

DRAFT DROUGHT PLAN 2022

Prepared April 2021
for consultation

EXCLUSIONS ON THE GROUNDS OF NATIONAL SECURITY

Northumbrian Water Limited has not excluded any information from this plan on the grounds that the information would be contrary to the interests of national security.

Under Section 37B(10)(b) of the Water Industry Act 1991, as amended by the Water Act 2003 ("the Act"), the Secretary of State can direct the company to exclude any information from the published Plan on the grounds that it appears to him that its publication would be contrary to the interests of national security.

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Essex & Suffolk Water is a trading division of Northumbrian Water Limited which is a group company of Northumbrian Water Group

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NON-TECHNICAL SUMMARY

We have prepared a summary of this Draft Drought Plan which explains in non-technical language how we respond to a drought and summarises the main triggers and actions in our Draft Drought Plan. This can be found on our website:

www.nwg.co.uk/droughtplan

Additionally, Defra has prepared the following document which summarises how water companies plan for dry weather and drought to make sure they can supply water and protect the environment:

www.gov.uk/government/publications/drought-managing-water-supply

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1. INTRODUCTION



1.1 Purpose of this Draft Drought Plan

This document is our Essex & Suffolk Water (ESW) Draft Drought Plan 2022. It has been updated following an eight-week public consultation which ended on 3 August 2021 and reflects our Consultation Statement of Response which we published on our website on 21 September 2021.

Drought plans are operational tactical manuals that detail the actions we will take during a drought. They identify how we intend to manage a future drought, what trigger levels can be used to identify when action is required, and what measures are available to support supplies when levels of service are compromised. They also outline how the effects of a drought and drought actions will be communicated to customers and takes account of the need to undertake environmental monitoring at those sites potentially affected by the implementation of drought actions.

This Draft Drought Plan builds on our previous Drought Plan 2018, our extensive experience of managing droughts, particularly those in the 1990s, and has been prepared following the Environment Agency's updated Drought Plan Guidance (2020).

1.2 What is Drought?

We live in a changing climate where droughts and hot weather are becoming increasingly likely. Our ESW supply area is particularly prone to drought, being located within one of the driest parts of the UK. There are many definitions of drought. The Environment Agency (2008) defines drought as "...a period of low rainfall which creates a shortage of water for people, the environment, agriculture, or industry".

Beran (1985) defines drought as “A decrease of water availability in a particular period and over a particular area”. This definition reflects the unique nature of every drought in terms of intensity and duration but also spatial distribution.

The Environment Agency refers to both environmental droughts and water resources droughts. For the purposes of this Drought Plan, an environmental drought is where low river flows or waterbody levels have the potential to cause damage to the natural environment and local ecology. A water resources drought affects the amount of water available for abstraction from rivers, waterbodies and aquifers for public water supply.

1.3 Regulatory Framework

We are required to prepare a drought plan under Section 39B of the Water Industry Act 1991, as amended by the Water Act 2003. A full list of the guidance and legislation that we have followed in preparing this Draft Drought Plan is included in Appendix 11.

The drought planning process is effectively regulated by the Secretary of State and the Environment Agency.

Our drought planning is supported by our Water Resources Management Plan 2019 which forecasts water demand for the period April 2020 to March 2060 and documents how we plan to meet this demand. In contrast, this Draft Drought Plan considers what measures can be implemented in the short term to address temporary shortages of water resources during drought conditions.

1.4 Early Consultation

We recognise the value of early communication with the many stakeholders potentially affected by and involved in the drought management process. We have pre-consulted with key stakeholders including other water companies, the Environment Agency, Natural England, and our Customer Challenge Group, known as the Water Forum, and have taken account of their responses in the development of this Draft Drought Plan.

We wrote to our drought plan consultees on 22 October 2020 and asked for comments or feedback on our current Drought Plan. We received comments back from the Environment Agency, Natural England, NFU, Wave Utilities, Independent Water Networks Ltd and the Consumer Council for Water and have taken account of them in the preparation of this Draft Drought Plan.

1.5 Draft Drought Plan Public Consultation

The consultation on our draft Drought Plan took place over an eight-week period, which ended on 3 August 2021. The draft Drought Plan was available for review on our website www.nwg.co.uk/droughtplan.

The Statutory Consultees included:

- The Secretary of State, Defra
- Ofwat
- Environment Agency

- Consumer Council for Water
- Natural England
- Local Authorities within the company's supply area
- National Park Authority
- Historic England
- Navigation Authorities

Consultees were asked to send their written representations on our draft Drought Plan to the Secretary of State for Environment Food and Rural Affairs which were then forwarded on to us at the end of the consultation period.

We subsequently prepared a Consultation Statement of Response which details:

- i. the consideration we have given to representations;
- ii. any changes that have been made or will be made to the draft Drought Plan as a result of consideration of those representations and the reasons for doing so; and
- iii. where no change has been made to the draft Drought Plan as a result of consideration of any representation, the reason for this.

If our responses to the consultation comments are accepted by Defra, they will be included in our final Drought Plan which should be published on our website www.nwg.co.uk/droughtplan during 2021/22.

2. ESSEX & SUFFOLK WATER INFORMATION

2.1 ESW Supply System and Drought Management Areas

2.1.1 Overview

The ESW area is split into two geographically separate supply areas known as the Essex Supply Area and the Suffolk Supply Area. Both supply areas are outlined in red in figure 1 below.

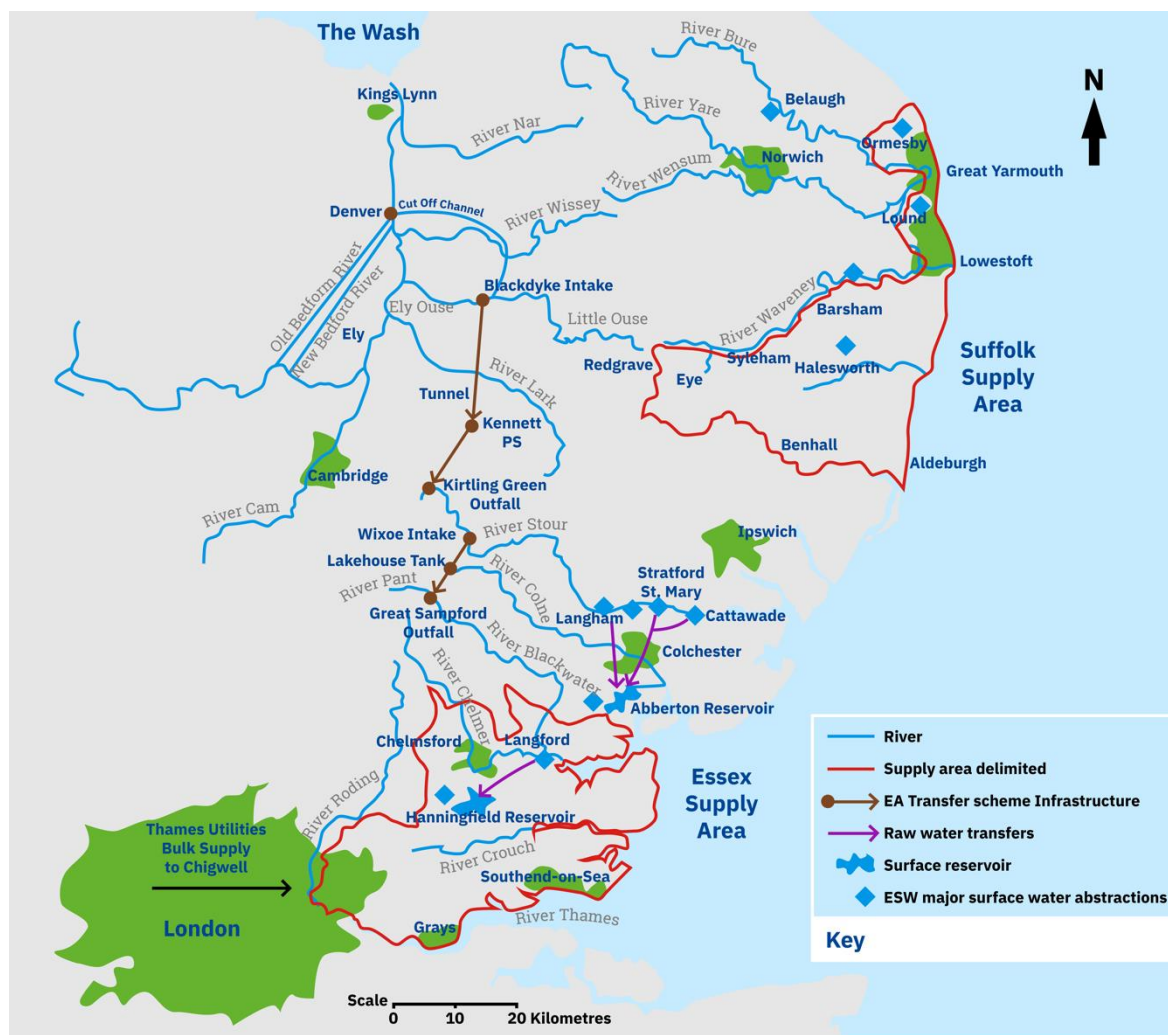


Figure 1: Essex & Suffolk Water Supply Areas

We supply water to around 1.5 million customers in the Essex Supply Area and around 300,000 customers in the Suffolk Supply Area.

We undertake water resources planning at a water resource zone level. A Water Resource Zone is defined as the largest possible zone in which all resources, including external transfers, can be shared and is the Zone in which all customers experience the same risk of supply failure from a resource shortfall.

We have four Water Resource Zones covering our Essex and Suffolk supply areas. The Essex Supply Area (see figure 2 below) is a single Water Resource Zone.

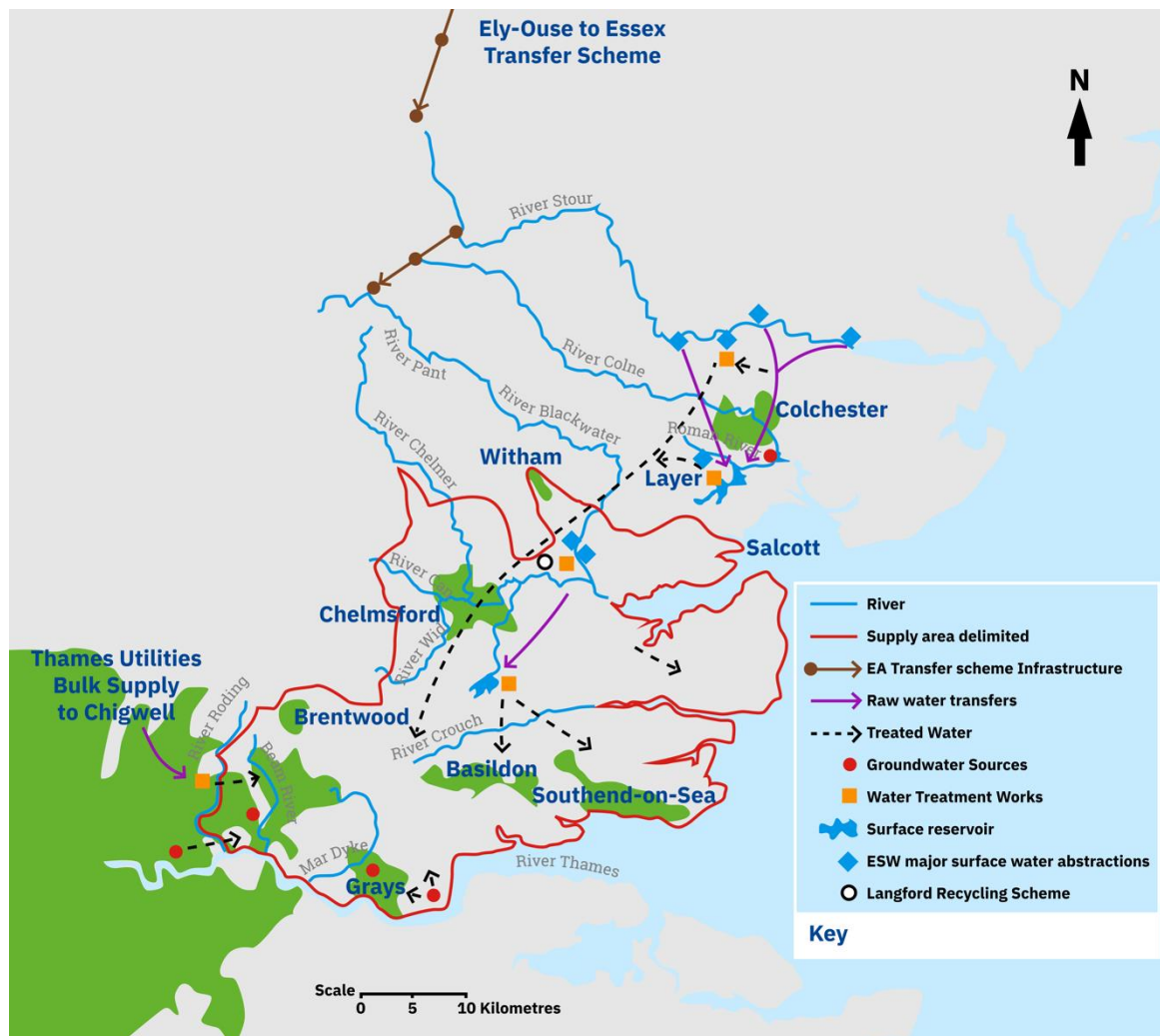


Figure 2: Essex Water Resource Zones

The Suffolk Supply Area comprises of three Water Resource Zones known as the Hartismere, Blyth and Northern/Central Water Resource Zones. The Suffolk supply area and associated infrastructure are illustrated in figure 3 below.

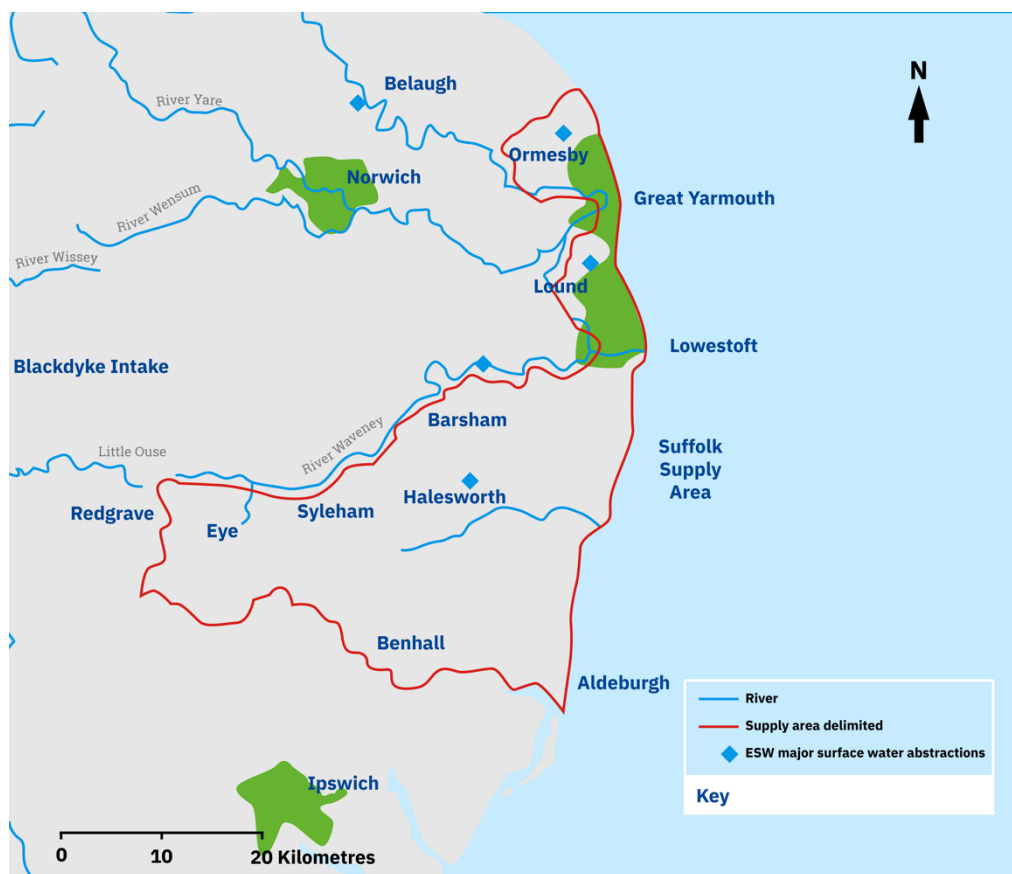


Figure 3: Suffolk Water Resource Zones

We will apply drought actions at a Drought Management Area (DMA) level. For demand side drought actions, the DMA is the Supply Area (i.e. Suffolk or Essex Supply Areas) and for supply side drought actions, the DMA is the Water Resource Zone.

