WFD assessments have been completed for all the supply side management options.

2 Description and Context of the Drought Plan 2019

2.1 Background and purpose

Anglian Water is the largest water and wastewater company in England and Wales by geographic area and is divided into 28 Water Resource Zones⁷ (WRZs) (see Figure 3) including the South Humber Bank which is a non-potable WRZ that sits within Central Lincolnshire. It stretches from the Humber north of Grimsby, to the Thames Estuary and then from Buckinghamshire to Lowestoft on the east coast. It also covers the Hartlepool area (not shown in Figure 3).

Anglian Water supply water and water recycling services to more than six million customers in the East of England and Hartlepool⁸. The East of England is one of the driest regions in the UK, with low rainfall (71% of the UK average) and high evaporation losses. Water supply is under pressure from population growth, climate change, sustainability reductions⁹, and the need to increase resilience of water supplies to severe drought.

Water companies have a statutory obligation to produce a Drought Plan. The Anglian Water Drought Plan 2019 will demonstrate how Anglian Water intends to protect public water supplies before, during and after a drought whilst also minimising any potential environmental effects.

⁷ WRZs represent an area within which managing supply and demand for water resources is largely self-contained. The definition of a WRZ (from Water Resources Planning Tools (WR27), UKWIR, 2012) is: 'The largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers will experience the same risk of supply failure from a resource shortfall'.

⁸ Water Resources Management Plan (Anglian Water, 2019)

⁹ In some cases, water company abstractions have been found to cause, or the potential to cause, environmental harm. As a result, the company may be required to reduce the amount of water they can abstract from the environment. If this reduces the amount of water available to put into supply, then it is known as a sustainability reduction.

Figure 3: Anglian Water Area and WRZs



Source: WRMP (Anglian Water, 2019)

2.2 Description of the Drought Plan 2019

The Drought Plan 2019 is an update to the previous iteration which was published in 2014. The Drought Plan 2019 will provide an account of how Anglian Water will ensure continued supply to customers when water resources may become depleted during periods of low rainfall.

The majority of the options included in the 2019 Drought Plan will remain the same as the Drought Plan 2014. These options cover three key drought management measures:

- Supply side management actions
- Additional supply side management options

- Demand side management actions

Anglian Water’s proposals for managing water supplies during a drought follow a ‘twin-track’ approach. In the first instance, Anglian Water will seek to manage demands on water before using any available supply side measures¹⁰.

The changes from the Drought Plan 2014 are presented in Table 7.

Table 7: Changes from Drought Plan 2014

Drought Management Measures	Options the same as in the Drought Plan 2014	Options changed since the Drought Plan 2014
General	-	<ul style="list-style-type: none"> • The Drought Plan 2019 also considers a 1 in 200-year level of service, in line with the Water Resource Management Plan (WRMP) 2019
Supply side management actions (implemented through Drought Permits)	<ul style="list-style-type: none"> • River Nene: Intake (Rutland Water) • River Nene: Intake (Pitsford Reservoir) • Wellington Wellfield: Intake • River Colne Augmentation (Ardleigh Reservoir) • River Gipping: Intake (Alton Water) 	<ul style="list-style-type: none"> • River Wensum: intake relocated • River Great Ouse: Intake (Grafham Water) – new methodology for gauging low flows. The option also now proposes a two-stage Drought Permit. • River Trent: Abstraction (Hall WTW) – new Drought Permit option
Additional supply side management options (do not require Drought Permits)	<ul style="list-style-type: none"> • Management of inter-company transfers (using existing infrastructure) • Road tankering of water to areas where supplies are low • Desalination of brackish water (using mobile plant) • 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 (using existing infrastructure) • Bulk transfers of water from other water companies (using existing infrastructure) • Conjunctive use¹¹ 	-
Demand side management actions	<ul style="list-style-type: none"> • Publicity campaigns • Meter optants • Leakage • Temporary water use (Hosepipe) bans • Non-essential use ban restrictions 	<ul style="list-style-type: none"> • Emergency Drought Orders (Severe Restrictions) – after the end of AMP7, these will only be required in a drought event with a return period greater than 1 in 200 years as a result of WRMP 2019 investment.

The following sections describe the different demand and supply side options included in the Drought Plan 2019. These options are likely to be implemented in a phased approach according to need.

2.2.1 Supply side management actions

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

¹⁰ Supply side management actions are measures that may be taken to increase supplies of water during a drought, over and above ordinary activities

¹¹ Conjunctive use was included as a high-level option in the Drought Plan 2014 but was not included in the associated SEA.

some cases, to help conserve reservoir storage. Groundwater options seek to supplement water supply.

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. Although there are two Drought Orders outlined in the Drought Plan 2019 these are changes to Environment Agency licences and Anglian Water “would expect to discuss each of them with the Environment Agency to determine the requirements for an environmental assessment in advance of a Drought Order application”¹². Therefore, only Drought Permits have been assessed as part of the SEA.

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 includes eight supply side options that would require a Drought Permit. All options, excluding the River Trent option and the changes described in Table 2, were included in the previous Drought Plan 2014, and therefore considered in the previous SEA:

- River Wensum: Costessey groundwater source - Increasing the amount of abstraction permitted from groundwater sources at Costessey.
- River Nene: Intake (Rutland Water) - Changing the current conditions attached to the abstraction from the River Nene, which would allow Anglian Water to take more of its licensed abstraction quantities. This will enable increased refilling of Rutland Water during a drought.
- River Nene: Intake (Pitsford Reservoir) - Changing the current conditions attached to the abstraction from the River Nene, which would allow Anglian Water to take more of its licensed abstraction quantities. This will enable increased refilling of Pitsford Reservoir during a drought.
- River Great Ouse: Intake (Grafham Water) - Changing the current conditions attached to the abstraction from the River Great Ouse, which would allow Anglian Water to take more of its licensed abstraction quantities. This will enable increased refilling of Grafham Water during a drought.
- Wellington Wellfield: Intake - Increasing the amount of abstraction permitted from groundwater sources at the Wellington Wellfield to reduce reliance on surface water intake.
- River Colne Augmentation (Ardleigh Reservoir) - Increasing abstraction from a groundwater source to supplement flows in the River Colne. This additional water would then be taken out of the river and used to refill Ardleigh Reservoir.
- River Gipping: Intake (Alton Water) - Changing the current conditions to allow increased abstraction from groundwater boreholes in the Suffolk area.
- River Trent: Abstraction (Hall WTW) – Temporarily reducing the hands-off flow (HOF), thereby allowing abstraction from the River Trent for Hall WTW to continue in conditions below the minimum permissible flow. This is a new option that wasn't included in the Drought Plan 2014. Further details on this option are presented in Section 2.3.

¹² Anglian Water Drought Plan 2014, page 90

To support the Drought Plan 2019 individual environmental assessments have been carried out for each of the potential Drought Permit options using a structured approach that fits the three-stage process for the assessment of environmental risk, as described in Section H.1 of the Environment Agency's Drought Plan guidance (Environment Agency, 2011), and to provide the information required in relation to monitoring and mitigation. Where required HRAs have also been carried out to assess effects on Natura 2000 sites. These environmental assessments and HRAs were used to inform the SEA.

2.2.2 Additional supply side management options

There are some potential additional supply side management options that may be considered during a drought. The additional supply side management options have been assessed based on a broad approach which reflects the level of information available for these alternatives. Specific information of the location and scale of many of these options are unknown at this stage and will be investigated in more detail by Anglian Water on an ongoing basis.

The Drought Plan 2019 includes the same additional supply side options that were included in the Drought Plan 2014 and therefore considered in the previous SEA. There is one additional option, conjunctive use, which was not considered in the previous SEA. The additional supply side management options are:

- Management of inter-company transfers (using existing infrastructure)
- Road tankering of water to areas where supplies are low
- Desalination of brackish water (using mobile plant)
- 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 (using existing infrastructure)
- Bulk transfers of water from other water companies (using existing infrastructure)
- Conjunctive use (involves the co-ordinated use of surface water and groundwater and allows flexibility depending on the conditions)

A number of 'interim' supply side options are being considered for drought deficits identified in the Water Resources Management Plan (WRMP) 2019. These options are 'interim' solutions and are currently being developed. They have not been included in the assessment as part of the SEA as there are insufficient option details to undertake a meaningful assessment. Supply side options in the WRMP such as transfers have been assessed as part of the SEA for the WRMP.

2.2.3 Demand side management actions

Anglian Water can also introduce a number of demand side measures during a period of drought. The Drought Plan 2019 includes the same six demand side management actions which were included in the Drought Plan 2014 and therefore considered in the previous SEA. These are:

- 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 Orders (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 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.

2.3 River Trent: Abstraction (Hall WTW)

The River Trent option is a new Drought Permit option included in the Drought Plan 2019 and has therefore not been previously assessed as part of a SEA. The River Trent option will involve abstraction from the river for Hall WTW. Anglian Water would seek to temporarily reduce the HOF to allow abstraction to continue in conditions below the minimum permissible flow. This will need to be implemented through a Drought Permit.

The River Trent is the third largest river in England, draining a catchment area of around 10,000km², most of which is upstream of the Hall abstraction point. There is a variety of conditions across the catchment, including upland areas in the Peak District, heavily urbanised parts in the west and lowland areas downstream of Nottingham. Average rainfall ranges from 1500mm in the upper catchment to around 600mm in the downstream sub-catchments.

The Trent is one of two major contributors to the Humber estuary, and is responsible for slightly less than the 50% of the contributing catchment area, but only 40% of average flow due to the Humber's other main contributor, the Ouse, having sub-catchments with significantly higher rainfall and run-off on average than those contributing to the Trent.

There are significant artificial influences on the Trent's flow which includes water supply reservoirs, groundwater abstraction, industrial abstraction and discharges, and discharges from sewage treatment works. The Trent's contribution to low flows is close to 50% which reflects the artificial influences, in particular the fact that discharges to the Trent from sewage works exceed abstraction levels. As the abstraction point at Hall is located within the tidally influenced reach of Trent, the variations in water levels may be more dependent on the tidal conditions downstream rather than the fluvial flow from upstream.