A description of each Water Resource Zone is provided in the following sections.

2.1.2 Essex Water Resource Zone

The Essex Supply Area is bounded by the Thames Estuary in the south, the Essex coastline as far north as Salcott in the east, Silver End in the north, and the London Boroughs of Redbridge, Barking and Havering in the west. The area includes the towns of Southend-on-Sea, Chelmsford, Witham, Brentwood, Billericay, Basildon, Grays, Dagenham and Romford (see figure 2).

In a drought year, only 54% of the water supplied within the Essex Supply Area is sourced from within it, with the rest being transferred in from outside the area. This is because the water abstracted from our local rivers and the bulk raw water supply from Thames Water is insufficient to meet demand.

The water sources within the Essex Supply Area include the Essex rivers: the Chelmer, Blackwater, Stour and Roman River, which support pumped storage reservoirs at Hanningfield and Abberton, and treatment works near Maldon, Stratford St. Mary, Chelmsford and Colchester. The remaining water sourced from inside the supply area (approximately 2% of total water supplied) is derived from groundwater

via Chalk well and adit sources in the south and south west of the zone at South Essex Well 1 and South Essex Well 2, each with on-site treatment.

In a drought year up to 26% of the water abstracted from the Essex rivers is supported by the Ely Ouse to Essex Transfer Scheme (EOETS). This is owned and operated by the Environment Agency and transfers water via pipelines and pumping stations from Denver in Norfolk to the headwaters of the River Stour and the River Pant / Blackwater (see figure 1).

The EOETS, the Essex rivers, and their associated intakes, the pumped storage reservoirs at Abberton and Hanningfield and associated raw water transfer pipes, pumping stations and treatment works are collectively known as the 'Essex System'. This reflects the nature of the water resource zone supporting the Essex Supply Area, which is a fully integrated with great flexibility for moving drinking water around to where it is required.

In a drought year, a further 15% of water in the Essex Supply Area is provided via a raw water bulk transfer provided by Thames Water Utilities from the Lee Valley reservoirs. The raw water is pumped directly to our treatment works at Chigwell for treatment and then into supply.

Since 2003, the Essex Supply Area has benefited from an innovative effluent recycling scheme near Maldon. The scheme intercepts effluent from Chelmsford Sewage Treatment Works (STW) and treats it to a very high standard at a purpose-built treatment plant. Once treated the water is pumped 3km upstream into the River Chelmer where it augments the natural river flow and is available for re-abstraction via existing intakes, supporting a nearby Water Treatment Works (WTW) and storage in Hanningfield Reservoir. On average, during dry periods, the scheme can provide an additional 20 megalitres per day (Ml/d) (April to November) of water for use within the Essex Supply Area.

Following completion of the Abberton Scheme in 2014, there is now a surplus of water across the full planning horizon of our current Water Resources Management Plan 2019. Water supplies in the Essex Supply Area are now resilient to significant droughts (significant is deemed to be a drought which occurs on average once every 200 years). The Abberton Scheme involved:

- increasing the storage capacity of Abberton Reservoir by 58% by raising the top water level in the main part of the reservoir by 3.2 metres;
- varying the Environment Agency's Ely Ouse Essex Transfer Scheme abstraction licences at Denver and Blackdyke in Norfolk. The licences, which control the amount of water transferred to the Essex Supply Area from the Ely Ouse, were varied to provide the potential for additional water to be transferred from Denver to fill the enlarged Abberton Reservoir; and
- constructing two underground pipelines. The first transfers water from the River Stour at Kirtling Green, downstream to Wixoe while the second transfers water from the River Stour at Wormingford to Abberton Reservoir.

2.1.3 Suffolk Hartismere Water Resource Zone

The Hartismere Water Resource Zone (see figure 3) is bounded to the north by the River Waveney (from its source at Redgrave in the west to Mendham in the east), to the west as far as Rickinghall and Wyverstone Street, and to the south as far as Mendlesham Green and Aspall. The Zone includes the market town of Eye situated on the River Dove, a major tributary of the River Waveney. The Zone is predominantly rural in nature and is characterised by arable farming.

All the water supplied within the Hartismere Water Resource Zone is abstracted from boreholes constructed into the Chalk and Crag aquifers (water bearing rock).

The Hartismere Water Resource Zone was particularly affected by the last major drought which affected Suffolk between 1995 and 1997. Consequently, following the drought we made significant investments in the zone including infrastructure enhancement to enable transfer of water more easily around the zone, and the successful development of two new groundwater sources to address security of supply concerns.

2.1.4 Suffolk Blyth Water Resource Zone

The Blyth Water Resource Zone is bounded by the Suffolk coastline in the east (between Aldeburgh in the south and Walberswick in the north), in the west by Earl Soham, and in the north at Chediston. The Zone includes the towns and villages of Saxmundham, Leiston, Framlingham, Peasenhall and the southern side of Halesworth. Similarly, to Hartismere, the Zone is predominantly rural in nature.

All the water supplied within the Blyth Water Resource Zone is abstracted from seven groundwater sources.

2.1.5 Suffolk Northern/Central Water Resource Zone

The Northern/Central Water Resource Zone in Suffolk is bounded by the River Waveney and River Bure to the west, and the Suffolk coastline from Southwold to Winterton-on-Sea in the east. The Zone includes the towns of Lowestoft, Great Yarmouth, north Halesworth, Bungay and Beccles. Demand in the Zone is heavily influenced by the large population centres in Lowestoft and Great Yarmouth. The transient holiday population in Great Yarmouth during the summer can have a notable seasonal effect on demand.

Water supplied in the Northern/Central Water Resource Zone is predominantly sourced from surface water, with a smaller proportion from groundwater in the south of the Zone. Surface water is provided via four sources including the River Waveney, the River Bure, and groundwater fed lakes at Ormesby, Lound and Fritton. A smaller component of raw water can be sourced from remote Chalk boreholes in the north of the Zone. Larger quantities of groundwater produced in the south of the Zone are abstracted from eight groundwater sources.

2.2 Restrictions on water use and our Levels of Service

2.2.1 Overview

During long or very intense droughts we may need to place some restrictions on customer water use to ensure we are always able to maintain reliable supplies should the dry weather turn into an extreme drought. Without these levels of service, we would need to develop new water supply schemes, such as new winter storage reservoirs.



The frequency of these restrictions (our Levels of Service) have been previously agreed with our customers during the development of our previous Water Resources Management Plans, and will be reviewed again as part of the development of our next Water Resources Management Plan 2024.

Our current Levels of Service are summarised below:

Drought Action	Frequency (Return Period)	Frequency (Percentage)
Level 1: Appeal for restraint	1 in 10 years	0.1 (10%)
Level 2: Phase 1 Temporary Use Ban	1 in 20 years	0.05 (2%)
Level 3: Phase 2 Drought Order Ban	1 in 50 years	0.02 (1%)
Level 4: Stand Pipes and Rota Cuts	1 in 250 years	0.004 (0.4%)

Our Levels of Service are presented as both a return period (e.g. 1 in 10 years) and as a percentage (e.g. 10%). For example, our Level of Service for an Appeal for Restraint is 1 in 10 years on average, or a 10% chance. This does not mean that an

Appeal for Restraint will be made with such regularity; for example a 1 in 10 year drought event may occur 3 times in 10 years and then not again for another 20 years. We are meeting all of our levels of service and have never needed to introduce Level 3 or 4 restrictions. The last time we introduced a Level 2 Temporary Use Ban was during the 1996-98 drought, although then it was called a hosepipe ban.

2.2.2 Level 1 Appeal for Restraint

Some droughts, typically those of short duration, do not require us to place restrictions on the use of water. However, we would always ask our customers to use water wisely. However, as a period of prolonged dry weather develops, we may need to implement a Level 1 Appeal for Restraint. We would use all of our communication channels (e.g. social media and press releases) to ask our customers to Use Water Wisely.

2.2.3 Level 2 Temporary Use Ban

As a drought develops, a Level 2 Temporary Use Ban (TUB) might be required (see Section 7.3.1 for more details). This would, for example, allow us to restrict the use of hosepipes for garden watering. Their use will still be rare and only when there is a real need.

2.2.4 Level 3 Non-Essential Use Ban

During severe droughts we may need to implement a Level 3 Non-Essential Use Ban (NEUB), sometimes referred to as a Drought Order Ban. This would allow us to place wider restrictions on the use of water including:

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

Restrictions would never be placed on the use of water for firefighting and our procedures for protecting vulnerable customers would come into force.

2.2.5 Level 4 Standpipes and Rota Cuts

During an unprecedented drought, we might need to implement a Level 4 restriction to introduce rota cuts. This can only be done by applying for an emergency drought

order. However, this is an emergency action and falls within the scope of our Emergency Plan and not this Draft Drought Plan.

2.3 Fire Service

Water companies have duties under Part 5 of the 2004 Fire and Rescue Services Act with regard to the provision of water for firefighting.

During minor and moderate droughts (i.e. those requiring Level 1, 2 or 3 drought actions to be implemented) we would never place restrictions on the use of water for firefighting. However, during unprecedented extreme droughts, the most severe of our Drought Plan actions is to reduce pressure within our network. This could affect the flow rate from hydrants used by the Fire Service for firefighting. Nevertheless we would take all reasonable measures to provide adequate supplies of water for the Fire Service's use in firefighting. In the very unlikely event that network pressure reduction was required we would provide the Fire Service with as much warning as possible (a minimum of 7 days) and we would formally notify the relevant Emergency Planning Authorities.

2.4 Links to Other Plans

2.4.1 National Drought Framework for England and Environment Agency Area Drought Plans

The Environment Agency has prepared a document entitled, 'Drought response: our framework for England' which can be accessed here:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625006/LIT_10104.pdf.

The framework explains the Environment Agency's role and the roles of others in managing the effects of droughts on people, businesses and the environment.

The Environment Agency also has its own area drought plans which set out the metrics for determining drought status, the actions it will take during a drought and its communications plans.

We will always work closely with the Environment Agency during a drought and will continue to:

- share monitoring data;
- consider the various stages of drought with regard to our own Drought Plan;
- provide regular water resource updates;
- work closely with the Environment Agency's communications teams and where appropriate issue joint communications with the Environment Agency and other stakeholders.

2.4.2 Regional Water Resources Groups

Overview

Our local regional Water Resources Group is Water Resources East (www.wre.org). We are a core member of WRE and are currently supporting the development of the first draft of the WRE Water Resources Plan which will be submitted to Defra in August 2021. As things currently stand WRE does not have any dry weather or drought actions that affect our supply area. However, we will take account of any future actions that might be developed.



We have had pre-consultation drought plan discussions with neighbouring water companies including Anglian Water in the WRE region and Thames Water and Affinity Water in the Water Resources South East (WRSE) region.

We have a bulk raw water supply agreement with Thames Water. The details of this bulk supply and how it will be managed during drought are presented in Section 2.6.2.

Additionally, we have a number of small potable water exports to Anglian Water and Affinity Water. For the purposes of developing this Draft Drought Plan we have assumed that the maximum quantities set out in the respective agreements will be available during drought.

We would consider any request to increase an export during drought on a first come first served basis and on a case by case basis, taking account of our own water resources position. We would not agree to increasing an export if it compromised our own levels of service or overall water supply resilience.

In an emergency situation, where customers of a neighbouring water company are at risk of a supply failure, we would look to support that company through the existing WaterUK mutual aid process where possible.

There might be occasions where we can operate our sources differently to benefit other water users during drought, while minimising the risk to supply. We will consider such requests on a case by case basis via waterresources@nwl.co.uk.

Regional Alignment

We will work collaboratively with other regional water companies, the Environment Agency and other sectors to ensure that dry weather / drought communications are consistent and do not contradict each other. This will cover the environmental and water resources position, water efficiency messaging and the implementation of and communication around customer restrictions where there is a common water resources drought.

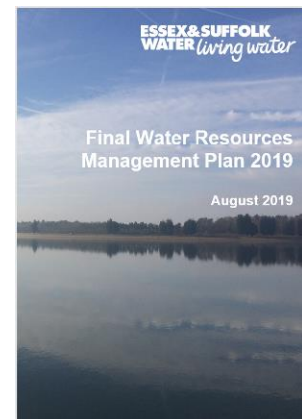
We will use language that is consistent across neighbouring water companies and seek to work collaboratively at a regional level, especially when imposing customer restrictions.

We have categorised our drought plan drought actions using the Level 1 to 4 definitions (see Section 6) and will be consistent in our language around Temporary Use Bans (TUBs) and possible exemptions. For TUBs (see Section 7.3.1 and Appendix 8) and Non-Essential Use Bans (NEUBs) (see Section 7.4.1) we have agreed common text in this Draft Drought Plan which covers, among other aspects, TUB and NEUB exemptions.

2.4.3 Water Resources Management Plan

We assess supply and demand in our Water Resources Management Plan (www.nwg.co.uk/wrmp) which sets out how we will provide a reliable and sustainable supply of water to our customers and is refreshed every 5 years.

Our latest plan called Water Resources Management Plan 2019 (WRMP19) covers the period from 2020 to 2060 and was prepared in line with the Water Resources Management Plan Regulations 2007 and Water Resources Management Plan Direction 2017.



WRMP19 forecasts how much water we will have available to supply our customers, taking account of future droughts, climate change and the need to protect the environment. It also forecasts how much water our customers will need taking account of future population growth. The forecasts are worst case in the sense that dry weather demands are measured against source yields defined by worse droughts on record (all of which had a return period of at least 1 in 200 years). By comparing our supply and demand forecasts in WRMP19 we confirmed that we will have reliable and sufficient supplies of water to meet customer demand.

We are currently preparing our new Water Resources Management Plan 2024 (WRMP24) as part of a five-year review known as PR24 (or Price Review 2024). Our initial supply and demand forecasts show that we may have supply deficits in our ESW Water Resource Zones that are driven by:

- increases in household consumption due to the Coronavirus pandemic;
- increases in forecast non-household demand;
- the impact of climate change on deployable output following a move from using CP09 to the CP18 projections;
- the need to be resilient to a 1 in 500 year drought (i.e. without needing to implement Level 4 drought actions) by 2039;
- a change in the method of assessing source and system deployable output using stochastic drought rainfall sequences; and
- abstraction sustainability reductions to the annual licensed quantities of our groundwater abstraction licences;

Consequently, we are undertaking an options appraisal to identify which options should be included in our WRMP24 final “best Value” plan to restore supply headroom in all our WRZs.

We experienced unprecedented increases in peak customer demand across all our Water Resource Zones in 2020 as well as significant increases in annual demand. The primary reason for this was due to the Covid-19 pandemic which resulted in many people either working from home or being furloughed. In both cases, water use in both the home and garden increased. However, unlike some other Water Resource Zones, Hartismere non-household demand remained closer to normal levels during the pandemic lockdowns, mainly because the majority of non-household demand in that zone is for meat processing which continued throughout. To manage this situation, we have implemented enhanced levels of water efficiency messaging in the Hartismere WRZ, both in terms of dry weather and winter preparedness. We are also considering a new transfer of water between our Blyth and Hartismere WRZs although this is dependent on the outcomes of our Water Industry National Environment Programme (WINEP) investigations which are due to conclude this Autumn. As indicated above, we are also undertaking an options appraisal as part of our Water Resources Management Plan 2024 to identify options to reduce demand and increase raw water supplies.

While our Water Resources Management Plans long term plans, by contrast, drought planning is essentially a prepared response to sustained dry weather (drought) conditions that have the potential to detrimentally affect public water supplies. This Draft Drought Plan is an operational tactical plan and sets out the actions we will take to manage water supplies in a drought and includes worked examples.

Drought conditions are usually manifested in the form of:

- reduced raw water availability (e.g. low river flows, low reservoir storage, low groundwater levels) and/or
- increased demand (e.g. due to increased drinking, garden watering, showering etc in dry weather).

There are direct linkages between longer term water resources planning and drought planning in terms of the calculation of all elements relating to the Supply Demand balance, which for the purposes of this document can be assumed to be consistent.

It should be recognised that the frequency of drought may increase in the future due to the impact of climate change.

Our levels of service for each of our Level 1, 2, 3 and 4 Drought Actions are the same for both our Water Resources Management Plan and this Draft Drought Plan.

2.4.4 NWL Business Plan

In our Price Review 2019 (PR19) Business Plan, we included a resilience scheme called the Abberton to Langford Pipeline. The scheme is needed to address any imbalance in reservoir storage between our main raw water reservoirs at Abberton (the larger reservoir) and Hanningfield (the smaller reservoir) in Essex. This scheme will enable us to transfer raw water from Abberton reservoir to our Water Treatment Works near



Maldon where it would be then treated. This would mean that the raw water normally abstracted from the River Chelmer and River Blackwater to supply this WTW, could instead be transferred to Hanningfield reservoir to address any imbalance in reservoir storage. The driver for this scheme is wider resilience (e.g. to address any deteriorating trend in raw water quality) and not drought.

2.4.5 NWL Emergency Plan

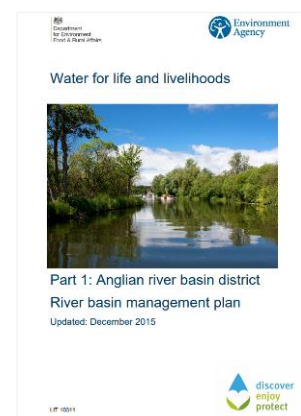
Our Business Continuity Team is responsible for developing and maintaining our Emergency Plans and for ensuring that our obligations are met under the Security and Emergency Measures Direction (SEMD) 1998.

Our Business Continuity team is represented on our Drought Management Group and would oversee implementation of Level 4 drought actions (standpipes and rota cuts) in the very unlikely event that they are needed.

2.4.6 River Basin Management Plan

River Basin Management Plans (RBMPs) set out how organisations, stakeholders and communities will work together to improve the water environment and include a series of objectives to support water bodies reaching good status.

We have a number of supply side drought actions in our Drought Plan which would require a drought permit. We have agreed monitoring and mitigation plans for each drought permit action which would cause a lasting deterioration in Water Framework Directive (WFD) status.



We are currently developing our Water Resources Management Plan 2024 and expect that the annual licensed quantity on a number of our abstraction licences will be reduced (known as a sustainability reduction) to support the water bodies we abstract from in the Anglian region river basin to reach good status. It is likely that these sustainability reductions will cause supply deficits in our Suffolk supply area, which will be addressed through new demand and supply schemes that we will promote through our WRMP24 and PR24 Business Plan. The sustainability reductions will not be applied to our abstraction licences until after the new demand and supply schemes have been implemented between 2025 and 2030.

In the meantime, we will aim to keep abstraction below an agreed baseline level. A consequence of this is that we are currently unable to agree to:

- increase non-domestic supplies to existing non-household customers; or
- supply new non-household customers requiring a non-domestic supply.

2.4.7 Other Water Company Drought Plans

In our pre-consultation discussions, we met with our neighbouring water companies (Anglian Water, Thames Water and Affinity Water) to ensure that our drought planning is consistent in terms of:

- assumptions regarding bulk raw water imports / exports;
- assumptions regarding potable water imports and exports; and
- communications.

Please see Section 2.6 below for details of agreements and arrangements for bulk supplies and transfers.

2.5 Agreements and arrangements for bulk supplies and transfers

2.5.1 Potable Water

We have a number of potable water imports and exports with Anglian Water and Affinity Water. For the purposes of this Draft Drought Plan we have assumed that the full quantity outlined in our water supply agreements will be available during a drought. Requests to increase transfers (within the capacity of the transfer mains) will be considered against our own water resources position and would only be supported if our modelling confirmed no significant increase in risk to our own customers' water supplies.

2.5.2 Raw Water Bulk Supply

We have a raw water bulk supply arrangement which is covered by an agreement between the Metropolitan Water Board (now Thames Water Utilities) and South Essex Waterworks Company (now Northumbrian Water Limited) dated 30 May 1963.

The bulk supply is provided from the King George and William Girling Reservoirs in the Lea Valley and if required, can potentially be supported by abstraction directly from the River Lea at defined intakes. The bulk transfer quantities to ESW are:

	Average daily MI/d	Maximum daily MI/d
Provision during non-drought periods	90.9	118.2
Provision during drought	71.0	
Provision during drought periods if TUB is imposed in Thames Water's supply area but not ESW's supply area (25% reduction)	53.0	88.7

Note: Between April 2018 and March 2022, we have agreed with Thames Water to further reduce the bulk supply to our Chigwell WTWs by 5MI/d.

Under normal operating conditions the scheme provides us with a bulk water supply of 91 MI/d on average but not exceeding 118 MI/d on any one day.

In 2014 following the enlargement of our Abberton reservoir we agreed with Thames Water that we will, on their request, reduce our bulk supply to 71MI/d (as an annual average), with a profile of no less than 60 MI/d between January and March each year and 75 MI/d during the remainder of the year.

Clause 2b of the bulk supply agreement refers to what will happen in the event of Thames Water imposing a Temporary Use Ban (TUB) on its domestic customers. If we also apply a TUB on our customers then the full average quantity of 71MI/d remains available to us. The last occasion this occurred was in 1976. If we do not impose a TUB on our domestic customers then the supply from TWU is reduced by 25%. This was the situation in 2006.

Within the agreement is also a statement that during an "unusual drought", Thames Water will supply us with such quantities as will represent "fair apportionment" of the water available. We have agreed with Thames Water that "unusual drought" will in future be defined as when Thames Water has entered their Level 3 drought restrictions and has implemented a non-essential use ban. Fair apportionment will not be pre-emptively defined as the circumstances of each particular drought differ spatially and temporally (evidenced by 1995/97 and 2005/06) and will be considered at the time that Level 3 restrictions are put in place. However, the apportionment will be derived from the relative shortfall in deployable output that each company is experiencing.

The process for implementing this provision involves dialogue between the companies in the period running up to the implementation of a TUB by Thames Water. When the potential for the imposition of a TUB by Thames Water is identified, Thames Water will inform us and keep us informed of the likely date of imposition of the ban and confirm that the bulk supply will be reduced by 25% from this date if we do not impose a TUB ourselves. Thames Water will also keep us apprised of the likely date of lifting of the TUB and will confirm that the reduction in the bulk supply can be lifted as soon as the TUB has been lifted. If we have not imposed a TUB but Thames Water has, then we will keep Thames Water informed on the likely date of our imposition of a TUB.

We have discussed with Thames Water options to provide mutual aid in situations where the respective supply/demand situations may require it. This can apply to drought situations but also to other circumstances such as during periods of outage where it is prudent to provide mutual aid to each other. This provision means Thames Water can allow for a reduction of up to 20 MI/d to the bulk supply it provides to us. Conversely there is also the potential for Thames Water to increase the provision up to 118 MI/d when we require it and Thames Water are able to make the transfer without compromising the supply to its own customers.

3. DROUGHT MANAGEMENT STRATEGY AND PROCESS

3.1 Overview

This section of our Draft Drought Plan sets out our strategy and the process we will follow when responding to drought.

3.2 Drought Management Objectives

The overall objectives of our Drought Management Strategy are:

- To expedite the process of implementing a drought action;
- To identify potential drought measures that may be required in response to a range of drought conditions;
- To provide a comprehensive package of information and procedures that mean we can respond quickly to drought conditions, including collecting the information necessary for a drought permit or drought order application;
- To enable early discussion with regulators, customers and other stakeholders on our proposed response to a drought; and
- To ensure that senior leaders within our business will be provided with detailed, relevant and reliable information on which to make decisions.

3.3 Internal Management

Our Drought Management process begins with the formation of our Drought Management Group (DMG). The trigger for forming the DMG will be based on ambient supply and demand conditions. Our key drought indicators are raw water storage at Abberton and Hanningfield reservoirs, Lound and Fritton Lakes and Ormesby Broad, and groundwater levels in the Chalk and Crag aquifers from which we abstract. These indicators, discussed further in Section 4, are reviewed and reported to all levels of management on a weekly basis outside of drought conditions by our Water Resources Team.

The decision to form the DMG will be made by our Head of Water Strategy and Planning and our Water Director. We will use our weekly water resource trend forecasts to determine whether the DMG should be formed. For example, if we forecast that Essex reservoir storage will fall below the Level 1 drought action trigger within the following 3 weeks, we will form the DMG. This will give us 3 weeks to prepare for making a formal appeal for restraint.

Our Head of Water Strategy and Planning will assume the role of Drought Manager and will chair the DMG. A DMG secretary will also be appointed and will be responsible for taking, circulating and tracking meeting actions.

The DMG will be formed from individuals representing both 'affected departments' and/or those able to provide the necessary expertise in relation to the various areas of drought management (see below).

Area of Responsibility		Job Title
Overall Management	Leadership and Accountability	Water Director
Drought Manager (Chair)	Chair - responsible for timely implementation of drought actions in line with this Drought Plan	Head of Water Strategy and Planning
Environment Agency Liaison	To update the EA on latest supply/demand situation and to consult the EA on drought actions	Water Resources & Performance Manager
Resource and Environmental Monitoring	To ensure monitoring is undertaken and reported	Water Resources Team Manager; and Environmental Scientist
Hydrology & Modelling	To undertake water resources system modelling and to provide advice on surface water abstraction	Hydrologist
Hydrogeology	To undertake groundwater modelling and to provide advice on groundwater abstraction	Hydrogeologist
Water Production	To operate Water Treatment Works as directed by the DMG To inform DMG of any Water Supply constraints	Head of Water Supply
Distribution & Leakage	To operate the water network as directed by the DMG To inform DMG of any Water network constraints To ensure appropriate resources are available to undertake enhanced leakage find and fix	Head of Water Network (South)
Water quality issues	To advise the Water Directorate and the DMG on any water safety plan hazards (Catchment to Customer Tap) that may arise as a drought develops	Water Quality Manager (South)
Demand	Reporting of customer demand	Supply Demand Team Leader
Water Efficiency	To support dry weather messaging and Appeals for Restraint	Water Efficiency Manager
Customer Services Rep	To ensure customers are kept informed as and when Level 1 to 4 drought actions are implemented	Head of Customer Operations
Public Relations Lead	To ensure key stakeholders are informed of drought conditions and proposed drought actions	Corporate Communications Manager
Communication Lead	To ensure all dry weather messaging and Appeals for restraint are actioned to agreed deadlines	Head of External Communications
Maintenance	To continue with proactive maintenance As a drought deepens, to ensure reactive maintenance is fast tracked	Regional Maintenance Manager
Asset Delivery	To ensure the timely delivery of any new assets	Asset Investment Programme Manager
Emergency Planning	Co-ordination of Level 4 drought actions (Standpipes and rota cuts)	Emergency Planning Advisor

All the roles included in the above table will attend the Drought Management Group from the date it is formed with the exception of the Asset Investment Programme Manager and Emergency Planning Advisor who will only attend when Level 3 actions are being considered.

The DMG will meet as follows:

- Level 1 Drought Action:** Every two weeks
- Level 2 Drought Actions:** Weekly
- Level 3 Drought Actions:** Daily
- Level 4 Drought Action:** Continuous in Emergency Meeting Room

Drought actions will be identified and implemented before a major resource difficulty occurs. Such actions will be reviewed on a regular basis in response to daily reporting of the resource situation.

Our drought strategy is to reduce demand in the early stages of drought, initially through enhanced dry weather messaging through our respective media channels, followed by a formal appeal for restraint. This approach will reduce the likelihood of needing drought permit actions to address supply issues should the drought worsen.

As a drought develops the DMG will continue to review our supply demand situation and will implement drought actions as prioritised in Section 6. We will liaise with the Environment Agency before deciding on any particular course of action that may impact the environment. Communication with the Environment Agency is covered in Section 10 of this document (Communications Plan).

3.4 Drought Management Process

3.4.1 Overview

The DMG will make decisions on the potential implementation of drought actions following the process summarised in figure 4.

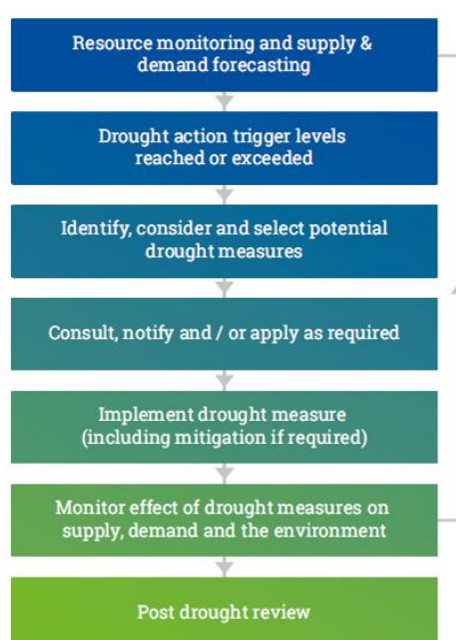


Figure 4: Drought Management Process

The arrows in figure 4 above denote lines of communication both internally and externally which are covered in Section 10.

The key elements of the above process are represented in the various chapters in this Draft Drought Plan.