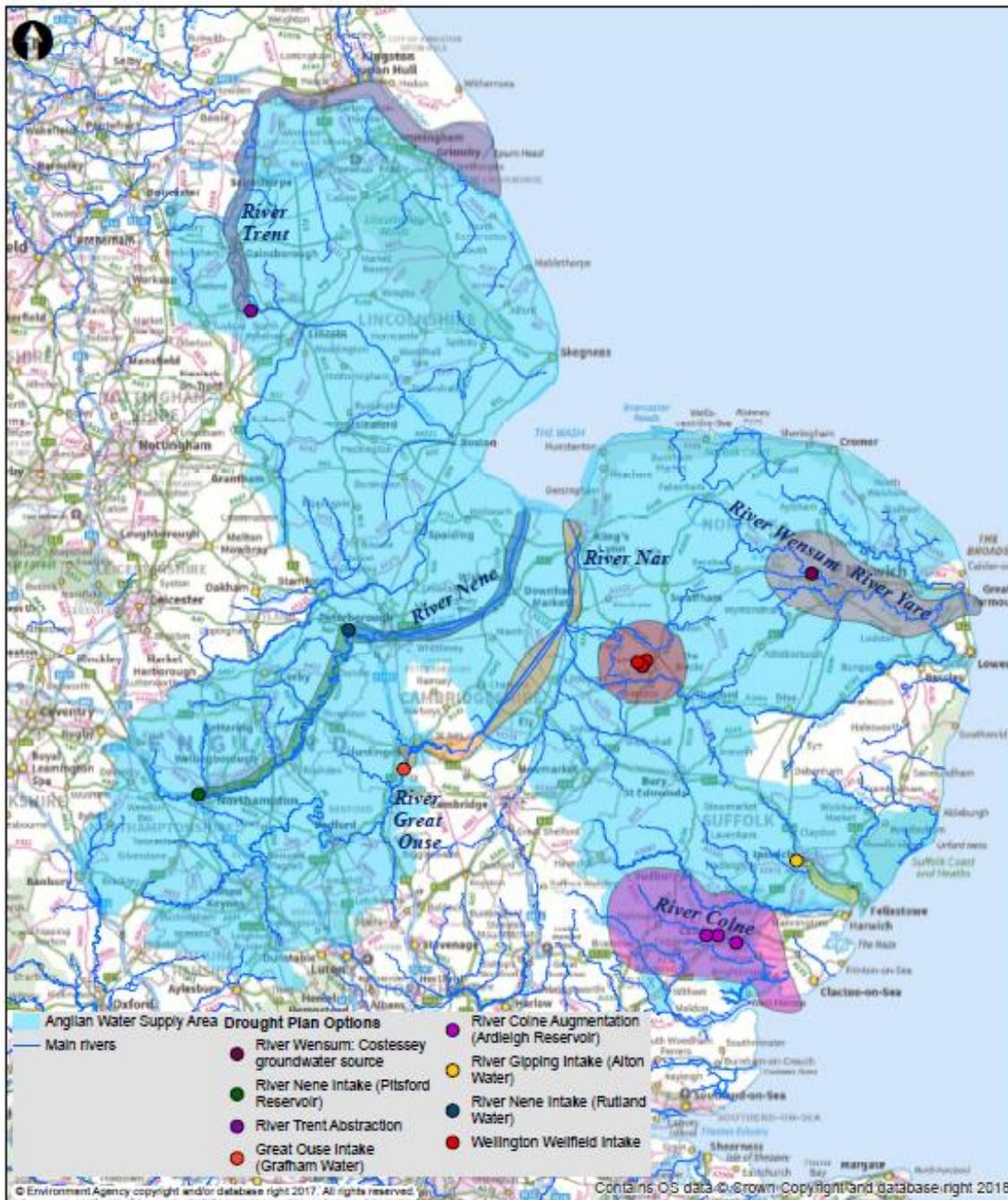
2.4 Definition of the SEA Study Area

To identify the study area of the SEA, Anglian Water's overall supply area was considered. However, this includes the Hartlepool RZ which does not contain any identified drought actions or measures and is geographically distinct from the other parts of the supply area. Therefore, it has been excluded from the SEA study area.

The proposed Drought Permit options can also extend beyond their immediate geographical boundary, making it appropriate to consider the wider area over which effects could occur. The map presented in Figure 4 has been adapted from the previous SEA to include the additional River Trent Drought Permit option. It highlights that Drought Permit options at the River Wensum, River Great Ouse and on the River Colne have the potential to influence beyond Anglian Water's immediate supply area. These areas of potential influence extend along the River Yare to Great Yarmouth, along the River Great Ouse around St Ives and to the area east of the Colne Estuary. The SEA study area has therefore been extended accordingly, and these potential areas of influence have been taken into account in the collection of baseline data to inform the forthcoming environmental assessment of options.

The Drought Plan 2019 also contains other measures in addition to the Drought Permits which are proposed for inclusion in the SEA. These include desalination, additional bulk transfers from outside the Anglian Water supply area and tankering amongst others. However, they are not included in Figure 4 as these are broad theoretical options which have not been developed in detail, although they have been assessed as part of the SEA using the information available.

Figure 4: Extent of influence of supply side options and SEA Study Area



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Drought Plan SEA Environmental Report							
Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
22/11/18	E Bacon	N Levy	P Ede	1:1,250,000	399155/CA01	PRE	P1

3 Consultation

3.1 The Consultation Process

Consultation is an integral part of the SEA process. The SEA Regulations require that consultation is carried out early in the plan development process with the relevant consultation bodies, regarding the '*scope and level of information to be included within the Environmental Report*'. In England the statutory consultation bodies are:

- Natural England
- The Environment Agency
- Historic England

There are three main phases of consultation associated with the SEA process. These are:

- Consultation on the scope of the SEA
- Consultation on the Environmental Report
- Publication of an SEA Post-Adoption Statement

3.2 Scoping Consultation

The SEA Scoping Report was issued on the 5th September 2018 for a five-week statutory consultation period to the three Consultation Bodies. The responses received and how these have been addressed are presented in full in Appendix C.

Key themes arising from the Scoping Report consultation included:

- Compliance with other legislation:
 - Detail whether a HRA and WFD assessment will be carried out for the Plan
- Description and Context of the Drought Plan 2019:
 - Inclusion of the spatial scope of the SEA study area.
- Plans and Programmes review:
 - Review of additional plans relating to the natural environment and historic environment relevant to the Drought Plan 2019
- Baseline:
 - Effects on archaeology, in particular water-logged archaeology
 - The scoping out of air, soil and material assets needs to be made clearer.
- SEA Framework:
 - Inclusion of non-designated heritage assets
- Methodology:
 - Inclusion of how the duration, frequency and reversibility of effects impact the magnitude of the effect assigned.
- Potential effects of drought permit options:
 - River Trent option – possible effects on fish populations (Humber Estuary SAC/SSSI interest feature) and the need for a HRA Stage 2 Appropriate Assessment. Consideration of effects on River and Sea Lamprey, as well as potential impacts on habitats within the designated site through changes in freshwater discharges.

- River Nene option – the increased abstraction from the River Nene (in order to the maintain water level within Rutland Water SPA) may be beneficial in principle but the challenge during drought is that water quality tends to decrease as water quantity is reduced. The HRA must consider the impact on phosphate loads in the reservoir.
- River Wensum option – the proposed relocation of the abstraction point on the River Wensum will need assessing in the HRA, due to potential impacts on SAC interest features.
- Mitigation and opportunities:
 - Opportunities which should be taken forward where possible include: habitat creation and restoration; opportunities to improve fish migration; and opportunities to improve recreational access.
- Cumulative effects:
 - Clearer methodology for how the cumulative assessment will be carried out.

3.3 Environmental Report Consultation

The SEA Directive and Regulations do not define a set timeframe for consultation on an Environmental Report. The SEA Directive states that Consultation Bodies and the public ‘*shall be given an early and effective opportunity within appropriate timeframes to express their opinion on the draft plan or programme and the accompanying environmental report before the adoption of the plan or programme or its submission to the legislative procedure*’.

The SEA Environmental Report was published for consultation alongside the draft Drought Plan 2019. A consultation log of responses is presented in Appendix E including a description of how responses have been addressed in this final Environmental Report.

3.4 Future Consultation

An SEA Post-Adoption Statement will be prepared following adoption of the final Drought Plan 2019, in accordance with the requirements of the SEA Regulations. The SEA Adoption Statement describes:

- How environmental considerations have been integrated into the final Drought Plan 2019
- How the Environmental Report has been taken into account
- How the opinions expressed in the consultation on the Environmental Report have been taken into account
- The reasons for choosing the final Drought Plan 2019 as adopted, in the light of the other alternatives considered
- The measures that are to be taken to monitor the significant environmental effects of the implementation of the final Drought Plan 2019

The SEA Post-Adoption Statement will be published alongside the final Drought Plan 2019.

4 Stage A Scoping Summary

4.1 Introduction

The scoping stage of the SEA process sets the context and scope for the SEA and Environmental Report. This chapter provides a summary of the scoping results as presented in the SEA Scoping Report (Mott MacDonald, September 2018). It covers the tasks under SEA Stage A including:

- Policies, plans and programmes review
- Baseline Information including future trends
- Key sustainability issues and opportunities
- SEA Framework
- Compatibility of the SEA objectives
- Compatibility of the Drought Plan 2019 objectives and the SEA objectives

4.2 Relationship with other Policies, Plans, and Programmes

A review of the relevant policies, plans and programmes was undertaken as part of the SEA for the previous Drought Plan 2014. The aim of the review was to determine the relationship between the Drought Plan 2014 and other existing International, European, national, regional, and local policies, plans and programmes. The Drought Plan 2019 must aim to support current relevant policies, plans, programmes, and environmental protection legislation at international, national, and local levels whilst also supporting, and where possible, strengthen the objectives of these plans and strategies within the Anglian Water Region.

As part of the scoping process, the policies, plans and programmes identified in the previous SEA were checked to determine whether they had been updated or superseded by more up-to-date versions. Table 8 presents the policies, plans, and programmes that were considered in the previous SEA and those identified in bold are where there have been updates. The updated policies, plans, and programmes have been reviewed and are presented in Appendix A.

4.3 Identification of Key Themes and Messages

The main themes, messages, and objectives from the policies, plans and programmes review that are considered relevant to the Drought Plan 2019 are presented below. These are as follows:

- Conserve flora and fauna and their habitats
- Conservation and wise use of wetlands and their resources
- Protection of wild birds and their habitats
- Halt overall biodiversity loss
- Creation of green infrastructure¹³

¹³ The European Commission defines green infrastructure as a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities, and enhances biodiversity. The Natura 2000 network constitutes the backbone of the EU green infrastructure. (Source: http://ec.europa.eu/environment/nature/ecosystems/index_en.htm)

- Protection of landscape character and quality
- Improve water quality so all waters achieve 'good status' as set out in the Water Framework Directive
- Prevent or limit inputs of pollutants into groundwater
- Monitor and provide information to consumers on drinking water quality
- Promote efficient use of water
- Reduce and manage the risks of flooding
- Reduce greenhouse gas emissions
- Adapt to the impacts of climate change
- Increase resource efficiency and reduce natural resource use and waste
- Create a green economy and promote sustainable growth
- Promote sustainable and healthy communities¹⁴
- Promote social inclusion and community participation
- Protect cultural heritage assets including archaeology and built heritage
- Protect best quality soils and agricultural land
- Support the Lawton (2010) recommendation for statutory undertakers planning the management of water resources to:
 - Make space for water and wildlife along rivers and around wetlands
 - Restore natural processes in river catchments, including in ways that support climate change adaptation and mitigation
 - Accelerate the programme to reduce nutrient overload, particularly from diffuse pollution

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

¹⁴ The UK Government definition of sustainable communities as outlined in the document 'Sustainable Communities: Homes for All' (ODPM, January 2005, page 74) is: "Sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all".

Table 8: Relevant Policies, Plans, Programmes, and Environmental Protection Legislation

International and European	
<ul style="list-style-type: none"> ● The Birds Directive (2009/147/EC) ● Ramsar Convention on Wetlands, 1971 ● The Habitats Directive – The Directive on Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC) ● Water Framework Directive (2000/60/EC) ● Shellfish Waters Directive (2006/113/EC) ● Nitrates Directive (91/676/EC) ● Freshwater Fish Directive (2006/44/EC) ● Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel 	<ul style="list-style-type: none"> ● Bathing Water Quality Directive (76/160/EEC) ● Drinking Water Directive (98/86/EC) ● Groundwater Daughter Directive 2006/116/EC ● EU 7th Environmental Action Plan (2013) ● EU Sustainable Development Strategy, May 2001 ● EU Biodiversity Action Plan, February 1998 ● The European Landscape Convention 2006 ● The European Convention on the Protection of Archaeological Heritage (Revised) 2001 ● European Landscape Convention, October 2000 ● The Convention for the Protection on the Archaeological Heritage of Europe, 1992
	
National	
<ul style="list-style-type: none"> ● Draft National Policy Statement for Water Resources (November 2017) ● UK Post-2010 Biodiversity Framework (2012) ● Working with the Grain of Nature: A Biodiversity Strategy for England, 2011 ● The Conservation of Habitats and Species Regulations 2017 ● Natural Environment White Paper – The Natural Choice: securing the value of nature ● Biodiversity 2020: A strategy for England's wildlife and ecosystem services ● UK Post-2010 Biodiversity Framework ● Salmon & Fresh Water Fisheries Act 1975 ● Wildlife and Countryside Act 1981 (as amended) ● Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel ● Environment Act 1995 ● Environmental Protection Act 1990 ● Countryside and Rights of Way Act 2000 ● Natural Environment and Rural Communities Act 2006 ● Making Space for Nature - A review of England's Wildlife Sites and Ecological Network (Lawton, 2010) ● The Marine and Coastal Access Bill, Defra (2009) ● UK Marine Policy Statement, Defra (2011) ● National Planning Policy Framework, DCLG (2012) ● Directing the Flow – Priorities for Future Water Policy, Defra (2002) ● Future Water, The Government's Water Strategy for England, Defra (2008) ● Water White Paper – Water for Life, Defra (2011) 	<ul style="list-style-type: none"> ● Water Industry Act 1991 and Water Act 2003 (s.63 of the Water Act 2003 inserted new sections 39B & 39C into the Water Industry Act 1991) (s.62 of the Water Act 2003 inserted new sections 37B-D into Water Industry Act 1991) ● Drought Plan Regulations 2005 ● Drought Plan Direction 2011 ● Flood and Water Management Act 2010 (s.36; amends the Water Industry Act 1991 by substituting a new s.76) ● Water Use (Temporary Bans) Order 2010 ● Water for People and the Environment – developing our water resources strategy for England and Wales, Environment Agency (2007) ● Water Resources Planning Guidelines, Environment Agency (2016) ● Managing Water Abstraction, Environmental Agency (2016) ● Future Environment Priorities for the Water Industry Asset Management Plans, Environment Agency (2004) ● A Better Environment, Healthier Fisheries, Better Fisheries for our Nations: Our Strategy, Environment Agency (2006) ● A Better Place to Play - Our Strategy for Water Related Sport and Recreation, Environment Agency, 2006 ● Climate Change Act 2008 ● The Climate Change and Sustainable Energy Act, 2006 ● Securing the Future; Delivering the UK Sustainable Development Strategy, 2005 ● Planning (Listed Buildings and Conservation Areas) Act 1990 ● Ancient Monuments and Archaeological Areas Act 1979 ● Marine and Coastal Access Act 2009



Regional and Local

- **Anglian Region River Basin Management Plan (2015)**
- **Water Resource Management Plan, Anglian Water (2019)**
- **The Broads Plan 2017, Broads Authority**
- **Management Plans for Areas of Outstanding Natural Beauty: Lincolnshire Wolds 2018-2023, Norfolk Coast 2014-2019, Dedham Vale 2016-2021**
- Defra Eel Management Plans for the UK – Anglian River Basin District, Defra (2010)
- **Anglian Water Biodiversity Strategy**
- Cambridgeshire Biodiversity Action Plan
- Norfolk Biodiversity Action Plan
- Lincolnshire Biodiversity Action Plan
- **Northamptonshire Biodiversity Action Plan**
- **Suffolk Planning Biodiversity Action Plan**
- **Northumbrian Water Group Biodiversity Strategy (2015)**
- Essex and Suffolk Water Biodiversity Action Plan
- IDB Biodiversity Action Plans
- Upper Colne Marshes Water Level Management Plan, Environment Agency (1999b)
- Ouse Washes Water Level Management Plan, Environment Agency (2002)
- Houghton Meadows Water Level Management Plan review, Environment Agency (2004)
- River Nar SSSI, Water Level Management Plan, Final Issue, Environment Agency (2006)
- Portholme Water Level Management Plan, Environment Agency (2006)
- **The Nene Catchment Abstraction Management (CAMs) Strategy, Environmental Agency (2013)**
- **Essex Abstraction Licensing Strategy, Environmental Agency (2017)**
- **Cam and Ely Ouse Abstraction Licensing Strategy, Environmental Agency (2017)**
- **North West Norfolk Abstraction Licensing Strategy, Environmental Agency (2017)**
- Stour and Orwell Estuaries Stage 4 Review of Consents Site Action Plan (v1.3, redacted), Environment Agency (2008)
- Norfolk Valley Fens SAC RoC Water Enjoying Water - Strategic Priorities for Water Related Recreation in East of England, 2009, Environmental Agency (undated)
- Breckland SAC RoC document, Environment Agency (2009a)
- Upper Nene Valley Gravel Pits Review of Consents Site Action Plan, Environment Agency (2011b)
- Ouse Washes Stage 4 Review of Consents Site Action Plan, Environment Agency (undated)
- **A Green Future: Our 25 Year Plan to Improve the Environment (2018)**
- **Drought Management in England, Environmental Agency (2017)**
- **Affinity Water Draft Drought Management Plan (2017)**
- **Cambridge Water Revised Draft Drought Plan (2017)**
- **Essex and Suffolk Water Draft Drought Plan (2018)**
- **Severn Water Drought Plan 2014**
- **Thames Water Draft Drought Plan 2017**
- **Yorkshire Water Draft Drought Plan 2018**
- Anglian waterway plans, Environment Agency, 2006: River Great Ouse waterway plan, River Ancholme waterway plan, River Nene waterway plan, River Welland and Glen waterway plan
- **Haven Gateway Green Infrastructure Strategy**
- **Colchester Borough Green Infrastructure Strategy**
- **Northampton Green Infrastructure Plan**
- **Greater Norwich Green Infrastructure Strategy**
- **Peterborough Green Grid Strategy**
- **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 Vales (NE527); 88 Bedfordshire and Cambridgeshire Claylands (NE555); 86 South Suffolk and North Essex Claylands; and 111 Northern Thames Basin (NE466).**
- **Flood Risk Management Plans**
- **Humber Estuary Coastal Authorities Group - Flamborough Head to Gibraltar Point Shoreline Management Plan (2010)**
- **The Wash Shoreline Management Plan 2 – Gibraltar Point to Old Hunstanton**
- **North Norfolk Shoreline Management Plan (2010)**
- **Kelling to Lowestoft Ness Shoreline Management Plan (2012)**
- **Essex and South Suffolk Shoreline Management Plan 2 (2010)**
- **Draft Lincolnshire Rights of Way Improvement Plan (RoWIP) 2014-2019**
- **Norfolk County Council Rights of Way Improvement Plan 2007-2017**
- **Suffolk County Council “In Step with Suffolk, Rights of Way Improvement Plan 2006-2016**
- **Essex County Council Rights of Way Improvement Plan (2009)**
- **Cambridgeshire County Council Rights of Way Improvement Plan Update (2016)**
- **Peterborough Rights of Way Improvement Plan 2016-2026**
- **Extension of the Northamptonshire Rights of Way Improvement Plan 2007-2011 to 2017**
- **England Coast Path: improving public access to the coast**

4.4 Baseline Scoping Summary

A review of the current baseline information for the environment and socio-economics for the Anglian Water Drought Plan 2019 was undertaken as part of the scoping process. The previous SEA baseline information was reviewed and updated where new information was available. The new information was collected from published sources including:

- Anglian Water Drought Plan 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

The baseline information forms an evidence base against which environmental issues or opportunities resulting from the Drought Plan 2019 can be predicted and assessed. The complete baseline information is presented in Appendix B under the SEA Directive topics:

- Biodiversity, Flora, and Fauna
- Climatic Factors
- Historic Environment¹⁵
- Landscape
- Population and Human Health
- Water (including flood risk)
- Soils
- Air
- Material Assets

The baseline information for each of the SEA Directive topics is summarised below:

- **Biodiversity, Flora, and Fauna** - The Anglian region has a rich and diverse natural environment which is reflected in many of the designated sites of national and international importance contained in the region¹⁶. There are 14 Special Protection Areas (SAC), 13 Ramsar sites, 15 Special Areas of Conservation (SAC), and 69 Sites of Specific Scientific Interest (SSSI) within 5km of the proposed Drought Plan 2019 options which have the potential to be affected. The study area supports a diverse range of aquatic species, many of which are afforded protection or are listed as being of conservation concern and are potentially vulnerable to changes in water levels and river flows.
- **Climatic Factors** – Current climate trends in England highlight that annual mean precipitation has not changed significantly since records began, however seasonal rainfall is highly variable. It appears to have decreased in summer and increased in winter, although with little change over the last 50 years (Jenkins et al, 2009). Projected changes for the Anglian River Basin using the Met Office UK Climate Projections (UKCP18) indicates that by the 2050s, under the RCP8.5 scenario and on a 1981-2010 baseline, annual mean temperatures will increase by 2.4°C, however summer will see the highest increase at 3.0°C.

¹⁵ Historic environment covers the SEA Directive topic cultural heritage including architectural and archaeological heritage

¹⁶ East of England Biodiversity Forum, East of England Biodiversity Audit 2002, Page 16

Annual precipitation is projected to increase by 2.8%, however seasonal variations in precipitation rates are projected with a 11.7% increase in winter and a decrease of 24.8% during summer.