3.4.2 Stage 1: Resource Monitoring and supply & demand forecasting

During this stage we undertake our business as usual water resource monitoring as well as water supply and customer demand forecasting which confirms whether we are entering a period of prolonged dry weather or not. This in turn informs the likelihood of needing to run the Ely Ouse to Essex Transfer Scheme (EOETS), our Essex Water Reuse Scheme and other river support schemes as required by the conditions on a number of our abstraction licences.

3.4.3 Stage 2: Drought Action Trigger levels reached or exceeded

The monitoring data from Stage 1 will tell us when the trigger level has been reached for implementing a drought action. The very first trigger is the formation of the DMG. As a drought intensifies, the DMG will brief our Executive Leadership Team and Board with increased frequency. The final decision for selecting and implementing a drought action lies with our Executive Leadership Team and Board.

3.4.4 Stage 3: Identify, Consider and Select Potential Drought Actions

This is when the DMG will review the drought measures in our Drought Plan and decide which ones to implement. Section 6.1 summarises the types of drought actions and the order in which they will be implemented. We will always implement those actions to reduce demand before applying for Level 3 Drought Permit actions.

3.4.5 Stage 4: Consult, Notify and Apply for Selected Drought Actions

For all of our drought actions, we will need to engage with a range of stakeholders (see Section 10 Communications Plan) including but not limited to neighbouring water companies, retailers and NAVs, Water Resources East, the Environment Agency, Natural England, the National Farmers Union (NFU) and CLA. This will ensure that:

- we are sharing our water resources position early; and
- that we can agree consistent messaging where other stakeholders are also ramping up their drought communications.

For Level 2 Temporary Use Bans (see Section 7.3) which restrict certain water use we are required to consult our customers and regulators.

For our Level 3 supply side actions (see Section 8.4), we will need to make an application for a drought permit or drought order.

3.4.6 Stage 5: Implement Drought Actions

Following completion of Stage 4, we will then implement the drought action. In the case of supply side drought actions (See Section 8), we will also implement any mitigation measures (see Section 11.4) to reduce the impact a drought action might have on the environment.

3.4.7 Stage 6: Monitor Effect of Drought Actions on Supply, Demand and the Environment

Once a drought action has been implemented, we will monitor its performance and confirm the effect it has on customer demand, water supply and in the case of supply side drought actions, the impact it has on the environment (see Section 11.3).

3.4.8 Stage 7: Post Drought Review

Once our monitoring data has confirmed a drought is over and drought actions have been withdrawn, we will then undertake a post drought review (see Section 12) to identify lessons learnt and to review and improve our drought plan process.

3.5 External Stakeholders

Understanding the context of drought outside of our own supply area is essential. Experience of the drought in the south of England in 2012 confirmed the importance of water companies, regulators and Defra working in a collaborative, fully informed manner. Following the formation of our DMG, our intention will be to work closely with Defra, the Environment Agency, Water Resources East, other water companies, other sectors such as agriculture and the National Drought Communications Group to ensure our messages are aligned. Coordination of the timing and content of messages to our customers helps considerably in removing confusion about what is happening, and what we want our customers to do.

3.6 Decisions & Consultation in a Drought

The final decision for selecting and implementing a drought action lies with our Executive Leadership Team (ELT) and Board. As a drought intensifies, the DMG will brief our ELT and Board with increased frequency. When a trigger level is reached, the ELT and Board will already be fully briefed and aware of its implications. They will therefore be able to grant immediate approval.

Once an action has been selected, we will consult with the Environment Agency and other consultees including the Consumer Council for Water and Natural England before notice of the application is made. We will also engage when required with affected areas of the Fire Service in order to ensure that any implications for operational fire-fighting have been adequately considered. This will be particularly important in the context of restrictions on water use.

4. RESOURCE MONITORING & DROUGHT INDICATORS

4.1 Overview

An important requirement of our Drought Plan is to regularly monitor the status of key drought indicators including rainfall, soil moisture deficit, reservoir levels and groundwater levels. This monitoring informs:

- our water resources position in terms of whether normal condition prevail or whether we are entering or in a period prolonged dry weather or drought;
- when to form our Drought Management Group (see Section 3); and
- when drought action triggers are reached and when to implement drought actions (see Section 5).

Section 4.3 below provides a summary of each drought indicator and where appropriate confirms the type and length of the monitoring record. A description of how monitoring data can be analysed and used in support of a drought application is outlined in Section 4.4.

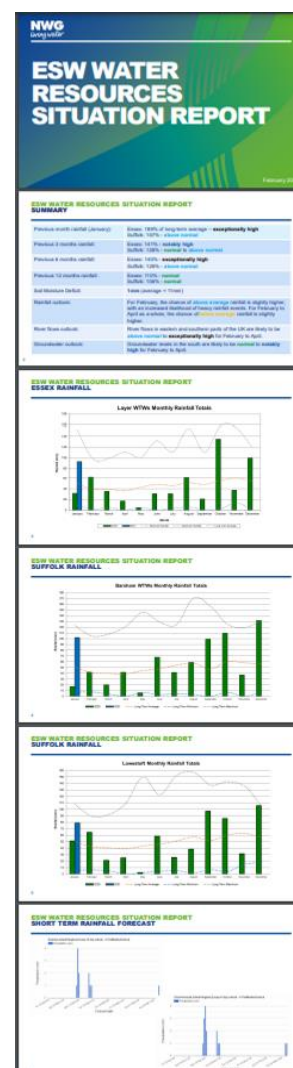
4.2 Water Resources Situation Report

We produce a monthly Water Resources Situation Report which is emailed to our Water Director and all interested teams. This report covers:

- Rainfall in each Water Resource Zone;
- 3, 6, 9 and 12 month rainfall deficits;
- Soil Moisture Deficit (SMD) in each Drought Management Area;
- Raw water reservoir storage levels;
- Natural lake water levels;
- River flows (as reported by the Environment Agency);
- Groundwater Levels;
- Short and medium term weather forecasts; and
- Distribution Input data (comprises customer demand and leakage) .

The monthly report compares the monthly outturn for each parameter against the long term average for that month.

The report narrative confirms whether a Drought Management Area is entering a period of prolonged dry weather or not and the likelihood of needing to run the Ely Ouse to Essex Transfer Scheme (EOETS), our Essex Water Reuse Scheme and other river support schemes as required by conditions on a number of our abstraction licences.



4.3 Drought Indicators & Monitoring

We have grouped our drought indicators into two categories:

- Hydrological and meteorological indicators that measure the direct effect on the hydrological cycle. These include rainfall (total and effective), soil moisture deficit, temperature, weather patterns, groundwater (levels and recharge / drawdown trends), river flow, reservoir inflows, reservoir storage and abstractable quantities; and
- Customer demand and consumption.

Drought indicators that historically have been of the greatest value in Essex and Suffolk are rainfall, reservoir storage, groundwater levels, river flows and customer demand and continue to be favoured in this Drought Plan. Both internal and external (Environment Agency) data sources are utilised where appropriate.

4.3.1 Rainfall

Rainfall is a primary indicator of drought severity. It has a direct effect on many hydrological parameters (soil moisture deficit, river flows and groundwater recharge) and can therefore directly impact on the quantities of water available for abstraction. Consequently, we will use rainfall to inform our drought status and to justify any restrictions on customers use of water.

We measure rainfall at the following Water Treatment Works:

Essex	Suffolk	Norfolk
Hanningfield: 1960 onwards	Barsham: 1983 onwards	Ormesby: 1992 onwards
Chigwell: 2006 onwards	Lound: 1998 onwards	
Layer: 1949 onwards	Blyth BH 7: 2005 onwards	
Langford: 1929 onwards	Bedingfield: 2005 onwards	
Langham: 2006 onwards	Hartismere BH 4: 2006 onwards	

During normal (non-drought) conditions, daily rainfall data is sent to our Water Resource team at the end of each month. During prolonged dry weather and drought, daily rainfall figures can be obtained directly as required.

Monthly rainfall data is also provided by the Environment Agency within a wider 'Hydrometric Bulletin' provided by East Anglia area, and a 'Hydrological Summary' provided by Thames area.

The East Anglia area bulletin includes average monthly rainfall figures for Essex, Suffolk and Norfolk. The Thames area summary includes average monthly rainfall figures for the River Lee Chalk catchment of the northeast part of the area.

More local rainfall data is available on request from the Environment Agency for most of the Essex and Suffolk water catchments.

4.3.2 Soil Moisture Deficit

Soil Moisture Deficit (SMD) is the amount of water required to raise a soil to field capacity. As a soil approaches field capacity, infiltration and ultimately aquifer recharge can potentially occur. The largest SMDs are found in the summer when rainfall is low and ambient air temperatures and evapotranspiration rates are high. Aquifer recharge usually starts around late September/October when SMDs reach a critical threshold.

As with rainfall, monthly SMD figures are quoted in the Environment Agency's monthly bulletins and area summaries.

4.3.3 Groundwater Levels

The monitoring of groundwater levels is of greatest importance in our Suffolk supply area, particularly in the groundwater-dominated Hartismere and Blyth Water Resource Zones.

Groundwater levels in our pumped boreholes are automatically recorded every 15 minutes. Manual groundwater level measurements using a dip meter are taken weekly by our Water Supply team and sent to our Water Resources team for validation. Additionally, we monitor groundwater levels in a number of monitoring boreholes as required under various abstraction licence conditions.

We will review groundwater level data and use it to determine if and when borehole pumps need to be temporarily lowered to maintain source deployable output.

As with rainfall and SMD, monthly average groundwater levels are reported in the Environment Agency's monthly bulletins and are summarised on a groundwater unit basis (e.g. Suffolk Chalk, Suffolk Crag, Essex Chalk, Essex Gravels).

4.3.4 River Flows

We have installed telemetry at a number of the Environment Agency's gauging stations on the Rivers Chelmer, Blackwater, Stour, Waveney and Bure with 15 minute flow data being stored on our internal systems. Hydrographs for each of these rivers are also provided in the Environment Agency's monthly bulletins and summaries.

Longer records for key gauging stations are already held in electronic format and are used for water resources system modelling and statistical analysis.

4.3.5 Reservoir and Lake Levels

We have two large, pumped storage reservoirs in Essex: Hanningfield Reservoir and Abberton Reservoir. Their storage capacities are 26,075 MI and 41,375 MI respectively.

To increase security of supply and the resilience of the Essex Water Resource Zone to drought, we increased the storage capacity of Abberton reservoir by 60% by raising the dam (the Abberton Scheme) between 2010 and 2014. We will be further increasing the resilience of the Essex Water Resource Zone through a new scheme called the Abberton Reservoir to Langford Pipeline. The pipeline will be laid over the next three years and will allow us to balance the storage of Abberton and Hanningfield reservoirs.

Reservoir water levels and reservoir storage are a critical element of monitoring the Essex Water Resource Zone and are plotted against reservoir control curves (triggers) for implementing our drought actions (see Section 5.2). Essex reservoir storage is calculated on a weekly basis using both a level method (converting it to volume using look up tables) and a water balance method (comparing what goes in the reservoirs with what comes out). Reservoir storage levels are widely circulated both internally and to external organisations including the Environment Agency and Essex Wildlife Trust.

Lake levels are recorded daily at Fritton Lake and Ormesby Broad in our Suffolk Northern/Central zone.

Both reservoir and lake levels are graphically presented to compare current levels with historic minimum, mean and maximum levels.

4.3.6 Weather Forecasts

We have access to Met Office weather forecasts and will review short, medium and long term weather forecasts more regularly as we enter a period of prolonged dry weather and / or drought.

4.3.7 Operational Reporting

Internal Operational Reporting

We monitor, record and report daily water availability, supply and demand figures for both the Essex and Suffolk supply areas in our “Daily Report”. This report is shared with all teams, managers and directors involved in water resources management. During a period of prolonged dry weather, all our abstractions and treatment works are optimised for dry weather conditions.

Ely Ouse to Essex Transfer Scheme Operation

We hold quarterly meetings with the Environment Agency about the EOETS and cover the following issues:

- an update on the region’s current water resource situation, including river flows, reservoir storage and groundwater levels;
- raw water quality issues;
- water availability at Denver;

- the operational status of the transfer scheme, treatment works and pumping station infrastructure, including planned maintenance downtime;
- current and predicted customer demand;
- likelihood of needing to run the EOETS to support storage in our Abberton and Hanningfield reservoirs; and
- likelihood of needing to run groundwater river support schemes.
-

4.4 Reporting & Analysis of Drought Conditions

Every drought in the UK has a unique spatial and temporal signature. Droughts are also unique in their duration and severity, as well as their individual hydrological and consequential characteristics. It is important therefore to ensure that reporting and analysis of a drought situation takes account of the wide range of factors that potentially define it. Historical data can be used to demonstrate:

- a period of prolonged dry weather;
- an exceptional shortage of rainfall;
- whether a shortage of rain is affecting key surface and groundwater sources; and
- how our drought and resource position compare with neighbouring water companies and at a national level.

Our Water Resources Team maintains data on the indicators described in Section 4 and is responsible for its validation, analysis and reporting during a drought.

Outside of drought, we prepare a monthly Water Resources Situation Report which is widely circulated. During a drought we update and issue this report weekly so that our Drought Management Group is kept updated on ambient drought conditions and drought action decisions can be made in a timely manner.

Our Water Resources Situation Reports cover the following elements:

- comparison of recent rainfall data against long term mean and minima for each water resource zone;
- comparison of rainfall trends, groundwater levels and river flows to assess the impact of low rainfall on sources (surface and groundwater);
- assessment of trends in soil moisture deficit and groundwater levels and their impact on river baseflows and prospects for recharge;
- assessment of refill for Abberton and Hanningfield reservoirs; and
- comparison of relevant hydrometric data against applicable drought measure trigger levels.

5. DROUGHT TRIGGERS

5.1 Overview

An important tool in assisting the Drought Management Group (DMG) in deciding whether to implement potential drought actions is the use of trigger levels, defined for key surface and groundwater sources. This section of our Draft Drought Plan presents the drought indicators and drought action triggers for each of our Drought Management Areas.

The triggers take account of our previous experience of droughts and also our recent assessment of drought vulnerability to different types of drought events using the UKWIR '[Drought vulnerability framework](#)' (17/WR/02/12). The outputs of these assessments are shown in [Appendix 1](#) and [Appendix 2](#) of this Draft Drought Plan. **This assessment has now been conducted using the preferred stochastic modelling approach. The results of which will be available for inclusion in our final Drought Plan.**

In our Essex Drought Management Area, the trigger for our drought actions is when reservoir storage in our pumped storage reservoirs at Hanningfield and Abberton falls below a series of reservoir storage control curves. In our Suffolk Drought Management Areas, the trigger for our groundwater drought actions is when groundwater levels fall below a series of groundwater level control curves. Additionally, prescribed flows measured at relevant gauging stations from the Rivers Bure and Waveney triggers.

These triggers confirm when we need to take action at all stages during a drought. The same control curves are used for the end of a drought event, i.e. drought actions are withdrawn once reservoir storage or groundwater levels rise above the control curve.

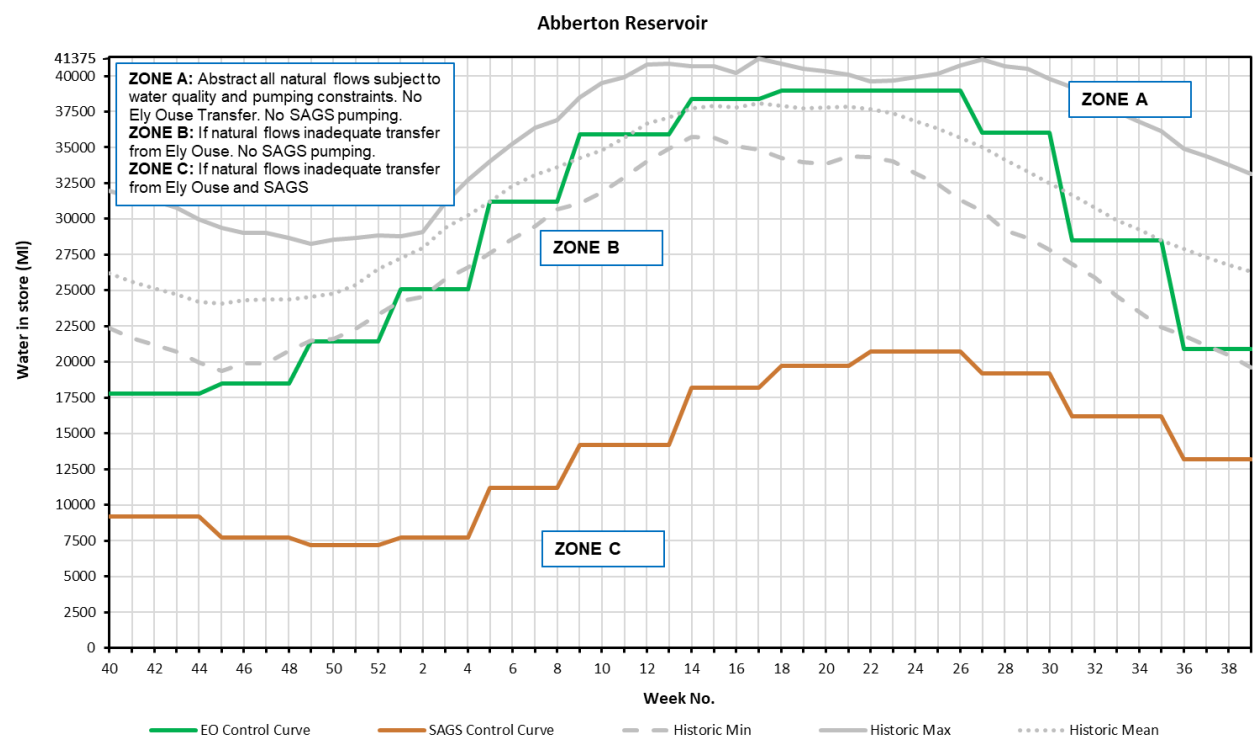
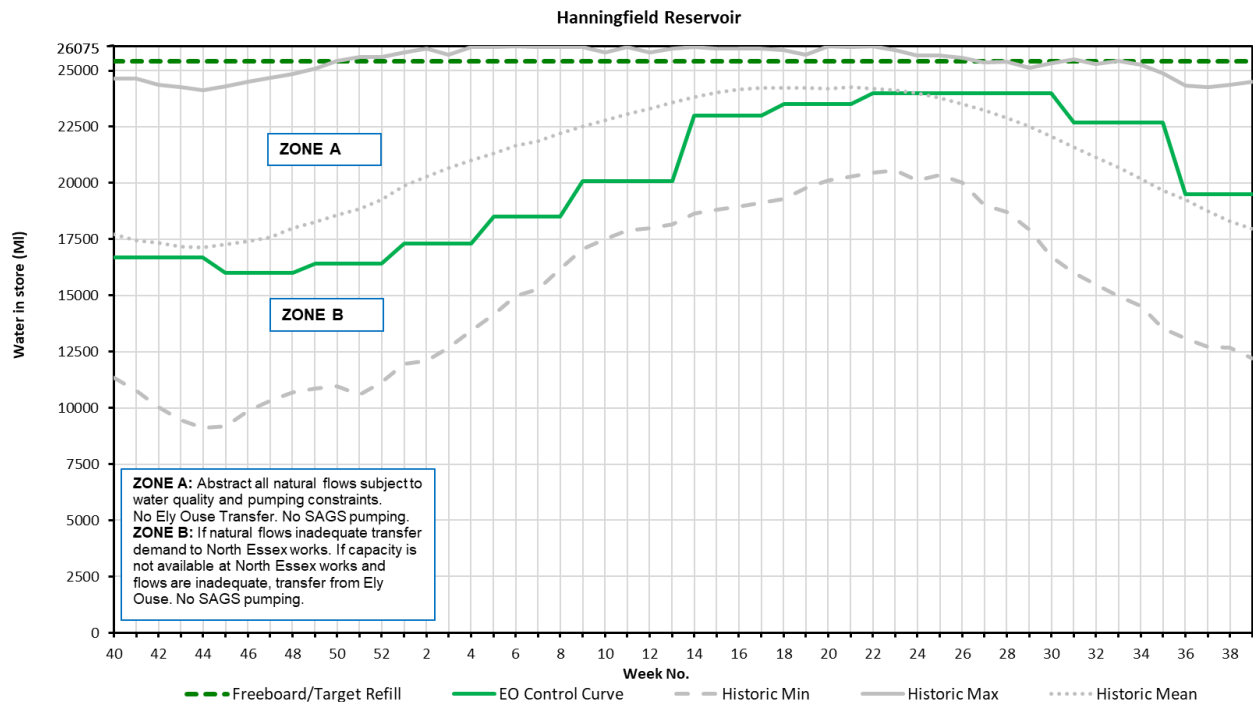
Worked examples have been produced (see [Appendix 3](#)) demonstrating the implementation of these trigger levels against droughts used in our baseline planning assumptions for WRMP19, and additionally against plausible more extreme droughts using the results of our Drought Vulnerability Framework Assessment and 1 in 500-year return period drought groundwater modelling. These examples show how we will introduce drought actions in a timely manner, allowing an appropriate lead-in time, for example when introducing water restrictions or applying for a drought permit or drought order.

5.2 Essex Water Resources Zone – Surface Water Sources

For the Essex WRZ trigger level tools in the form of control curves are used to inform decisions as to when to implement drought measures in response to storage in the Essex reservoirs. The first tool is a set of operational control curves that are used to call upon the Ely Ouse to Essex Transfer Scheme (EOETS) to support refill of Abberton and Hanningfield reservoirs. These control curves are reviewed and agreed with the Environment Agency.

The current EOETS control curves are presented below. The areas between control curves define discreet zones that indicate what level of support should potentially be implemented. The first zone (Zone A) reflects an 'ideal' situation whereby combined

storage levels stay within acceptable limits throughout the year, and natural river flows are enough to maintain these levels. The next zone (Zone B) reflects where storage levels have fallen to such that operation of the EOETS should be initiated. For Abberton Reservoir there is a third zone (Zone C) that reflects where the Stour Augmentation Groundwater Scheme (SAGS) should be initiated in addition to the EOETS.



For water resources planning, a further set of control curves for Level 1 (Appeal for Restraint), Level 2 (Temporary Use Ban), Level 3 (Non-essential Use Ban) and Level 4 (Standpipe and Rota Cuts) restrictions are incorporated into the Essex Aquator model. These curves are plotted up in our worked examples in [Appendix 3](#). When modelled combined Essex reservoir storage falls below each control curve, a demand saving is triggered in the model. During a real drought, a comparison of actual combined reservoir storage against the control curves can be used by our Drought Management Group as an indicator as to when restrictions should be implemented.

An extension of the naturalised flow record for the Essex and Ely Ouse rivers was undertaken for our WRMP19 modelling, and ahead of WRMP24 we have migrated our Essex Aquator model to a new version (Aquator XV). Based upon these changes since the current set of operational EOETS control curves were derived, we have agreed with the Environment Agency to redefine the control curves. This work will be carried out in time for the curves to be used operationally for the 2021/22 reservoir refill season, for WRMP24 modelling and for the final version of this Draft Drought Plan.

The trigger level tools are not designed to be used in a prescriptive manner due to the inherent nature and variability of droughts. Rather, they are used as a guide for management decisions.

5.3 Suffolk Supply Area – Groundwater Source Triggers

5.3.1 Overview

Operational experience from droughts in the 1990s demonstrated that our sources are very resilient to drought apart from one Hartismere water resource zone source. However, we are currently in the process of constructing a new standby satellite source which will ensure the full quantity on our abstraction licence is always available.

The resilience of our groundwater sources is also supported by the 1 in 200 year drought groundwater modelling that was undertaken using the Environment Agency's regional model for our Water Resources Management Plan 2019 and more recently by 1 in 500 year drought modelling undertaken for this Draft Drought Plan. In both instances, the deployable output of groundwater sources were not reduced due to these significant droughts.

5.3.2 Groundwater Triggers

We have developed Level 1, 2, 3 and 4 drought action triggers for one of our Hartismere Water Resource Zone boreholes and have used this to develop a worked example, which is presented in [Appendix 3](#). A Hartismere borehole was chosen as this was the only Water Resource Zone in the 1990s droughts that had a borehole less resilient to drought.

Additionally, further groundwater source trigger levels are already provided by the drought curves that have been produced for each of our groundwater sources as part of an exercise to define source deployable outputs for water resource planning purposes.

The methodology to calculate groundwater deployable output (UKWIR, 1995) relies on both operational data (water level/output data) from drought periods and, where available, analytical data derived from test pumping of the sources. When the water level/source output data is plotted, along with a suitable drought rest water level, drought-bounding curves can be constructed that define the lower limit of the envelope of all points plotted. Drought curves and deployable outputs are defined for both average and peak demand conditions.

We will monitor actual groundwater levels during prolonged dry weather and drought against the drought curves. Where groundwater levels fall below the drought curves, we will determine the cause (i.e. is it due to drought) and use this information to determine whether drought actions need to be brought forward should groundwater levels in our indicator boreholes remain above drought action trigger levels.

Additionally, we will closely monitor groundwater levels in the Environment Agency's monitoring boreholes as reported in their monthly Hydrological Summary reports.

Both sources of information will provide an important reference for the DMG to consider, in the event of the onset of a groundwater drought in the Suffolk Supply Area. During a drought, the DMG will review water levels at the Company's groundwater sources on a regular basis. If these levels begin to approach or exceed the trigger levels, available drought measures will be discussed by the Group.

5.4 Suffolk Supply Area – Surface Water Source Triggers

5.4.1 River Waveney

Potential drought trigger levels for the River Waveney already exist in the form of prescribed flow and abstraction conditions within the abstraction licence. The licence conditions stipulate that when gauged flows in the River Waveney fall below 0.62 cumecs (cubic metres per second), the daily quantity of authorised abstraction reduces as summarised below.

Gauged Flow at Ellingham Mill	Rates of Abstraction not to Exceed
0.62 cumecs	20.5MI/d
0.53 cumecs	13.6MI/d
0.45 cumecs	9.1MI/d
0.40 cumecs	4.5MI/d

A further condition allows for the Environment Agency's Waveney Augmentation Support Scheme (WAGS) to be run at rate which will augment rivers flows to a level that meets our forecasted abstraction requirement. The reliable yield of the WAGS is in excess of our forecasted abstraction requirements over the next five years.

5.4.2 River Bure

Potential drought trigger levels for the River Bure already exist in the form of prescribed flow and abstraction conditions within the abstraction licence. The licence conditions stipulate that when gauged flows in the River Bure fall below 0.45 cumecs, the daily quantity of authorised abstraction reduces as summarised below:

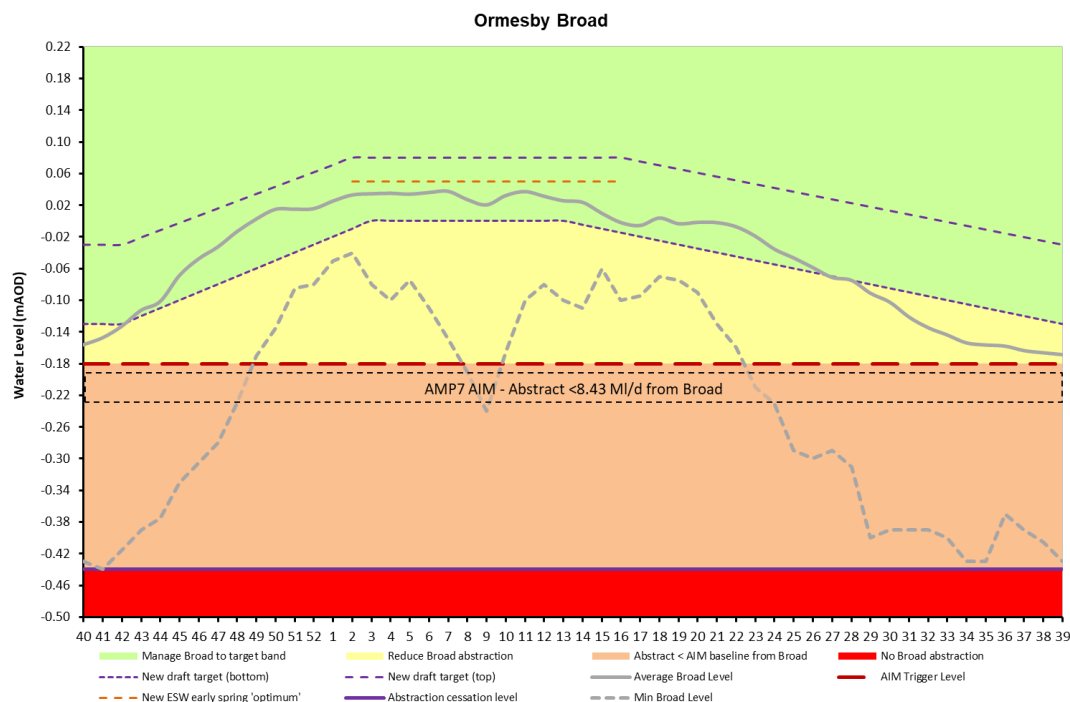
Gauged Flow at Ingworth	Rates of Abstraction not to Exceed
> 0.45 cumecs	27.2 MI/d
0.450 to 0.420 cumecs	22.73 MI/d
0.420 to 0.385 cumecs	20.45 MI/d
<0.385 cumecs	18.18 MI/d

If demand, and therefore our abstraction requirement, is greater than 18.18 MI/d, then we will operate a new treated water transfer scheme that allows water from the “Central” part of the Northern / Central Water Resource Zone to be transferred to the “Northern” part of the zone. Ultimately this will result in an increase in abstraction from the River Waveney and a marginal increase in utilisation of the WAGS.

5.4.3 Ormesby Broad

Ormesby Broad is part of the wider Trinity Broads system and is a Natura 2000 protected site. Following the Environment Agency’s Review of Consents process our abstraction licence was modified to include a level at which we must cease abstracting and an obligation to remove sediment to maintain water depths across the full extent of the Broads, including in shallow bays. The sediment removal was completed in 2017, after which the abstraction cessation level was enforced.

The abstraction cessation level was set at the lowest water level observed during the 1996/97 drought, which was deemed not have caused any permanent damage to the site’s designated features of interest. Now that the abstraction cessation level is in place it is important that abstraction from Ormesby Broad is managed to ensure that its full deployable output is maintained during drought years, and that when abstraction from the River Bure is restricted due to low river flows there is sufficient water in Ormesby Broad to meet customer demand. Consequently, the following dry weather control curves were developed and implemented.