- **Historic Environment** - The numbers of listed buildings, scheduled monuments, registered parks and gardens, and conservation areas have been collected at a local authority level. There are over 51,000 listed buildings, 2,193 scheduled monuments, 201 registered parks and gardens, and 1,293 conservation areas in the local authorities within the Anglian Water region. There are 213 archaeological sites which are classed as at risk in 2017. Buried archaeology is particularly vulnerable to changes to water levels therefore specialist guidance and advice will be undertaken in areas with known, or potential, buried archaeology.
- **Landscape** – There are five areas of outstanding natural beauty (AONB) in the East of England including The Chilterns, Dedham Vale, Lincolnshire Wolds, Norfolk Coast, and Suffolk Coast and Heaths. The East of England is the arable agricultural core of England which 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. There are eight National Character Areas within the Anglian Water area.
- **Population and Human Health** – The Anglian Water region has an approximate population of 7.1 million people¹⁷ and is one of the fastest growing populations in the United Kingdom. Although a significant proportion of this growth can be attributed to natural increases, most is a result of migration into the region from the UK and overseas which has been driven by the region's proximity to London. The population is projected to grow by approximately 17% by 2028, an increase of some 900,000 residents. The Eastern region of England reports health which is slightly above the English nation in general whereas the East Midlands region is slightly worse. The East of England has the third highest employment and third highest gross disposable household income (GDHI) per head of any English region. Employment rates in the East Midlands is the fourth highest in the England and GDHI is the fifth highest. The East of England contributes to 9% of the UK's Gross Value Added (GVA) and the East Midlands contributes 6%.
- **Water** – The Anglian Water region is the most water stressed in England and has the lowest precipitation¹⁸. This coupled with planned growth, increased water demand and climate change will place extra pressure on its already limited resources. The availability of water varies throughout the SEA study area. For the WFD waterbodies, the baseline does not provide details of all waterbodies within the Anglian Water supply area, instead it presents information for the specific waterbodies that were identified as being with the zone of hydrological influence for each of the options. The overall status from the River Basin Management Plan (RBMP) varies for each of the waterbodies and ranges from 'Poor' to 'Good', however the majority are classed as 'Moderate'. The Anglian Water area is one of the lowest lying and flat regions in the country and therefore coastal and river flood risk is a significant concern. 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 (WRZs) . There are also pockets of Flood Zone 2 across the Anglian Water area.
- **Soil** - The Anglian region predominantly consists of agricultural land, 70% (2.1 million ha) was farmed in 2009 with 1.6 million ha used for crops and horticulture¹⁹. Much of the soil is

¹⁷ Defra, EA, December 2015 'Part 1: Anglian river basin district river basin management plan', Page 9

¹⁸ Anglian Water, Our Company

¹⁹ Environment Agency, State of the Environment - Agriculture and Land Management, Page 1

derived from silt and peat deposits, providing highly fertile soils, and resulting in some of the best and versatile agricultural land in England. Agriculture is an important activity in the region not only for land use, but also for the economy where cereals, rapeseed and potatoes make up the majority of the arable crops grown. The region is also estimated to contain 5,700ha of brownfield and contaminated land which is derelict, vacant or is in use with the potential for redevelopment²⁰.

- **Air** – 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 (NO₂), sulphur dioxide (SO₂) and particulate matter (PM₁₀) show the East of England is on track to meet the UK Air Quality Strategy Targets.
- **Material Assets** - 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 27,500km².

4.4.1 Future Baseline Trends, Key Issues and Scoping of Topics

The SEA Directive requires that ‘the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the Plan or Programme’ is identified. Prediction of future trends is difficult because they depend on a wide range of global, national, and regional factors and decision-making. The relevant issues and trends have been identified in Table 9.

²⁰ National Land use database, 2010. NLUD 2008 Mixed Vintage Dataset

Table 9: Key trends and future evolution of the baseline with and without the Drought Plan and Scoping of Topics

SEA topic	Key baseline trends identified and potential implications of not producing the Drought Plan 2019	Topic Scoped in or out of the SEA	Key issues for each SEA topic (identified from both PPP and baseline review)
Population and human health	<p>There have been no changes since the previous SEA, however Anglian Water have expressed population growth places significant pressure on water resources. It is also assumed health has not changed since the previous census.</p> <p>It is unlikely that the absence or presence of the Drought Plan 2019 would have any influence over population growth in the study area. It is also unlikely that there would be any long-term impact on human health, although without the Drought Plan there could be potential for short term health implications due to the poor management of water resources during a drought.</p>	Scoped in	<ul style="list-style-type: none"> • Ensure supplies of water are reliable and affordable. • Manage water quality for human health – especially where there are links to consumption of water or food (e.g. shellfish), or exposure (e.g. through bathing waters). • Deliver sustainable development, recognising social, environmental and economic needs
Biodiversity, flora and fauna	<p>It can be assumed that the existing level protection for designated sites within the study area will be remain protected in the long term. There are 13 relevant SSSIs within 5km of the River Trent, 11 of which are below the favourable condition.</p>	Scoped in	<ul style="list-style-type: none"> • Protecting, conserving and enhancing biodiversity. • Slow/halt or reverse biodiversity losses and declines. • Protect fish populations and fisheries (freshwater and marine), linked with habitat quality and water quality. • Integrate biodiversity considerations to new developments.
Water	<p>Specific targets have been set for the protection and overall improvement of the water environment as per the WFD and River Basin Management Plans. As there is a legal obligation to meet these targets, there will likely be a trend of improving water quality over time.</p> <p>The Anglian region is one of the lowest lying and flat regions in the country and therefore coastal and river flood risk is a significant concern. 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. Increased flood risk has the potential to affect Anglian Water operations.</p> <p>Without the Drought Plan 2019, reactive responses to drought would be more likely to occur which could potentially have detrimental impacts on the water environment. This could therefore affect the UK's ability to meet the WFD targets.</p>	Scoped in	<ul style="list-style-type: none"> • Ensure the protection, improvement and sustainable use of all water bodies • Ensure the appropriate management of water during times of drought. • Ensure the integration of water issues and biodiversity, recognising the links between the two. • Reduce or control water pollution caused by a range of factors, e.g. nutrients and sewage. • Protect water supply operations from flood risk
Climatic factors	<p>Climate change predictions have not been updated since the previous SEA, however it is anticipated that there will be an increase in average temperatures and precipitation will be lower in summer and higher in winter.</p> <p>The presence or absence of this Drought Plan will have no likely effect on climate change. However, if there are more severe and frequent droughts as a result of climate change, the Drought Plan could help plan for these.</p>	Scoped in	<ul style="list-style-type: none"> • Comply with targets for reductions in greenhouse gas emissions • Encourage the reuse of materials and use of sustainably sourced materials wherever possible. • Ensure future plans are resilient by accounting for climate change implications.
Historic Environment	<p>Historic England reported in their 2017 report that heritage assets at risk is decreasing. There are now less than 400 registered assets at risk with more than 100 entries on the 2015 report now removed. There has been success with churches and scheduled monuments, however there has been an</p>	Scoped in	<ul style="list-style-type: none"> • Protect important archaeological sites through designations. • Encourage public awareness through promoting important heritage sites.

	<p>increase in the number of secular buildings and conservation areas on the register.</p> <p>There are no direct identified implications for the historic environment trends based on the options associated with the presence or absence of the Drought Plan 2019. There is potential that certain types of options could have direct or indirect impacts of designated and non-designated heritage assets.</p>		
Landscape	<p>There are five areas of outstanding natural beauty within the Anglian region. 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. Future development may put pressure on the Green Belt and openness of the countryside. However, it is unlikely that the presence or absence of the Drought Plan will significantly affect landscape.</p>	<p>Scoped out</p> <p>In line with the previous SEA, landscape has been scoped out of the SEA. The options are unlikely to involve large permeant infrastructure. Additional supply side options such as conjunctive use are assessed as part of the WRMP SEA.</p>	N/A
Soils	<p>It is projected that climate change will result in a rise in temperatures and reduction in summer rainfall, which could increase the likelihood of drought conditions and therefore put pressure on soils. In addition, there will be an increasing demand for water in agriculture, and climate change is likely to result in increasing demand for irrigation water of up to 25% in the Anglian region during summer.</p>	<p>Scoped out</p> <p>In line with the previous SEA, soil has been scoped out of the SEA. The options are unlikely to involve significant excavation or land take.</p>	N/A
Air	<p>Air quality will continue to be protected through national and European legislation and targets. However, future development and growth will continue to affect air quality through transport and industry.</p>	<p>Scoped out</p> <p>In line with the previous SEA, air has been scoped out of the SEA. Tankering is likely to be the only option which could affect air quality, and these impacts have been covered under the climate change topic.</p>	N/A
Material Assets	<p>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 27,500km².</p> <p>In line with the previous SEA, material assets have been scoped out of the SEA. Any effects are covered under the population and human health objective.</p>	<p>Scoped out</p> <p>In line with the previous SEA, material assets have been scoped out of the SEA. Any effects are covered under the population and human health objective.</p>	N/A

Source: Adapted from Atkins (2013) SEA

4.5 SEA Framework

4.5.1 Setting the SEA Framework

The SEA Framework forms the basis for predicting and assessing the effects arising from the implementation of the Drought Plan 2019. The SEA Framework used in the previous SEA has been reviewed and used for the Drought Plan 2019 because it is relevant for the 2019 SEA, it has been refined through previous consultation, and it will maintain a consistent approach.

The previous overall methodology for the SEA was an objective-led approach. The previous SEA Framework was developed by 'translating' the relevant baseline information and identified environmental issues into a series of environmental objectives against which each option could be assessed. The list of objectives also incorporated relevant environmental themes and objectives from other plans and programmes. Objectives were only developed for the SEA topics that were identified as being likely to be significantly affected by the Drought Plan 2019. In order to provide a more standardised approach to the assessment, a series of topic assessment questions were developed under each objective to ensure that each option is appraised in a consistent way.

The SEA Framework has been reviewed based on the updated policies, plans, and programmes review, baseline, and key issues contained in this report. The proposed SEA Framework for the Drought Plan 2019 SEA is presented in Table 10.

Table 10: SEA Framework – Objectives and Assessment Criteria

SEA Topic	Drought Plan 2019 SEA Objectives	Topic Assessment Questions	Inter-relationships with other topics/issues
Biodiversity, flora, and fauna	To protect and where feasible enhance biodiversity including designated and other important habitats and species	<ul style="list-style-type: none"> • Is the option likely to affect the conservation status of any SPA/SACs, Ramsar sites, SSSIs or locally designated sites? • Is the option likely to affect ancient woodland, Biodiversity Action Plan (BAP) habitats and/or protected and BAP species? • Will the option affect any habitats that support legally protected species or species of conservation concern? • Is there potential for contribution to achieving 'favourable' conservation status or for creation of new BAP habitats? • Is there a possibility for invasive species to be spread/ introduced or for algal blooms to occur? • Would the option protect and enhance aquatic and terrestrial habitats and species? • Are there any opportunities for habitat creation or restoration? 	Where there are water-dependent habitats, there are strong linkages between biodiversity and water (both quality and quantity)
	To maintain and where possible improve freshwater fisheries	<ul style="list-style-type: none"> • Does the option location affect any important fisheries (salmonid or cyprinid)? • Are there potential indirect impacts (e.g. from affecting other aspects of aquatic ecology (habitat or food species) upon which fish rely)? • Are there opportunities to improve fish migration or could migration be impeded? 	Links with water objectives
Climatic factors	To reduce greenhouse gas emissions	<ul style="list-style-type: none"> • What is the level of energy use (kwh per year) and annual carbon emissions/size of carbon footprint (tonnes)? • Is there potential to offset energy use or contribute to renewable energy generation? 	
Historic Environment	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	<ul style="list-style-type: none"> • Could the option affect (directly or via their setting) any historic, cultural, and archaeological sites, e.g. Scheduled Monuments, listed buildings, Registered Parks and Gardens, Conservation Areas, historic landscapes, non-designated heritage assets, buried archaeology? 	Indirect relationship with population/human health and landscape
Population and human health	Minimise adverse impacts on communities and households especially the most vulnerable groups	<ul style="list-style-type: none"> • Is there potential for health and/or quality of life to be adversely or positively affected? 	
	To minimise impacts on businesses and local economy	<ul style="list-style-type: none"> • Are there any pathways for effects on local businesses or other economic interests that rely on water and/or that may have licences connected to the water bodies affected? • Are there potential adverse or positive effects on tourism? 	
	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	<ul style="list-style-type: none"> • Will the option impact on any formal or informal recreational areas, parks, recreational facilities, and national trails/footpaths/access? • Are there opportunities to create new/additional recreational facilities, or potential to increase amenity/ access to riverside/countryside? • Will the use of rivers or other water bodies (e.g. reservoirs) for angling, birdwatching, water sports or navigation be affected? 	