Once the Ormesby Broad water level falls into the yellow zone abstraction is reduced, with any deficit in meeting customer demand being met by the River Bure abstraction. However, if abstraction rates from the River Bure are constrained due to low river flows, then the Northern / Central treated water transfer will be operated which, as outlined in Section 5.4.2 above, means that there will be an increase in abstraction from the River Waveney and a marginal increase in utilisation of the WAGS.

During the prolonged dry weather in 2018 our abstraction at the River Bure Pumping Station was constrained and Ormesby Broad water levels were such that the Northern / Central Transfer was required. However, at that point the scheme was still to be commissioned and so was not available for use. Instead, we secured permission to bring back into supply a redundant River Bure intake located downstream of our current intake. The River Bure Pumping Station constraint has now been resolved and the Northern / Central transfer is now operational. Consequently, re-commissioning the redundant downstream intake is not required and so has not been considered as a drought action in this Draft Drought Plan.

5.4.4 Lound and Fritton Lakes

From a water quantity perspective Lound and Fritton Lakes performed well during the 1990s droughts. This is largely because they have a significant groundwater inflow and the water level responds very quickly to rainfall events.

However, algal blooms did constrain output. This issue was resolved soon after with the construction of a new front end process called Dissolve Air Flotation (DAF), which removes all organic matter ensuring output on the subsequent primary and secondary processes are maintained.

Given the above points, detailed trigger levels for Lound and Fritton Lakes have not been defined. Only once the availability of these sources is tested in future droughts more extreme than those of the 1990s, we will have enough data to define meaningful trigger levels. Until then graphs of daily water levels compared to historic mean, minimum and maximum levels will be used as a tool by the DMG in consideration of the need to implement specific drought measures.

5.5 Triggers to Increase Annual Licence Conditions

We monitor use of our abstraction licences daily. For operational reasons one borehole may need to be taken out of supply and a neighbouring borehole within the same WRZ may take up the demand, using up its annual licence limit more quickly. However, this is acceptable as the demand can then be redistributed when the original source is back in supply. For this reason, we believe that an absolute trigger based on licence utilisation is not appropriate. Consequently, we will use an indicative trigger of 5% above target utilisation to invoke detailed discussions with our operational teams. These discussions will confirm whether licence utilisation can be brought back within target **though operational changes**, or whether a recommendation to the Drought Management Group should be made to **initiate enhanced dry weather messaging**. We would not use this specific metric on its own to trigger Level 1 (Appeal for restraint), Level 2 (Temporary Use Ban – TUB) and Level 3 Non-essential use bans drought actions.

5.6 Understanding the drought vulnerability of our supply systems

5.6.1 Essex Surface Water

As part of our WRMP19 we assessed the drought vulnerability of our supply systems to the worst droughts on record (which have a return period of 1 in 200 years or greater) and concluded that we have enough supply headroom.

However, the latest Drought Planning and Water Resources Planning Guidelines require all water companies to assess the vulnerability of their supply systems to different types of drought events, and the probability and impacts of such events occurring. We are currently undertaking this work as part of preparing our WRMP24. Some, but not all, of this work has been completed in time for this Draft Drought Plan, and so for our Essex Water Resource Zone we have undertaken an assessment which uses the principles of the UKWIR 'Drought Vulnerability Framework' (17/WR/02/12). The outputs from this assessment are presented in [Appendix 1](#). This assessment has now been conducted using the preferred stochastic modelling approach. The results of which will be available for inclusion in our final Drought Plan.

The Drought Vulnerability Framework assessed the resilience of the Essex System to droughts of a range of durations (6, 12, 18, 24 and 36 months) and return periods (100, 200, 500 and 1000 years). The assessment looked at droughts with both October and December end-months. The demand placed upon the system during the drought modelling was out-turn DI plus Target Headroom for 2018/19, the most recent Dry Year affecting the Essex WRZ.

The number of days of failure of the system were recorded for each drought, with failure occurring either when the demand could not be met, or the emergency storage level of a reservoir was reached. The only drought scenario to cause failure of the Essex System was the December-ending 24-month 1000-year return period scenario, with 24 days of failure.

We have used the information from our vulnerability assessment to inform the setting of our drought triggers and actions. Our WRMP24 drought resilience assessments will be ready for the final Drought Plan and will replace this interim Drought Vulnerability Assessment.

5.6.2 Suffolk Groundwater

For our groundwater sources, we have undertaken a deployable output assessment using the Environment Agency's regional model and a 1 in 500 year drought rainfall sequence. A 1 in 200 year drought assessment was undertaken for PR19. The outputs from this assessment are presented in [Appendix 2](#).

In summary the groundwater modelling carried out for the 1 in 500 year drought assessment was based closely on the previous 1 in 200 year assessment used for the PR19 Water Resources Management Plan (Amec Foster Wheeler, 2017). Six model runs were constructed – three for the North East Anglian Chalk (NEAC) groundwater model and three for the Essex groundwater model – representing the Naturalised, Recent Actual and Fully Licensed scenarios and running for a period of 1900-90 using

stochastic rainfall and potential evapotranspiration. Output generated from these scenarios comprised groundwater levels and synthesised daily flows.

Further details of the 1 in 500 year groundwater modelling can be found in Wood's technical note (Available on Request, Wood, 2021).

For each groundwater source, the lowest modelled historical water level experienced between 1970 and 2014 was compared with the lowest modelled 1 in 200 year and 1 in 500 year drought groundwater level during 1949 and 1950. The difference between these two groundwater level heads was then applied to the drought baseline curve for each groundwater source reliable output graph (UKWIR, 1995) to determine whether there was likely to be a reduction in DO due to the two drought scenarios.

All Essex and Suffolk groundwater sources were found to be resilient to a 1 in 200 year and a 1 in 500 year drought, with the exception of the South Essex wells. The changes in deployable output are in the table below:

Groundwater Source	PR19 Deployable Output (MI/d)	1:200-yr Drought Scenario Deployable Output (MI/d)	1:500-yr Drought Scenario Deployable Output (MI/d)
South Essex Well 1	3.5	3.5	3.45
South Essex Well 2	3.4	1.95	1.95

5.7 Testing our Drought Plan Triggers

We have tested the effectiveness of our drought plan triggers with respect to meeting our levels of service against:

- the droughts used in our baseline planning assumptions for our WRMP19; and
- a plausible more extreme drought using the results of our Drought Vulnerability Framework Assessment and 1 in 500 drought groundwater modelling.

The results of the testing, including worked examples, are presented in [Appendix 3](#).

The worked examples:

- show how we would expect our drought plan to work under the drought scenarios;
- confirm what actions we would take;
- demonstrate the expected time frames and durations for each action.

In summary, the testing demonstrates that the triggers are appropriate to both droughts and that Level 4 drought actions are not needed.

6. WHAT WE WILL DO IN A DROUGHT



This section of our Draft Drought Plan sets out all of the actions we may take during a drought.


6.1 Formation of Drought Management Group

The first action to be implemented in the lead up to a drought will be the formation of our Drought Management Group (DMG). Drought measures will then be implemented in the order presented in Section 6.3 below as determined by the DMG, and ratified by our Executive Leadership Team and Board.

Our DMG acts as the hub of our drought management process. The DMG has responsibility for reviewing water availability and demand on a weekly and/or daily basis and deciding whether and when drought measures should be implemented, and when they should be subsequently withdrawn. Implementation will be strongly influenced by reference to ambient hydrological conditions (see Section 4 and exceedance of the trigger levels indicated in Section 5).

6.2 Drought Actions

We have categorised each of our drought plan actions using the level 1 to 4 definitions below:

Severity of the drought	Level	Demand side actions	Supply side actions
Drought Plan 	Level 1	<ul style="list-style-type: none"> Communications campaign including enhanced dry weather messaging Increased leakage control 	<ul style="list-style-type: none"> Optimising sources Reducing treatment works outage Reducing process losses
			<ul style="list-style-type: none"> Running dry weather river support schemes including Essex Recycling Plant, the Ely Ouse to Essex Transfer Scheme and the Waveney Augmentation Groundwater Scheme
		<ul style="list-style-type: none"> Formal Appeal for Restraint for voluntary reduction in water use 	
	Level 2	<ul style="list-style-type: none"> Temporary use bans 	<ul style="list-style-type: none"> Lowering borehole pumps Road Tankering (Suffolk only)
	Level 3	<ul style="list-style-type: none"> Drought Order Non-essential use ban 	
			<ul style="list-style-type: none"> Drought permits to temporarily increase licensed quantities on abstraction licences Drought permits to temporarily reduce compensation flows; and ordinary drought order to obtain additional water
Emergency Plan	Level 4	<ul style="list-style-type: none"> All possible actions to avoid emergency drought orders including Pressure Reduction 	<ul style="list-style-type: none"> All possible actions including major environmental impact drought permits and orders
		<ul style="list-style-type: none"> Emergency drought orders (such as standpipes) 	

If needed, we will implement the drought actions in the order they appear in the table above.

Our drought plan only includes Level 1 to 3 drought actions. Level 4 actions are included in our Emergency Plan although in our worked examples (see [Appendix 3](#)) we have included the likely triggers for these actions.

All our Level 1 to 4 drought actions are described in Sections 7 and 8 below.

Our drought strategy is to always implement our demand saving actions first including reducing customer demand, leakage and Water Treatment Works outage.

We will implement our demand side actions in a timely manner and will have them in place long enough to have a measurable impact on water demand, which we measure continuously and report daily.

We will only implement the supply side actions, i.e. those to take more water from the environment using drought permits and orders, **including those to increase annual licence limits for groundwater abstractions**, once all demand side actions have been exhausted. The supply side actions with the least impact on the environment would be implemented first. In doing this, we will consider the environmental impact category (minor, moderate, major, uncertain) and associated confidence level (low, medium, high) for each supply side action. **We will review the order in which the supply side drought options are implemented by 30 April 2022 following update of the HRA assessments by 31 March 2022.**

Should drought permits / orders be required, we will include details of the demand measures we have used, and the demand savings made.

We have prepared a Summary Drought Options Form for each of our drought actions (see Appendix 5) which contain the following information:

- **Option Implementation Assessment:** triggers, yield/demand saving, implementation timetable, permissions required and risks;
- Drought Management Area to be applied;
- **Environmental Assessment:** risk to the environment, summary of possible environmental effects, details of studies, monitoring requirements and mitigation actions.
- Impact on Other Activities
- **the risks associated with this action:** for instance, social and economic factors and uncertainties associated with timings and water savings

The environmental assessment section of the summary form has been populated using information from the environmental assessment reports for the supply side actions.

7. DEMAND SIDE DROUGHT ACTIONS



This section of our Draft Drought Plan describes the demand side drought actions that we may employ to address potential water supply shortages during a drought.

7.1 Level 1 Drought Actions

7.1.1 Campaigns to encourage customer to use less water

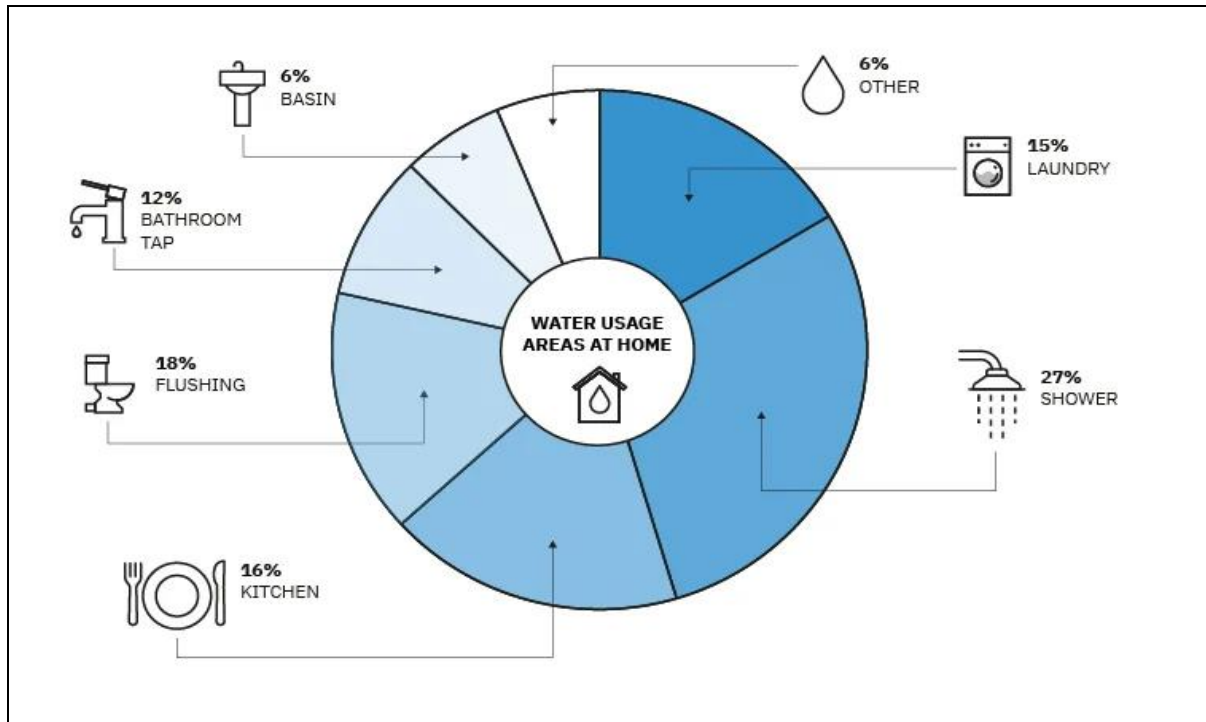
Enhanced dry weather messaging

Following a period of sustained dry weather and once the Environment Agency has announced our supply area is in an environmental drought, then we will increase the level of dry weather and water efficiency messaging we undertake. We will convey strong messages to customers in relation to how dry weather is affecting the environment and our water resources and how they can help by reducing the water use and using water wisely. Examples of the water saving tips we would use are shown below.