Water	To protect and where possible enhance river flows and groundwater resources	<ul style="list-style-type: none"> Does the option take into account requirements for sustainability reductions, CAMs assessments of water availability, and the sensitivity of surface and groundwater to abstraction? Will there be a conflict with any of these requirements? Is there potential to help ameliorate low flows? 	Where there are water-dependent habitats, there are strong linkages with biodiversity objective
	To protect and where feasible enhance the quality of surface, transitional and coastal waters	<ul style="list-style-type: none"> Is the option likely to affect biological or chemical quality elements? Would the option affect flow regimes or significantly change water levels? Is there potential for physical effects on the river channel and/or hydromorphology of watercourse(s)? Would the option help or conflict with meeting WFD objectives for preventing deterioration and achieving good ecological status? For Heavily Modified water bodies, would the option contribute to or prevent the implementation of mitigation measures specified in the River Basin Management Plan? 	Where there are water-dependent habitats, there are strong linkages with biodiversity objective
	To protect and enhance groundwater quantity and quality	<ul style="list-style-type: none"> Is there the potential to affect groundwater quality (including contamination, saline intrusion etc)? Would the option affect groundwater flows or significantly change groundwater levels? Could the option have any other effects that could cause deterioration in groundwater status under the WFD? Could the option contribute to meeting WFD status objectives for any groundwater bodies? 	

Source: Atkins (2013) SEA

4.6 Compatibility Assessment – SEA Objectives

To ensure that the SEA objectives are compatible with each other, and to identify any potential conflicts, a high-level compatibility assessment of the SEA objectives was undertaken. The assessment is based on the compatibility assessment undertaken for the previous SEA and the results are presented in Table 11.

Table 11: Compatibility Assessment of SEA Objectives

No.	Objective	1	2	3	4	5	6	7	8	9	10
1	To protect and where feasible enhance biodiversity including designated and other important habitats and species										
2	To maintain and where possible improve freshwater fisheries	✓									
3	To reduce greenhouse gas emissions	✓	✓								
4	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	✓	✓	✓							
5	Minimise adverse impacts on communities and households especially the most vulnerable groups	✓	✓	✓	✓						
6	To minimise impacts on businesses and local economy	?	?	✓	?	✓					
7	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	✓	✓	✓	✓	✓	✓				
8	To protect and where possible enhance river flows and groundwater resources	✓	✓	✓	✓	✓	?	✓			
9	To protect and where feasible enhance the quality of surface, transitional and coastal waters	✓	✓	✓	✓	✓	?	✓	✓		
10	To protect and enhance groundwater quantity and quality	✓	✓	✓	✓	✓	?	✓	✓	✓	

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

4.7 Compatibility Assessment – SEA and Drought Plan 2019 Objectives

The stated purpose of Anglian Water’s Drought Plan 2019 is to:

“Protect public water supplies whilst minimising any environmental impacts that may arise, as a result of our activities, during a prolonged period of low rainfall”.

The stated purpose of the Drought Plan 2019 recognises the potential environmental implications of protecting public water supplies during a drought. There are potential pathways

for conflicts between the stated Drought Plan 2019 purpose and many of the SEA objectives. These are highlighted in Table 12.

Table 12: Compatibility of Drought Plan 2019 and SEA objectives

No.	SEA Objectives	Compatibility with stated purpose of Drought Plan 2019
1	To protect and where feasible enhance biodiversity including designated and other important habitats and species	There are potential conflicts between protecting public water supplies during periods of low rainfall and protecting biodiversity interests, specifically for water dependent habitats/species and fisheries. This is a fundamental consideration in the drought planning process and is addressed through Environmental Assessments of the relevant drought options. The stated objective of the Drought Plan 2019 reflects the need to protect environmental interests alongside public water supply.
2	To maintain and where possible improve freshwater fisheries	
3	To reduce greenhouse gas emissions	Objectives are considered to be broadly compatible
4	To protect and where feasible enhance sites and features of archaeological, historic, and architectural interest, and their settings	Objectives are considered to be broadly compatible
5	Minimise adverse impacts on communities and households especially the most vulnerable groups	Compatible – no conflicts identified
6	To minimise impacts on businesses and local economy	Some potential conflict between demand side drought options and commercial water users
7	Protect and, where possible, enhance recreation and amenity facilities and increase access and enjoyment of the countryside	Some potential for conflicts between the need for public water supply and specific water-dependent recreation activities, which could be adversely affected
8	To protect and where possible enhance river flows and groundwater resources	There are potential conflicts between protecting public water supply and also protecting and enhancing water resources and water quality. As for biodiversity interests above, this is a fundamental consideration within the drought planning process and is addressed through the Environmental Assessments of each drought option. The stated objective of the Drought Plan 2019 reflects the need to protect environmental interests alongside public water supply
9	To protect and where feasible enhance the quality of surface, transitional and coastal waters	
10	To protect and enhance groundwater quantity and quality	

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

5 Options Assessment Methodology

5.1 Introduction

The assessment approach follows the same methodology used for the previous SEA of the Drought Plan 2014. The overall approach to the SEA is objective-led and the Drought Plan 2019 options have been assessed against the SEA objectives using the assessment questions developed as part of the SEA Framework.

The supply side Drought Permit assessments undertaken for the previous SEA were reviewed based on the updated environmental assessments and HRAs (where relevant) for each of these options. A new assessment was undertaken for the new River Trent Drought Permit option. The remaining demand management and additional supply side options assessment were reviewed based on updated baseline and key issues.

5.2 Assessment of individual options

5.2.1 Identification and Prediction of Effects

The updated EARs and HRAs (where relevant) for each of the supply side drought options (Drought Permit) 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 13 below.

Table 13: 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.

Source: Drought Plan 2014 SEA (Atkins, 2013)

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 2013 SEA.

5.2.2 Determining significance of Effects

The assessment was based on a qualitative seven-point scale as presented in Table 14 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 14: 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 13 **Error! Reference source not found.** 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.

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 15.

Table 15: 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 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)

5.2.3 Mitigation Measures

Mitigation measures were developed for the previous SEA where significant (i.e. moderate or major) adverse effects were identified. The mitigation measures were developed as part of the assessments of individual Drought Plan 2014 options, and followed a hierarchy of avoidance, reduction, or restoration/offsetting. The previous mitigation was reviewed in light of the updated assessments. If required, additional mitigation measures have been recommended.

5.3 Alternatives

SEA guidance produced by UKWIR (2012) indicates that in the context of drought planning, individual drought options are taken to constitute ‘alternatives’ within the Drought Plan 2019. The previous SEA assessed the relative performance of the different options against the SEA objectives, taking into account in-combination/cumulative effects between individual options. The comparison of options undertaken in the previous SEA was reviewed and the new Drought Permit option included.

5.4 Cumulative effects

Cumulative effects were considered in two ways:

- The cumulative effects of the Drought Plan 2019 – whether the sum of the effects of the options proposed within the Drought Plan 2019 is greater than those identified for individual options.
- The cumulative effects of the Drought Plan 2019 with other plans and programmes - considering the individual and cumulative effects within the plan, against other policies, plans and programmes which are relevant to the study area.

The cumulative effects assessment undertaken for the previous SEA was reviewed and updated where necessary.

6 Assessment of Drought Plan 2019 Options

6.1 Introduction

This section presents a summary of the assessments for the Drought Plan 2019 options. The full assessments for each of the options are presented in Appendix D.

6.2 Supply Side Options (Drought Permits)

6.2.1 Overall performance of options

The sections below provide a narrative summary of the results from the supply side management options. A summary of the assessment table is presented in Table 16. The main issues identified are as follows:

- The impacts associated with summer Drought Permits tend to be more significant than if they were implemented during winter months.
- The majority of the adverse effects identified for the surface water intake options are secondary impacts and relate to reductions in water quality and flows associated with increased abstraction. Mitigation measures have been proposed for the majority of the potential impacts.
- The best performing option against the objectives is one of the groundwater options due to positive effects on water levels and quality.
- There is no material difference to the impacts of the groundwater options whether they are used in summer or in winter.

River Gipping: Intake (Alton Water)

The assessment identified slight negative effects for biodiversity during a winter Drought Permit due to water quality deterioration. Slight negative effects have also been identified for fisheries as lower flows could impact the spawning of flow sensitive species.

No effects were identified for climate change as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment. There are numerous remains and features within the potential zone of influence, however any incremental change in visual appearance associated with a lowering of the HOF is unlikely to be significant. Any direct impacts would be mitigated and therefore significant effects on the historic environment are unlikely.

Communities and households are not expected to be affected by the Drought Permit. The Drought Permit will have slight negative effects on other abstractors during a winter Permit. Slight negative effects have also been identified for recreation during winter months as water quality deterioration could affect the aesthetic value. Algal blooms and weed choking may also affect navigation and low flows may also affect anglers.

Slight negative effects have been identified for water resources. Impacts on flow are anticipated to be minimal, however the lower flows could exacerbate the impacts associated with high

phosphate levels and low dissolved oxygens levels which some of the waterbodies are currently experiencing. The Environmental Assessment stated that the overall WFD status of the waterbodies is unlikely to be affected and the potential to achieve the overall goal of Good ecological status in the future is not likely to be prevented by the Drought Permit. There is also potential 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.

River Colne Augmentation (Ardleigh Reservoir)

The assessment identified that the Drought Permit will have slightly positive effects on fisheries due to increased flows and dilution capacity. Fish spawning will also be supported by augmented flows. There are negligible effects identified for biodiversity as water quality improvements could result in a shift in species composition. However, as these improvements in quality are not expected to be significant, effects are therefore negligible. There are no likely significant effects for internationally or nationally designated sites.

No effects were identified for climate change as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment. There are numerous remains and features within the potential zone of influence, however there are no impacts on surface water identified therefore those heritage assets along the River Colne are likely to be negligibly affected. Slight risks associated with the drawdown in groundwater levels, but these are also predicted to be negligible.

Communities and households are not expected to be affected by the Drought Permit. Slight negative effects for other abstractors on the River Colne has been identified in the assessment as the Drought Permit could create a small amount of drawdown in a localised area around the Lower Colne groundwater source. However, it has been identified that the Drought Permit will have slightly positive effects on recreation and amenity as opportunities for fishing, canoeing and rowing will be improved during periods of low flow.

The Drought Permit will have mixed negligible, slightly positive and slightly negative effects on water resources. Slight positive effects will occur due to the augmentation from groundwater enabling greater dilution of nutrients and other pollutants, and slight negative effects due to a small reduction in groundwater resources within a localised area around the Colne. The WFD assessment undertaken as part of the Environmental Assessment concluded that the impacts of the potential Drought Permit 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.

River Wensum: Costessey Groundwater Source

Moderate negative effects have been identified for biodiversity during a summer Drought Permit and slight negative effects during a winter permit. There is potential for effects on the qualifying features of the Riven Wensum SAC/SSSI. A HRA Task II: Appropriate Assessment was therefore undertaken for the Drought Permit which concluded that the potential adverse effects have the potential to be mitigated and no further stage in the appropriate assessment will be required. Slight negative effects have also been identified for fisheries for a summer Drought Permit as a result of reduced flow, however it has been identified that effects will be more significant for fisheries during a winter Drought Permit.

No effects were identified for climate change as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment. There are numerous remains and features within the potential zone of influence and there is also risk associated with further short-term drawdown or groundwater and river levels. However, this would already be in the context of already low river and groundwater levels due to prolonged low rainfall.

Communities and households are not expected to be affected by the Drought Permit. The assessment identified slight negative effects on the economy as other abstraction have the potential to be impacted. Recreation is likely to be affected due to reduced water levels in the Costessey Pits and Taverham Lake. The WFD Assessment shows that under both baseline and drought permit conditions, the change in flows remain within the allowed percentage change for each of the exceedance percentile values to remain at Good status. Groundwater levels also have the potential to be slightly affected due to additional drawdown. The assessment identified negligible effects for water quality.

River Great Ouse: Intake (Grafham Water)

Moderate negative effects have been identified for biodiversity during a summer Drought Permit. The Environmental Assessment found that there was potential for likely significant effects on the Ouse Washes SAC, SPA, and Ramsar as a result of water quality impacts, particularly during a summer Drought Permit. A HRA Stage II: Appropriate Assessment was therefore undertaken which concluded that the proposed Drought Permit will not affect the integrity of the designated sites and identified a robust programme of monitoring and mitigation measures. The Environment Assessment also identified moderate effects on fisheries health, spawning and passage for the summer permit. Slight negative effects were identified for the winter permit for both biodiversity and fisheries as impacts are not expected to be as significant.

No effects were identified for climate change as there is no new infrastructure required from the either the summer or winter Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment for both the summer and winter Drought Permit. There are numerous remains and features within the potential zone of influence and there is also risk associated with drawdown of river levels. However, this would be in the context of already low river flows due to prolonged low rainfall.

Communities and households are not expected to be affected by the Drought Permit. There is potential for slightly negative effects on the economy during a summer Drought Permit as reduced flow may mean the demand for other abstractors cannot be met. There are not anticipated to be any effects on other abstractors during a winter Drought Permit. Recreation will likely have slight negative effects during winter months due to the predicted impact on fisheries. However, effects during summer are anticipated to be moderate negative due to increased use coinciding with risk of algal blooms and limitation of boat movements.

The Environmental Assessment identified slight negative effects on water resources during a summer permit whereas effects during winter would be negligible. The WFD assessment concluded that Stage 1 or Stage 2 of the proposed Drought Permit would not permanently affect the overall status of the River Great Ouse at the intake. There are also likely to be more significant negative effects on water quality during a summer Drought Permit due to increased phosphate, orthophosphate and ammonia concentrations. However, there is potential to reduce water quality issues and algal blooms at Grafham Water by maintaining water levels, therefore a

mixed positive and negative impact has been identified. There are no effects identified for groundwater.

River Nene: Intake (Pitsford Reservoir)

Moderate negative effects have been identified for biodiversity and fisheries for a summer Drought Permit due to deterioration in water quality. Fish spawning and passage may also be affected by a reduction in flows, particularly during summer months. Slightly negative effects were identified for biodiversity and fisheries during winter months as effects are anticipated to be less pronounced.

No effects were identified for climate change, for both summer and winter, as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment for both the summer and winter Drought Permits. There are numerous remains and features within the potential zone of influence and there is also a key risk associated with further short-term drawdown in river levels. However, this would be in the context on already low flows due to prolonged low rainfall.

Communities and households are not expected to be affected by the Drought Permit. During a summer Drought Permit, the assessment identified slight negative effects on the economy as other abstractors have the potential to be impacted. Recreation will be affected during a summer permit due to increased risk of algal blooms. It is likely that there will be no effects and negligible effects for both the economy and recreation respectively during a winter permit.

The assessment also identified moderate negative effects for water resources and surface water quality during a summer permit. The WFD assessment concluded that it was unlikely that the proposed Drought Permit would permanently affect the overall status of the River Nene at the intake. Capacity to dilute nutrients and pollution will be reduced during summer which could lead to algal blooms and DO sags therefore moderate negative effects have been identified. Surface water quality is likely to be slightly negatively affected during winter. However, slight positive effects have been identified as maintaining water levels at Pitsford Reservoir during a drought will reduce the risk of reduced water quality. No effects have been identified for groundwater quantity or quality.

River Nene: Intake (Rutland Water)

Moderate negative effects have been identified for biodiversity during a summer Drought Permit. The Environmental Assessment found that there was potential for likely significant effects on the Nene Washes SAC, SPA and Ramsar as a result of water quality impacts. A HRA Stage II: Appropriate Assessment was therefore undertaken which concluded that adverse impacts of the Drought Permit on the water quality of the Nene Washes can be mitigated against. The Environmental Assessment identified moderate effects on fisheries health, spawning and passage for the summer permit. Slight negative effects were identified for the winter permit for both biodiversity and fisheries as impacts are not expected to be as significant.

No effects were identified for climate change for both the summer and winter Drought Permit as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment for both the summer and winter Drought Permit. There are numerous remains and features within the potential zone of influence

and there is also slight risk associated with the drawdown in river levels. However, this would be in the context of already low river flows due to prolonged low rainfall.

Communities and households are not expected to be affected by the Drought Permit. Moderate impacts were identified for the economy as other abstractors have the potential to be affected by the Drought Permit, it is anticipated that effects will be more significant during summer therefore slight negative effects have been identified for a winter Drought Permit. Recreation also has the potential to be affected due to reduced water quality which is more pronounced during the summer Drought Permit.

The assessment identified moderate negative impacts on water resources due to the reduced HOF and consequent increase in abstraction. 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. There are likely to be mixed positive and negative effects on water quality as a result of the Drought Permit. The reduced flows in summer months and increased algal activity could reduce water quality. Maintaining water levels in Rutland Water during drought periods could reduce 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. No impacts were identified for groundwater.

Wellington Wellfield: Intake

The assessment identified that changes to water quality, flow or levels as a result of the Drought Permit are expected to be low. No effects have therefore been identified for fisheries. There are water-dependent BAP habitats along the River Wissey and River Little Ouse but the impacts on these are likely to be negligible, therefore negligible effects have been identified for biodiversity.

The assessment identified no effects for biodiversity and fisheries as any changes to water quality, flow or levels as a result of the Drought Permit are expected to be low.

No effects were identified for climate change as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment. There are numerous remains and features within the potential zone of influence, however there are no impacts on surface water identified therefore those along the River Wissey and River Little Ouse are likely to be negligibly affected. Slight risks associated with the drawdown in groundwater levels, but these are also predicted to be negligible.

Communities and households are not expected to be affected by the Drought Permit. Slight negative effects are predicted for the economy as five other groundwater abstractors could potentially be affected by the drawdown. As there are negligible changes to water levels, flows or quality anticipated as a result of the Drought Permit, no effects on navigation and recreation have been identified.

The assessment identified the Drought Permit will have slightly negative effects on water resources as additional pumping at Wellington Wellfield will result in additional drawdown in the groundwater body. Negligible effects were identified for surface water quality. The WFD 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. Groundwater quality effects are not anticipated; however, the Drought Permit has the potential to have slight negative effects on groundwater levels due to drawdown.

River Trent: Abstraction (Hall WTW)

The environmental assessment identified that the Humber Estuary SAC, SPA and Ramsar site is the only designated site within hydrological continuity. It is expected that the change in flows is unlikely to have an effect on the designated site, however given the sensitivity of the lamprey species a HRA Stage II: Appropriate Assessment was carried out. This identified that the likelihood of negative impacts occurring from the Drought Permit on river and sea lamprey is likely to be low. However, there is uncertainty around the passability of Cromwell Weir therefore slight negative effects has been identified. It is also not likely that there will be a significant adverse effect on the macroinvertebrate, macrophyte and diatom populations of the River Trent downstream of Hall WTW abstraction point. Negligible effects have therefore been identified for biodiversity. It is not likely the reduced water levels and flows associated with the Drought Permit will affect the migration, spawning, entrainment or passability of salmon, river and sea lamprey, European eel or other fish species. However, some uncertainty remains therefore a slight negative effect has been identified for fisheries.

No effects were identified for climate change as there is no new infrastructure required from the Drought Permit and significant additional energy requirements are considered unlikely.

Negligible effects were identified for the historic environment. There are numerous remains and features within the potential zone of influence and there is also slight risk associated with the drawdown in river levels. However, this would be in the context of already low river flows due to prolonged low rainfall.

Communities and households are not expected to be affected by the Drought Permit. There have been no effects identified for the economy as downstream abstractors are not likely to be affected by the Drought Permit. The temporary reduction in water flows or levels as a result of the Drought Permit is not expected to impact water quality, and there would be no abstraction at levels below the existing Hands-Off Level, therefore no effects on navigation and recreation have been identified.

The assessment identified that there is potential for slight negative effects for water resources as the abstraction does reduce levels in the vicinity of the abstraction point, and for some distance up and downstream, but the effect is small. The WFD 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 (Good Ecological Status) in the future. Negligible effects have been identified for water quality as reduction in flows are a result of the Drought Permit is predictable to be minimal. 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. No effects have been identified for groundwater resources.

Table 16: Summary of Supply Side Options (Drought Permits)

Option	River Gipping: Intake (Alton Water)	River Colne Augmentation (Ardleigh Reservoir)	River Wensum: Costessey Groundwater Source		River Great Ouse: Intake (Grafham Water)		River Nene: Intake (Pitsford Reservoir)		River Nene: Intake (Rutland Water)		Wellington Wellfield: Intake	River Trent: Abstraction (Hall WTW)
	Winter		Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter		Winter
	East Suffolk & Essex	East Suffolk & Essex	Norwich & The Broads	Norwich & The Broads	Ruthamford	Ruthamford	Ruthamford	Ruthamford	Ruthamford	Ruthamford	Norfolk Rural	Central Lincolnshire
1 Biodiversity	-	0	--	-	--	-	--	-	--	-	0	0
2 Fisheries	-	+	-	--	--	-	--	-	--	-		-
3 Climatic Factors												
4 Historic Environment	0	0	0	0	0	0	0	0	0	0	0	0
5 Communities												
6 Economy	-	-	--	--	-		-		--	-	-	
7 Recreation	-	+	-	-	--	-	-	0	--	-		
8 Water Resources	-	0	--	--	-	--	--	-	--	-	-	-
9 SW Quality	-	+	--	-	+ / --	+ / -	+ / --	+ / -	+ / --	+ / -	0	0
10 GW Quality	-	-	-	-							-	

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

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)

6.3 Additional Supply Side Management options

6.3.1 Overall performance of options

A summary of the assessment results for the additional supply side management options is presented in Table 17.

The additional supply side management options perform relatively well against the SEA Framework with slight positive effects identified for many of the objectives. To maintain the security of water supply during a drought, these options involve the transfer of water from areas with higher resource availability or use sources that do not directly come from rivers or aquifers. This helps to support 'natural flows' in rivers and reduces the need for abstraction which also reduces pressure on the various environmental parameters.