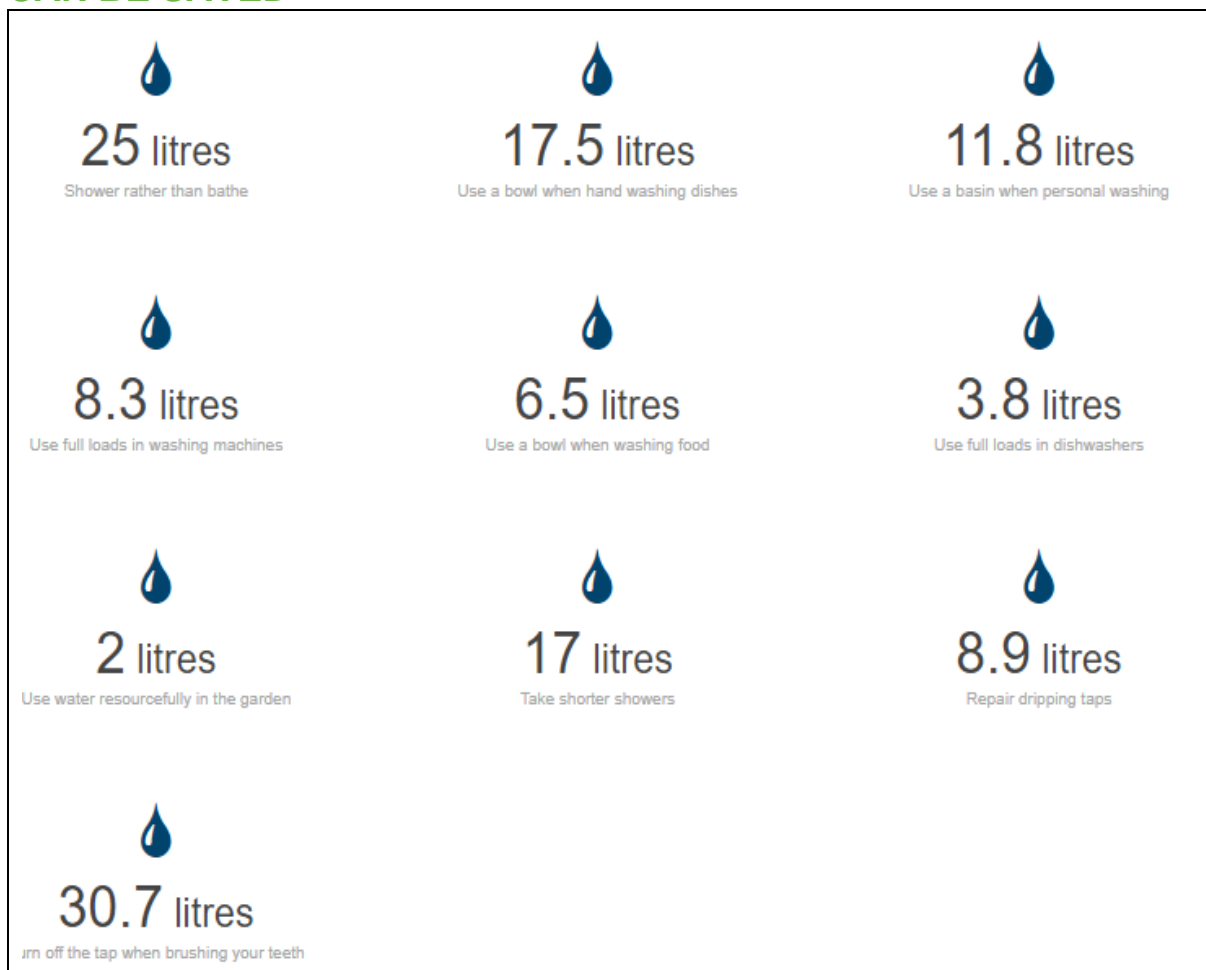
Appeal for Restraint

If a drought deepens and turns into a water resources drought, then our first action will be a Level 1 Appeal for Restraint.

WATER USE IN THE HOME



WATER SAVING TIPS AND THE QUANTITIES OF WATER THAT CAN BE SAVED



At an industry level previous droughts have shown that an Appeal for Restraint can result in average demand reduction of between 0 and 5%. However, our experience is that a demand saving of nearer to 7% is achievable. This may decrease in the future as meter penetration increases and customers have already altered their water use because of being on a measured supply. However, we will only know this through experience gained during future droughts.

We will monitor and measure demand and if the 7% demand savings are not achieved, then we would consider implementing a TUB earlier than planned.

Our full Drought Plan Communications Plan is presented in Section 10.

7.1.2 Leakage Reduction

Overview

Prolonged periods of drought may result in soil shrinkage and increased ground movement causing mains to fracture and leakage values to increase. We have made significant progress in reducing leakage from our network and already have some of the lowest levels of leakage in the country. However, we recognise that we must reduce leakage further and have agreed with our regulators that we will reduce leakage by a further 17.5% by 31 March 2025. We will achieve this through the use of innovative technologies to find leaks, through additional resource for find and fix and through mains renewal.

Our supply network is divided up into District Metered Areas (DMAs) which are small managed areas of the network with flow meters monitoring inlet flows. All of our DMAs are reviewed on a weekly basis to prioritise the areas for leakage detection activities. This period can be shortened during drought or severe weather events and can be prioritised to address specific issues and areas of severe drought.

Increased Leakage Find and Fix during Drought



We know that during drought, when we are asking customers to reduce their own water use, our customers will rightly expect us to promptly repair any burst pipes. During prolonged dry weather, the number of burst water mains can increase by 60% over a month. Consequently, we will ensure that workloads are prioritised and if necessary, resources are increased, in order to repair all visible leaks as soon as possible, often the same day. This is a key aspect of working with our customers to reduce overall water demand during a drought.

During a drought, our leakage find and fix teams will focus on those areas where we are most at risk of needing to implement drought actions.

Reduce Mains Pressure

Pressure reduction within treated water networks reduces water pressure to a level that reduces the risk of leakage and burst pipes while also maintaining acceptable pressure at our customers' taps. This is achieved through the use of pressure sensors and pressure reducing valves. Pressure reduction also reduces the flow rates from existing leakage sites and reduces wastage at customers' taps caused by pressure being higher than it needs to be.

We continually monitor network pressure and will continue to ensure that pressure remains at optimised levels. Consequently, there are no further opportunities to reduce pressure within the network to reduce leakage without impacting adversely on pressure at our customers' tap and this is not considered a viable action in our drought plan.

Reducing mains pressure below our agreed levels of service to reduce customer water use is considered in Section 9 (Extreme Drought Measures).

Applying for a drought permit and demonstrating control of demand through leakage

We have a number of supply side drought actions which, if needed, will require us to apply for a drought permit. If we ever need to apply for a drought permit we will need to demonstrate to our customers and to our regulators that we have taken all reasonable action to control demand through leakage reduction. The requirements of this are covered in Appendix G of the Environment Agency's Droughts Permits and Drought Order Supplementary Guidance. This states that,

“...during a normal year, a water company is expected to achieve leakage targets set by Ofwat and that during a year when there is prolonged dry weather, leading to a drought, the water company is expected to follow its published drought plan and increase work to reduce the amount of water lost via leakage”.

In the event we need to apply for a drought permit, we will provide detailed information on how we have controlled leakage in the period of time before submitting the drought permit application together with details of how we have controlled demand. We would determine the period of time enhanced leakage reduction is required prior to a permit application during pre-application talks with the Environment Agency. As a minimum, we will:

- provide an estimate of how leakage has been reduced as a result of drought action measures;
- confirm how we have increased resources to reduce leakage;
- benchmark pre- and post-drought action find and fix rates;
- provide details of leakage reduction public awareness campaigns.

7.1.3 Metering

Water metering is an important part of our strategy for managing demand. Meter penetration in the ESW region currently stands at 63% in Essex and 70% in Suffolk (as of 31st March 2021).

We actively promote the benefits of installing a water meter to our customers including that installation is free, that it can help reduce water usage and therefore reduce their water bill.

It is our policy to meter the following types of domestic property:

- all customers who opt to have a meter;
- all new properties; and
- properties where water is used in significant quantities, including:
 - for garden watering, other than by hand-held apparatus. This includes the use of sprinklers; and
 - for the automatic replenishing of ponds or swimming pools with a capacity greater than 10,000 litres. Unmetered bills will draw customers' attention to this.

Customers are required to notify us if they are using water for any of these purposes. Arrangements will be then made to fit a meter at no cost to them. During a drought, particularly prior to the introduction of any restrictions on water use, the requirement for large discretionary users of water to have a meter installed will be emphasised in our drought communications.

Additionally, as outlined in our Water Resources Management Plan 2019, in Essex we will continue with the current strategy of optant metering but will no longer continue with selective metering on change of occupier of a domestic property. Instead, we have introduced Area Metering which we predict should add a further 25,000 meter optants by March 2025 to the forecast number of “natural” optants expected. Our Area Metering programme installs meters into existing empty meter chambers. Our customers will remain unmeasured but over a two year period we send them a “water bill” showing what they would have paid had they opted for a meter.

We have made considerable progress over recent years to increase meter penetration in order to support customers in reducing their water use and bills. This has included encouraging customers to opt for a free meter by giving annual information on free meter installation in our billing documentation, numerous metering campaigns over the years and a programme of selective meter installations on non-household properties.

In earlier Drought Plans, we had proposed an enhanced awareness campaign to increase meter uptake rates during a drought. Whether this was ever going to be effective is debatable, but with meter penetration approaching 70% in Suffolk and 63% in Essex, it is no longer considered a drought action. We can only encourage customers to opt for a free meter but given the annual information on free meter installation in our billing documentation and numerous metering campaigns over the years, it is unlikely that many, if any, who would want a meter are not aware. Additionally, our new “pre-metering” programme in Essex should further stimulate customers to opt for a metering knowing they will save money. Experience of previous

drought also indicates that appeals for restraint, being highly successful, are already getting customers to save the water that they would have saved by having a meter installed. However, we will continue to respond to all meter applications and aim to have the majority of meters installed within 30 days.

7.1.4 Water Conservation Measures (Water Efficiency)



Overview

We have been running a wide variety of water efficiency projects since 1997 including large-scale home retrofit projects, school audits and education, business audits, research projects and initiatives with partners such as housing associations. Our water efficiency strategy has demonstrated its value by delivering quantifiable and sustainable water savings through innovative, creative and leading projects.

A critical part of our ongoing programme is the monitoring of results to quantify actual water demand savings and how sustainable they are. We strive to be proactive and innovative. This has involved researching the most cost effective methods of reducing water consumption, developing new analysis techniques, and improving our understanding of people's behaviour and motivations to evaluate the most beneficial approaches to promoting water efficiency as well as providing practical advice and help to customers.

We have reviewed our strategy as part of our Water Resources Management Plan 2019 and our strategy continues to be based on a process of reviewing effectiveness, making improvements and responding to new opportunities to trial new products, evaluate new methods of working, work with new partners and improve our measurement and analysis techniques.

Every Drop Counts

Every Drop Counts is our largest ever water saving campaign, taking a truly innovative and wide-reaching approach by offering customers the chance to participate in a range of initiatives that are usually delivered at different times and places throughout the year. During prolonged dry weather or drought, we deliver enhanced dry weather messaging through Every Drop Count. Further information on Every Drop Counts is included in our [Water Resources Management Plan 2019](#). It uses a combination of targeted advertising and community-based marketing to maximise participation in the wide range of water efficiency projects to help communities not only save water, but energy and money too.



A key component of the campaign is the offer to householders of a free plumber-led home retrofit visit worth over £130. The water and energy saving visit includes the installation of a wide range of retrofit products alongside effective engagement with the householder to enact long-term behaviour change. Participating customers that have received an Every Drop Counts water efficiency retrofit visit are each saving on average 21.3 litres per day. This equates to an annual saving of 7,775 litres which in turn results in monetary savings of approximately £21 on each participating customer's water and sewerage bills.

On an annual basis, we deliver the Every Drop Counts whole-town approach in a specific town selected for varying reasons. Each annual campaign is launched with a stakeholder engagement event in May, following which the home retrofits and school educational programmes are delivered throughout the summer. Activity concludes in October, following which the autumn sees a period of customer research and data analysis, and throughout the winter the identification of recommendations and planning for the subsequent year. Our Whole Town Approach allows us to promote our Priority Services Register (www.eswater.co.uk/priority) and "water without the worry" leaflet (www.eswater.co.uk/watersure). It also allows us to understand which of our water saving tips and products they like the most which helps us refine our offer. In deciding which towns to focus our annual campaigns in, we take account of our current water resources position and whether we are in or likely to be in prolonged dry weather situation.

A key component of Every Drop Counts is an overarching innovative marketing campaign. The campaign aims to generate a buzz around the community using billboards, electronic panels, stunt marketing and newspaper/radio advertisements to raise awareness. We also worked with the environmental charity Groundwork to deliver a series of customer engagement events that were tailored to provide opportunities for our customers to sign-up for a water saving retrofit in the local high street, at supermarkets, shows and festivals. By working in partnership with the community and environmental charities, we are also able to engage community champions to deliver a series of customer engagement stands, utilising their understanding of the community to encourage wider participation.

The Ripple Effect

The Ripple Effect is our new Water Efficiency education programme initiative:

www.nwg.co.uk/responsibility/working-with-schools/the-ripple-effect/

As with Every Drop Counts, we would use this initiative during prolonged dry weather to promote our dry weather messaging.

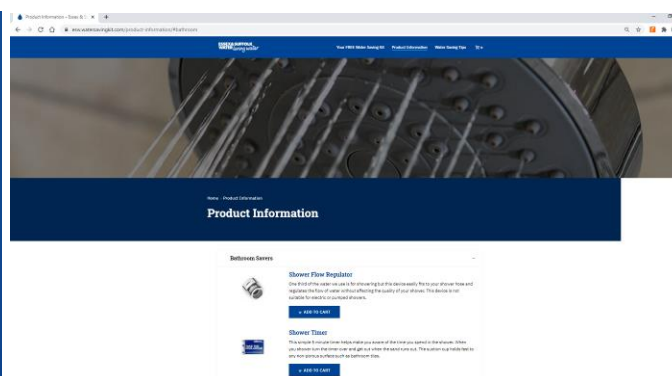


When we all make small changes to our water use, we can make big waves in protecting our precious water supply. Consequently, we are inviting school communities to get involved in the programme. Through a range of films, interactive games and activities for 8 to 11 year olds, The Ripple Effect encourages everyone to learn more about water and make small changes to protect our water supply. Everyone can become a part of The Ripple Effect by becoming Water Trackers who are expert protectors of water and guardians of the water cycle.

We hope that children will build their knowledge at Water Tracker Training Camp and test their knowledge on a journey through Water Tracker House. Both journeys contain a suite of interactive, flexible curriculum-linked resources that can also be used individually, as well as for remote or home learning.

Water saving products

We offer a range of water saving products to our customers free of charge. They are available from our website <https://esw.watersavingkit.com/> and are promoted using social media, through customer frontline staff and our water saving programmes.



Our products and offers are summarised below:

Water Saving Product Type	Water Saving Product name	How it will help customers save water
Bathroom Savers	Shower flow regulator	One third of the water we use is for showering, but this device easily fits to your shower hose and regulates the flow of water without affecting the quality of your shower. This device is not suitable for electric or pumped showers.
	Shower timer	This simple 5 minute timer helps make you aware of the time you spend in the shower. When you shower turn the timer over and get out when the sand runs out. The suction cup holds fast to any non-porous surface such as bathroom tiles.
	Water saving tap inserts	The tap inserts work by introducing air into the flow reducing the amount of water and energy used. They are easy to fit to taps with a circular outlet and comes with a fitting tool included.
	Universal sink plug	Ideal for any sink or bath with a leaky plug, avoiding the need to top up with water. Can be used in any plug in any fitting.
Toilet Savers	Save A Flush Bag	The Save-a-flush is an effortless way to reduce water use in the bathroom. It's a bag filled with crystals which you easily pop into your cistern. The crystals will then expand to save 1.2 litres of water every time you flush. Suitable for toilets with a handle cistern 7.5 litres or more capacity.
	Toilet Leak Detection Capsules	The dye tablets are used to identify leaks in a toilet that can waste water. Simply drop a tablet in the cistern and know in a few minutes if a repair needs to be made.
Garden Savers	Water Storing Gel	The water gel granules absorb water when the soil is watered and then release it back into the soil when the plants need it. They can be mixed in into the soil when planting hanging baskets, containers, window boxes, pots, flower beds etc.
	Water Sticks	A simple solution to the problem of when to water your plants. Simply push it into the soil and look at the colour of the paper. Red means it needs a water, blue means your plant has enough water.
	Trigger Hose Gun	Using a hose to water your plants and borders can use a lot of water, especially if we have a long hot summer. The trigger on this hose gun makes it easier to turn on and off the water supply, helping to reduce wastage. It also offers multiple jets whether you are watering your hanging baskets or flower beds.
Discounted water saving products		We have agreed with affiliate companies, customer discounts for water butts to allow rainwater harvesting.