However, there is also the potential for negative effects from these options. The option for tankering water poses risks for the community due to added inconvenience and the possibility of facing further restrictions as well as disruption to the local economy and effects on climatic factors from increased vehicle movements. There is also the potential for moderate negative effects on climatic factors due to energy intensive processes for brackish water desalination and the return of tidal effluent. Desalination options also have the potential for negative effects on biodiversity and water quality through brine discharge. Conjunctive use options have the potential for negative effects on biodiversity and heritage assets through changes in ground and surface water levels. Other negative effects could occur from the introduction of water from different sources into surface water systems, potentially effecting surface water quality and biodiversity, flora and fauna

Table 17: Summary of Performance of Additional Supply Side Options

Option Objective	Management of inter-company transfers	Road tankering	Brackish desalination	Return of tidal effluent	Inter-catchment transfers	Bulk transfers from other water companies	Conjunctive use
1. Biodiversity	+		-- AND +	- / -- AND +	-- / --- AND +	+	- - AND +
2. Fisheries	+		+	- / -- AND +	-- / --- AND +	+	+
3. Climatic factors		-	--	--			
4. Historic Environment							- -
5. Communities	+	--	+	+	+	+	+
6. Economy		-					
7. Recreation	+		+	+	+	+	+
8. Water resources	+		+	+	+	+	+
9. Surface water quality	+		-- AND +	- / -- AND +	- / -- AND +	+	+
10. Groundwater quality	+		+	+	+	+	+ AND -

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

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)

6.4 Demand Side Options

6.4.1 Overall performance of options

A summary of the assessment results for the demand side options is presented in Table 18 below.

The demand side options perform relatively well against the SEA objectives with many of the options scoring slightly positive effects. A number of these options involve reducing water demand which therefore reduces the amount of abstraction required, retaining water in the natural environment. This helps to secure water supply during a period of drought whilst also helping to alleviate risks for the various environmental parameters.

There are also slight and major negative effects which have been identified for a number of the demand side options. Both the meter optants and leakage reduction options will likely result in a reduction in the amount of water lost from leakages, however there are increased costs associated with finding and fixing leaks which could be passed on to the customer. There is also the potential for the non-essential use ban to negatively affect certain types of businesses as well as recreation amenities and facilities. Major negative effects on communities and the local economy have been identified as a result of the Emergency Drought Order (Severe Restrictions) due to the high level of restriction that would be required.

Table 18: Summary of Performance of Demand Side Options

Option Objective	Publicity Campaigns	Meter Optants	Leakage Reduction	Hosepipe Bans	Non-Essential Use Bans	Emergency Drought Order (Severe Restrictions)
1. Biodiversity	+	+	+	+	+	+
2. Fisheries	+	+	+	+	+	+
3. Climatic factors	+	+	+			
4. Historic Environment						
5. Communities	+	- AND +	- AND +			- - -
6. Economy	+	+	+		-	- - -
7. Recreation					-	-
8. Water resources	+	+	+	+	+	+
9. Surface water quality	+	+	+	+	+	+
10. Groundwater quality	+	+	+	+	+	+

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

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)

7 Cumulative Effects Assessment

7.1 Cumulative effects within the Drought Plan 2019

No cumulative effects have been identified between any of the demand management options, or between the demand management and supply side options proposed for inclusion within the Drought Plan 2019. The additional supply side options have been excluded from the cumulative effects assessment at this stage as there are insufficient details on the location and scale of these options to enable a meaningful assessment to be made. As further information becomes available in the future these options can be assessed as part of future revisions to the Drought Plan.

The majority of the supply side options assessed within the SEA are geographically distinct from each other and there are generally no overlaps between the identified zones of potential hydrological influence of each option. There are therefore limited pathways for cumulative effects between the supply side options. This is reflected in Table 19, which records no cumulative effects between any of these geographically distinct options.

The only exceptions are the Pitsford Reservoir and Rutland Water options, which both abstract from the River Nene. Pitsford Reservoir intake is an abstraction point located on the River Nene upstream of the Wansford intake used to support Rutland. It was identified that implementation of the Drought Permit for Pitsford Reservoir would reduce flows in the River Nene between the Pitsford and Rutland intakes. However, although the implementation of the Pitsford Reservoir Drought Permit would result in less water being available for abstraction at Wansford, it is not expected there would be a significant impact on the flows downstream of that intake, since increased abstraction for Pitsford would generally mean reduced abstraction for Rutland. Therefore, it is not anticipated that these two options will have cumulative effects on the Nene Washes European Sites.

It is considered that additive effects could occur if both options were deployed during the summer months. However, potentially affected abstractors are independent of each abstraction point and would not be subject to any cumulative effects. There are no pathways for additive effects between river flows and water quality. The impacts identified for winter permits do not share many common overlaps.

Potential additive effects on navigation, amenity and angling from the two options could arise if these options are deployed together, as a much greater length of the River Nene would be affected and would limit the ability of recreational users to seek alternative locations on the river that were not affected by Drought Permits. However, at this stage, this is not considered sufficient to increase an overall effect from slight negative to moderate negative, as the river will still remain available as a recreational resource, albeit with a temporarily slightly reduced value.

Additive impacts on the overall fisheries health of the River Nene also need to be considered. If both options are deployed together in the summer, the effects over a greater length of the River Nene could compromise the ability of the fish populations of the river to recover following a drought, but again it is considered unlikely that the effects over a greater length of the river would be sufficient to raise the level of impact from moderate to major negative overall.

Table 19: Cumulative effects between Drought Plan 2019 options

Leakage reduction												
Hosepipe ban												
Non-essential use ban												
Emergency Drought Orders (Severe Restrictions)												
River Gipping: Intake (Alton Water)												
River Colne Augmentation (Ardleigh Reservoir)												
River Wensum: Costessey Groundwater Source												
River Great Ouse: Intake (Grafham Water)												
River Nene: Intake (Pitsford Reservoir)												
River Nene: Intake (Rutland Water)												
Wellington Wellfield: Intake												
River Trent: Abstraction (Hall WTV)												
Drought options	Meter optants	Leakage reduction	Hosepipe ban	Non-essential use ban	Emergency Drought Orders (Severe Restrictions)	River Gipping: Intake (Alton Water)	River Wensum: Costessey Groundwater Source	River Great Ouse: Intake (Grafham Water)	River Nene: Intake (Pitsford Reservoir)	River Nene: Intake (Rutland Water)	Wellington Wellfield: Intake	

Source: Adapted from the Atkins (2013) SEA

7.2 Cumulative effects with other plans

7.2.1 Other Water Company Drought Plans

The following Drought Plans of neighbouring water companies have been reviewed in detail for potential cumulative impacts with Anglian Water's Drought Plan 2019:

- Affinity Water (Eastern Region)
- Cambridge Water
- Essex and Suffolk Water
- Thames Water
- Severn Trent Water

Affinity Water's 2017 draft Drought Management Plan states that due to the robustness of the resources available in the East region, they have never had to impose restrictions on customers and do not envisage that the use of Drought Permits will ever be required. Therefore, it is unlikely there will be any pathways for cumulative effects between the two Plans.

Cambridge Water Drought Plan 2018 does not propose any Drought Permits/Orders or temporary water transfers. However, they do include supply side options including the use of alternative sources than those normally used which includes the recommissioning of a groundwater source at St Ives. The intake option (Grafham Water) on the River Great Ouse is the closest to this within Anglian Water's Drought Plan 2019. Cambridge Water have not identified any environmental impacts. Therefore, it is unlikely there will be any pathways for cumulative effects.

Essex and Suffolk Water's draft Drought Plan 2018 has identified a potential reduction in baseflow and reduced water levels/flows in the River Gipping as part of the Redgrave Group Licence drought measure. The environmental assessment for Anglian Water's River Gipping Drought Permit identified potential for a reduction in water levels. This may be a potential pathway for cumulative effects between the two Plans.

Cumulative effects have not been identified between Thames Water's draft Drought Plan 2017 and Anglian Water's Drought Plan 2019. The options included within Thames Water's Drought Plan are geographically distinct from Anglian Water's options. There are no options included within the same surface water catchment or groundwater body.

Severn Trent Water draft Drought Plan 2018 is not likely to have any cumulative effects with Anglian Water's Drought Plan 2019. The SEA of Severn Trent's draft Drought Plan 2018 states that Anglian Water and Severn Trent have a bulk supply agreement which provides up to 18Ml/d to rural Rutland. However, this does not automatically vary with any drought management measures, and the agreement does not stipulate that Severn Trent Water will require Anglian Water have to impose any water use restrictions on its customers that are supplied by this bulk water supply. During drought condition, close liaison between the two companies will be required.

A summary of the cumulative effects identified as part of the HRA Stage II assessment and other water company drought plans is presented in Appendix F.

7.2.2 Anglian Water Water Resources Management Plan 2019

The SEA of the WRMP 2019 has been reviewed to determine whether there are any cumulative effects between the options proposed in the two Plans. The WRMP 2019 proposes supply side

options including new transfers, desalination and resilience options some of which are located in the five Water RZ covered by the Drought Permit options in the Drought Plan 2019.

There have been no negative environmental impacts identified for the transfer pipelines and resilience options proposed in the WRMP 2019. It is therefore unlikely that there will be pathways for cumulative effects between the options proposed in the two Plans.

In the East Suffolk RZ, a desalination option is proposed at Felixstowe. The WRMP identified negative effects on WFD status and ecology. It is unlikely that there will be cumulative effects between Felixstowe Desalination and the River Colne Drought Permit option as they are geographically distinct. The zone of influence of the River Gipping Drought Permit is adjacent to the Port of Felixstowe where the desalination option would be located. However, as there are no negative environmental impacts identified for the River Gipping Drought Permit, it is unlikely there will be cumulative effects between the two options.

Overall, no potential cumulative impacts have been identified between Anglian Water's Drought Plan 2019 and the WRMP 2019.

A summary of the cumulative effects identified as part of the HRA Stage II assessment and Anglian Water's WRMP is presented in Appendix F.

8 Mitigation and Monitoring

8.1 Mitigation Measures

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

Mitigation has been integrated throughout both the Drought Plan 2019 and SEA processes. The SEA has only reported the likely residual environmental effects of the Drought Plan 2019 options following mitigation. The mitigation measures considered within the residual impacts include those that have been identified as part of the Environmental Assessments, and any additional mitigation that has been identified as part of the SEA option appraisals. The latter has been proposed where impacts may fall outside of the specific remit of the Environmental Assessments but is required to address any specific issues identified through the SEA process.

The key types of mitigation measures that have been identified through the combined Environmental Assessment and SEA process are:

- Publicity and extensive consultation in relation to the implementation of water restrictions, bans on use or Emergency Drought Orders
- Consultation with affected water users (particularly in relation to other abstractors) to determine how licences are used, associated conditions and potential impacts of specific drought options
- Reductions in abstraction rates at specific times to help support river flows for navigation
- Dredging and weed clearance to ensure navigation, amenity and angling interests are protected
- Where there are proposals for increased abstraction from surface water sources, use of variable abstraction rates, water level monitoring and ensuring free passage of spate flows through affected river systems will help to avoid stagnation of water
- Use of specific water quality measures such as introduction of temporary phosphate removal treatment
- To protect fish populations; over-pumping of additional water into isolated river channels, aeration of river reaches and fish rescues, as deemed appropriate
- Modifications to operating regimes of water level management or flood risk management structures, where appropriate, to help ensure that river flows are maintained
- Further consultation and liaison with the Environment Agency
- Provision of adequate treatment of any water which is to be transferred between catchments
- Provision of adequate treatment of effluent prior to its reintroduction to any surface water bodies
- Consultation with the Environment Agency regarding water quality requirements of transferred/ reused water or effluent
- Use of renewable or 'clean' energy sources for any options which have high energy demands
- Where archaeological remains are at risk due to water level changes measures set out in the Historic England 'Preserving Archaeological Remains' guidance (2016) should be implemented as appropriate.

- Surface and groundwater quality and water level monitoring

There are additional mitigation measures which have been recommended for the Drought Permit options. These are covered in more detail in the assessment tables in Appendix D and in the EARs and HRAs.

8.2 Monitoring

Monitoring evaluates the performance of the Drought Plan 2019 and as such assists in determining whether the identified SEA objectives are being achieved; it allows early identification of unforeseen adverse effects and thus appropriate remedial action can be taken to deal with any issues or problem areas. Monitoring will be an important requirement to measure performance and ensure the Drought Plan 2019 is being successfully implemented. The DCLG guidance states that it is inappropriate to monitor everything, and monitoring proposals should be focused on the following areas that:

- Indicate a likely breach of international, national, or local legislation, recognised guidelines or standards
- May give rise to irreversible environmental, economic or social damage, with a view to identifying trends before such damage occurs
- Were subject to uncertainty in the SEA and where monitoring would enable prevention or mitigation measures to be taken.

Provision for monitoring of the effects of Anglian Water's Drought Plan 2019 is provided for by an Environmental Monitoring Plan (EMP), which is appended to the Drought Plan 2019. This sets out the monitoring that has been proposed within the individual Environmental Assessment Reports.

The mitigation and monitoring measures outlined within the most recent Environmental Assessment Reports largely coincide with the recommendations within the SEA Environmental Report.

9 Summary

9.1 Introduction

The SEA of Anglian Water's Drought Plan 2019 has assessed the options proposed for inclusion in the Plan against a series of environmental objectives set for the study area. The assessment has included supply side options which would require Drought Permits, additional supply side options which are more at a conceptual level of detail (e.g. tankering and desalination), and demand side options. Mitigation measures for negative impacts have been identified where possible, and this Environmental Report documents the residual environmental impacts of the proposed Drought Plan 2019.

9.2 Summary of Effects from the Supply Side Management Options

The main effects which have been identified for the supply side management options are as follows:

- The impacts associated with summer Drought Permits tend to be more significant than if they were implemented during winter months.
- The majority of the adverse effects identified for the surface water intake options are secondary impacts and relate to reductions in water quality and flows associated with increased abstraction. Mitigation measures have been proposed for the majority of the potential impacts.
- The best performing option against the objectives is one of the groundwater options due to positive effects on water levels and quality.
- There is no material difference to the impacts of the groundwater options whether they are used in summer or in winter.

9.3 Summary of Effects from the Additional Supply Side Management Options

The additional supply side management options perform relatively well against the SEA Framework with slight positive effects identified for many of the objectives. To maintain the security of water supply during a drought, these options involve the transfer of water from areas with higher resource availability or use sources that do not directly come from rivers or aquifers. This helps to support 'natural flows' in rivers and reduces the need for abstraction which also reduces pressure on the various environmental parameters.

However, there is also the potential for negative effects from these options. The option for tankering water poses risks for the community due to added inconvenience and the possibility of facing further restrictions as well as disruption to the local economy and effects on climatic factors from increased vehicle movements. There is also the potential for moderate negative effects on climatic factors due to energy intensive processes for brackish water desalination and the return of tidal effluent. Desalination options also have the potential for negative effects on biodiversity and water quality through brine discharge. Conjunctive use options have the potential for negative effects on biodiversity and heritage assets through changes in ground and surface water levels. Other negative effects could occur from the introduction of water from different sources into surface water systems, potentially effecting surface water quality and biodiversity, flora and fauna.

9.4 Summary of Effects from the Demand Side Options

The demand side options perform relatively well against the SEA objectives with many of the options having slightly positive effects. A number of these options involve reducing water demand which therefore reduces the amount of abstraction required, retaining water in the natural environment. This helps to secure water supply during a period of drought whilst also helping to alleviate risks for the various environmental parameters.

There are also slight and major negative effects which have been identified for a number of the demand side options. Both the meter optants and leakage reduction options will likely result in a reduction in the amount of water lost from leakages, however there are increased costs associated with finding and fixing leaks which could be passed on to the customer. There is also the potential for the non-essential use ban to negatively affect certain types of businesses as well as recreation amenities and facilities. Major negative effects on communities and the local economy have been identified as a result of the Emergency Drought Order (Severe Restrictions) due to the high level of restriction that would be required.

9.5 Summary of Cumulative Effects

An assessment of the potential cumulative effects of the Drought Plan 2019 has also been undertaken. This has included an assessment of the effects within the Drought Plan 2019 (between the Drought Plan 2019 options), and of the potential effects of the Drought Plan 2019 with other plans and programmes of particular relevance.

The cumulative assessment identified potential for cumulative effects for the Pitsford Reservoir and Rutland Water options, which both abstract from the River Nene. It is considered that additive effects could occur if both options were deployed during the summer months. However, potentially affected abstractors are independent of each abstraction point and would not be subject to any cumulative effects. There are no pathways for additive effects between river flows and water quality. The impacts identified for winter permits do not share many common overlaps.

The assessment of the potential for cumulative impacts between the Drought Plan 2019 and other neighbouring water company Drought Plans, and the Anglian Water WRMP 2019, identified no specific pathways for cumulative impacts.

9.6 Mitigation and Monitoring

Mitigation has been integrated throughout both the Drought Plan 2019 and SEA processes. The SEA has only reported the likely residual environmental effects of the Drought Plan 2019 options following mitigation. The mitigation measures considered within the residual impacts include those that have been identified as part of the Environmental Assessments, and any additional mitigation that has been identified as part of the SEA option appraisals. The latter has been proposed where impacts may fall outside of the specific remit of the Environmental Assessments but is required to address any specific issues identified through the SEA process.

Provision for monitoring of the effects of Anglian Water's Drought Plan 2019 is provided for by an Environmental Monitoring Plan (EMP), which is appended to the Drought Plan 2019. This sets out the monitoring that has been proposed within the individual Environmental Assessment Reports.

The mitigation and monitoring measures outlined within the most recent Environmental Assessment Reports largely coincide with the recommendations within the SEA Environmental Report.

9.7 How Environmental Considerations Influenced the Development of the Drought Plan

The majority of the options have been taken forward from the Drought Plan 2014 and were assessed through the 2013 SEA Environmental Report, therefore, there were limitations with regards to the extent that environmental considerations influenced the development of the Drought Plan 2019. There was more opportunity to influence mitigation and monitoring for the Drought Permit options and through the EARs, HRAs and SEA, a comprehensive set of mitigation measures and monitoring requirements have been set out to minimise effects on the environment and communities.

10 References

- Anglian Water (2014). *Drought Plan 2014*. [pdf] Available at: https://www.anglianwater.co.uk/assets/media/2014_Drought_Plan.pdf [Accessed 20 June. 2018]
- Anglian Water (2017). *Our Company*. [online] Available at: <https://www.anglianwater.co.uk/about-us/our-company.aspx> [Accessed 20 June. 2018]
- Anglian Water (December 2019). *Water Resources Management Plan 2019*. [pdf] Available at: <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/water-resources-management-plan/> [Accessed 10 February. 2020]
- Atkins (2013). *Drought Plan 2014 – Strategic Environmental Assessment Environmental Report*.
- Department for Environment, Food and Rural Affairs (DEFRA). Datasets on the Water Environment. [online] Available at: <https://data.gov.uk/publisher/department-for-environment-food-and-rural-affairs> [Accessed 25. June 2018]
- DEFRA (2002). *MAGIC Interactive Map*. [online] Available at: <http://magic.defra.gov.uk/> [Accessed 26 June. 2018]
- Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0042> [Accessed 26 June. 2018]
- Environment Agency (2011). *Strategic environmental assessment and climate change: a guide for practitioners*. [pdf] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/297039/geho0811buca-e-e.pdf [Accessed 25 June. 2018]
- Environment Agency (2018). *Catchment Data Explorer*. [online] Available at: <http://environment.data.gov.uk/catchment-planning/> [Accessed 25 June. 2018]
- Environmental Assessment of Plans and Programmes Regulations 2004, No. 1633*. Available at: <http://www.legislation.gov.uk/uksi/2004/1633/introduction/made> [Accessed 25 June. 2018]
- Historic England (2016). *Sustainability Appraisal and Strategic Environment Assessment – Historic England Advice Note 8*. [pdf] Available at: <https://content.historicengland.org.uk/images-books/publications/sustainability-appraisal-and-strategic-environmental-assessment-advice-note-8/heag036-sustainability-appraisal-strategic-environmental-assessment.pdf/> [Accessed 26 June. 2018]
- Historic England (2017). *Heritage Counts 2017 East of England*. [pdf] Available at: <https://content.historicengland.org.uk/content/heritage-counts/pub/2017/ee-regional-report-2017.pdf> [Accessed 25 June. 2018]
- Jenkins, G., Perry, M. and Prior, J., 2009. The climate of the United Kingdom and recent trends.
- Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., & Wynne, G.R. (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network*. Report to DEFRA, pp 73.

Mott MacDonald (2018). *Anglian Water Draft Drought Plan 2019 SEA Screening Report*.

Mott MacDonald (2018). *Anglian Water Draft Drought Plan 2019 SEA Scoping Report*.

Mott MacDonald (2020). *Drought Permit Environmental Assessment - River Trent: Abstraction (Hall WTW)*.

Mott MacDonald (2020). *Drought Permit Environmental Assessment – River Colne Augmentation (Ardleigh Reservoir)*.

Mott MacDonald (2020). *Drought Permit Environmental Assessment – River Great Ouse: Offord Intake*.

Mott MacDonald (2020). *Drought Permit Environmental Assessment – River Nene: Duston Mill Intake (Pitsford Reservoir)*.

Mott MacDonald (2020). *Drought Permit Environmental Assessment – River Nene: Wansford Intake (Rutland Water)*.

Mott MacDonald (2020). *Drought Permit Environmental Assessment – River Wensum (Costessey Boreholes)*.

Mott MacDonald (2018). *Drought Permit Environmental Assessment – Wellington Wellfield: Intake*.

SNC-Lavalin (2020). *Drought Permit Environmental Assessment – Alton Water*.

Natural England. *Designated Sites View*. [online]. Available at:
<https://designatedsites.naturalengland.org.uk/SiteSearch.aspx> [Accessed 22 June. 2018]

Office of the Deputy Prime Minister (now the Department for Communities and Local Government (DCLG)) (2005). *A Practical Guide to the Strategic Environmental Assessment Directive*, pp 26-29.

UK Water Industry Research (UKWIR) (2012). *Strategic Environmental Assessment and Habitat Regulations Assessment – Guidance for Water Resources Management Plans and Drought Plans*, (ref. 12/WR/02/7).