Water Efficiency During Drought

During drought conditions promotion of water saving products will be enhanced. Our water efficiency strategy will be to:

- increase our water efficiency messaging emphasising the need to “Use Water Wisely” under the campaign heading of Every Drop Counts;
- promote how our customers can reduce their water use; and
- promote our water efficiency offer (see table above).

Additionally, we will continue to:

- undertake household water efficiency retrofit projects
- promote our large scale educational programme aimed at primary schools; and
- provide information to customers on how to save water via the company website, in billing literature, in dedicated leaflets, on social media and through a widespread radio campaign.

Outside of this, customers are able to purchase water butts at low prices through a partnership we have with a water butt supplier.

In the event of a drought, the scale and pace of the campaign can be increased and focused particularly on the delivery of key water efficiency messages to encourage customers to request free water saving devices.

7.1.5 Operational Water Usage: Flushing of water mains

Regular flushing of our water mains is a necessary requirement to ensure compliance with drinking water quality regulations. However, during a drought, this may send out the wrong message to our customers.

During a drought, we will consider suspending our flushing programme. This could save 0.04 Ml/d and will support our water efficiency messages. Some flushing may always be necessary for hygiene purposes and we would never compromise on this.

7.2 Level 2 Demand Side Drought Actions

7.2.1 Temporary [Water] Use Bans (TUB)

Overview

Temporary Use Bans, commonly referred to as TUBs, are powers granted to water companies to impose restrictions on customers' water use. Previously these were referred to as 'hosepipe bans' but they were modified in 2010 under the Flood and Water Management Act to cover a wider range of restrictions.

TUBs can be introduced quickly – seven days after an advert has been placed in newspapers in the area which will be affected. They predominantly focus on water use by domestic customers because this provides the largest water saving and helps protect public services and the economy.

When we need to introduce a TUB, we will take account of the WaterUK / UKWIR Code of Practice and Guidance on Water Use Restrictions. This provides guidance on the effective implementation of water use restrictions by way of Temporary Use Bans (TUBs) and Drought Orders (DO) to help manage demand during times of drought.

We will ensure that we implement a TUB in a proportionate manner, by considering the balance between any impact on an individual or group of customers and overall public interest. In line with the Code of Practice, we will consider among other aspects:

- the nature and seriousness of the water supply situation;
- the water savings from introducing the TUB;
- the feedback from stakeholders including neighbouring water companies and Water Resources East; and
- whether the restriction will impact on vulnerable customers or groups.

TUB definitions are presented in Appendix 9.

The remainder of this section sets out how we will introduce and withdraw a TUB in what we believe to be a proportionate and reasonable way.

Trigger for a TUB

The Drought Management Group will consider a TUB once Essex reservoir storage falls below the TUB control curve or when Suffolk groundwater levels fall below the TUB control curve. Worked examples illustrating when our DMG will prepare for a TUB are presented in [Appendix 3](#).

We will ensure that TUBs are always in place before the need to apply for a drought permit or order (between 1 April and 1 October) and will ensure they are in place long enough to have a measurable impact on customer demand. We measure customer demand daily and would expect to see a reduction in demand within 1 to 2 weeks.

Areas of Restrictions

If needed we may introduce a TUB either across the whole company supply area or in a Drought Management Area (i.e. Suffolk or Essex supply areas). The last time we imposed a TUB, in the 1990s droughts, we imposed restrictions at the Drought Management Area level; although the bans in Essex and Suffolk were in force at similar times they were not necessarily for the same duration.

If a TUB is required in the future we intend to apply it at the Drought Management Area scale again. This is because the Suffolk and Essex supply areas, while integrated in their own right, are geographically separate with no link between them.

Our Essex supply area comprises one integrated Water Resource Zone with water from any of its five major treatment works theoretically being capable of feeding any area. This means any shortage of water is not attributable to any specific group of Essex customers or their water demand. Savings from any Essex customers help to preserve the total amount of water we have available in Essex. Conversely, our Suffolk supply area comprises of three Water Resource Zones. We believe that applying a TUB at the Water Resource Zone level would be confusing for our customers who would not necessarily know which WRZ they are in.

Phasing of Restrictions

As the introduction of TUBs gives water companies a wider range of powers it is important we give careful consideration to the phasing of restrictions. Different levels

of drought will be triggered at different times, according to each water company's water resource limits, so companies can decide to implement restrictions in stages according to local conditions, rather than apply them in full at once. This helps mitigate the impact of restrictions on business which undertake water use activities as part of their core business, such as car washes.

However, we will apply the full TUB powers before progressing to the next restriction, for example, implementing TUBs before applying for a Drought Order.

Temporary Water Use Ban Demand Saving

During the 1990s droughts TUBs were required although then they were known as "hosepipe bans". Our experience of these bans provides us with a reasonable expectation of what customer water use savings from a future TUB might be.

A Level 1 Appeal for Restraint will have already been implemented before a TUB and this will have already reduced garden watering, specifically of lawns, and so we need to be careful not to overestimate the savings from potential restrictions by double counting savings.

Nevertheless, we conclude that a TUB will deliver an additional demand reduction of around 5% on top of the 7% saving made from an Appeal for Restraint. This is based on evidence from previous hosepipe bans and also accounting for the temporary use ban including all hose pipe use (not just domestic gardens). This 5% saving does however assume there are no exemptions to the TUB.

Communicating the Introduction, Phasing In and Lifting of Temporary Restrictions

We will inform our customers of the introduction and lifting of temporary use restrictions by email (where we have an email address), through our website (www.eswater.co.uk), through our social media channels and through the issue of press releases to both national and independent radio stations and television channels.

We will inform neighbouring water companies, Water Resources East, NAVs and water retailers for business by email through our agreed communication contact.

TUB advertising and timeline to implementation

Section 76B(2) of the Water Industry Act 1991 sets out the procedure for implementing a TUB:

"Before the period for which a prohibition is to apply the water undertaker must give notice of the prohibition and its terms-

- a. in at least two newspapers circulating in the area to which it is to apply, and*
- b. on the water undertaker's internet website."*

The notice of prohibition must set out clearly the terms and extent of the proposed prohibition and specify the date on which the prohibition will commence and the area

to which the ban will apply. We must also provide details of how customers can make representations about the proposed prohibitions to us and leave a reasonable period for the representations to be made.

We consider a reasonable period to be 21 days from when the notice of the prohibition is posted on our website. This allows the advertisement of the ban to appear in the local newspapers, which may only be published weekly, and 14 days for representations to be made as a result of the newspaper advertisement. In the event that we receive an un-expectedly large response to the TUB consultation, we will bring in extra resource to manage this.

The majority of Water Resources South East (WRSE) and Water Resource East (WRE) water companies, including Essex & Suffolk Water, have agreed a universal TUB enforcement policy which we will follow (see [Appendix 8](#)).

Aligning our Approach to Introducing a TUB and Reducing Demand

We will work with neighbouring water companies and Water Resources East to ensure that we align our approach to drought messaging and the introduction of TUBs. We will ensure that we share our supply demand position in a timely manner, will consult on our messaging and will ensure they are aware of our intention to implement a TUB in a timely manner.

There could be a situation where our neighbouring water companies need to introduce a TUB but we do not because our TUB triggers have not been met. This was the case in 2012. In this instance, we do not believe that we should introduce a TUB simply because a neighbouring water company has done, however we would ensure that our drought messaging was supportive of our neighbouring water companies' positions.

Exceptions

Water companies can grant exceptions from these restrictions for customers and businesses. These exceptions aim to minimise the impact on vulnerable customers and the economy. The following pages set out who can apply for exceptions and what they cover.

There are two types of exceptions to these restrictions which can be applied by water companies:

- Statutory Exceptions – activities/water uses which are exempt from the legislation; and
- Discretionary Exceptions – activities/water uses which are not covered by a statutory exception, but water companies can grant the use of a hosepipe under certain circumstances.

Discretionary Exceptions can be further split into two categories:

- 'Universal' – these exceptions have been agreed by all companies who signed up to the Drought Code of Practice (A document which aims to ensure a common approach to drought management by UK Water companies). Such

exceptions do not require customers to write or make representation to the water company to obtain permission; and

- 'Other concessions' – these are exceptions which individual water companies can choose to offer customers, depending on the particular circumstances. These exceptions do require customers to write or make representation to the water company to obtain permission.

Summary of exceptions

The following table sets out the statutory, universal discretionary and agreed discretionary temporary use ban exceptions for Essex & Suffolk Water which is line with most other water companies in the Water Resources East and Water Resources South East regions.

TUB Category	Statutory exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)
1. Watering a garden using a hosepipe	Using a hosepipe to water a garden for health or safety reasons. NB In this category, the definition of “a garden” includes “an area of grass used for sport or recreation”. Therefore, it should be noted that watering areas of grass, which are used for sport or recreation, is covered by a Statutory Exception for health & safety only in relation to the active strip/playing area, not the entire ground.	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Use of an approved drip or trickle irrigation system fitted with a pressure reducing valve (PRV) and timer 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge To water newly laid turf for first 28 days
2 Cleaning a private motor-vehicle using a hosepipe	A “private motor-vehicle” does not include (1) a public service vehicle, as defined in section 1 of the Public Passenger Vehicles Act 1981 (c), and (2) a goods vehicle, as defined in section 192 of the Road Traffic Act 1988 (d)	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Use of a hosepipe in the course of a business to clean private motor vehicles where this is done as a service to customers 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge
3. Watering plants on domestic or other non-commercial premises using a hosepipe	Does not include watering plants that are (1) grown or kept for sale or commercial use, or (2) that are part of a National Plant Collection or temporary garden or flower display.	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Use of an approved drip or trickle irrigation system fitted with a PRV and timer 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge To water newly laid turf for first 28 days
4. Cleaning a private leisure boat using a hosepipe	(1) cleaning any area of a private leisure boat which, except for doors or windows, is enclosed by a roof and walls. (2) Using a hosepipe to clean a private leisure boat for health or safety reasons.	<ul style="list-style-type: none"> Commercial cleaning Vessels of primary residence Cases where fouling is causing increased fuel consumption Engines designed to be cleaned with a hosepipe 	<ul style="list-style-type: none"> To prevent or control the spread of non-native and/or invasive species
5. Filling or maintaining a domestic swimming or paddling pool	(1) filling or maintaining a pool where necessary in the course of its construction (2) filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap (3) filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment	None	

TUB Category	Statutory exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)
	(4) filling or maintaining a pool that is used for the purpose of decontaminating animals from infection or disease (5) filling or maintaining a pool used in the course of a programme of veterinary treatment (6) filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity		
6. Drawing water, using a hosepipe, for domestic recreational use	None	None	
7. Filling or maintaining a domestic pond using a hosepipe	Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity	<ul style="list-style-type: none"> Blue Badge holders on the grounds of disability 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge
8. Filling or maintaining an ornamental fountain	Filling or maintaining an ornamental fountain which is in or near a fish-pond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy	None	<ul style="list-style-type: none"> To operate water features with religious significance
9. Cleaning walls, or windows, of domestic premises using a hosepipe	Using a hosepipe to clean the walls or windows of domestic premises for health or safety reasons	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Commercial cleaning 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge
10. Cleaning paths or patios using a hosepipe	Using a hosepipe to clean paths or patios for health or safety reasons	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Commercial cleaning 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge
11. Cleaning other artificial surfaces using a hosepipe	Using a hosepipe to clean an artificial outdoor surface for health or safety reasons	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Commercial cleaning 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge

7.2.2 The basis for the variability of responses to water use restrictions from water companies in South East England

In the South East region, water companies source their supplies of raw water prior to treatment in the following ways:

- River abstraction;
- Reservoirs filled by river abstraction or impoundment of river water; and / or
- Groundwater abstraction from boreholes and springs.

The ratio of source types varies within a company's own Water Resource Zones and between companies and this causes variability in drought resilience and response. Unlike unseasonably dry soil that constitutes an agricultural drought and which can arise from only a few weeks of dry and sunny weather over the growing season, it takes at least several months of below average rainfall to initiate a water resources drought. Particularly important is winter rainfall as it is this that replenishes most water resources. The low groundwater levels and river flows that result from this type of dry period reduce water availability from rivers and boreholes and so reservoir levels fall. This poses a risk to a water company's ability to supply its customers.

To manage this risk water use restrictions are an important measure that water companies can use to reduce demand during drought. They not only enable companies to maintain essential supplies but also help to conserve water resources for later in a drought and reduce the environmental impacts of abstraction during this critical period.

Water companies will only impose water use restrictions upon their customers if they are absolutely necessary, and in accordance with their Levels of Service for water supply. Water companies fully appreciate the confusion that can be caused among some customers when one company introduces restrictions, but its neighbouring water company does not. Clearly from a customer point of view if restrictions need to be imposed, then a simple and consistent approach should be adopted for introducing water use restrictions across the South East. Where we make an Appeal for Restraint or impose restrictions, we will always consult neighbouring water companies and Water Resources East to ensure messaging is consistent. However, two reasons why water companies may have to react differently in terms of restrictions and their timing are as follows:

- **Differing levels of drought severity across the region:** While droughts across the South East will generally be caused by a regional trend of several months of below average rainfall, sub-regional differences in rainfall may cause differing levels of drought severity across the region. In other words, the need to impose restrictions for one company may not equally apply to another company in the South East. This was the case in 2012.
- **Differing vulnerabilities at Water Resource Zone level:** Due to the way the water supply system has developed over time, many water company supply areas are sub-divided into Water Resource Zones (WRZs). These are defined as the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which customers experience the same risk of supply failure from a resource shortfall. WRZs can be divided into those dependent upon:

- River abstraction only;
- Groundwater abstraction only;
- Reservoirs filled by abstracting local river water or by impounding river water; and
- Various combinations of the above.

This mix of WRZ types means that even if there were not a significant difference in drought severity across the region, WRZs will tend to react differently to the same drought, with certain zones experiencing higher levels of risk to supplies than others. That means in similar drought conditions, rivers, groundwater sources and reservoirs across the region can respond differently in terms of risk to supply. For example, a WRZ dependent on combined river abstraction and reservoir storage for supply may have a different level of risk to one based on groundwater abstraction. This difference in WRZ vulnerability has an impact both at the company level and regional level. A water company may need to introduce water use restrictions preferentially in its more vulnerable WRZs while it may not need to extend the ban to the remaining zones in its area of supply. At the regional level one water company may need to impose water use restrictions earlier in a drought than its neighbours, while another water company is able to withhold the imposition of restrictions until much later or not at all.

7.2.3 Company Exemptions additional to legislative exemptions

Following the implementation of a TUB, we will consider any appeals for exemptions made to us and will take account of other water companies' experience of exemptions during similar droughts.

We intend to introduce exemptions that will benefit vulnerable customers and, in the initial stages at least, reduce to a minimum the economic consequences of a drought on our non-household customers. The precise groups and activities to be exempted during any TUB will form part of the advertisements that are necessary to introduce a drought and will also appear on our website. The extent of exemptions granted will be dependent on the severity of the drought that we are in. For example, the 2012 drought was mainly a water resource drought caused by two dry winters leading to low recharge of ground waters and reservoir storage. The effects of the drought on water supplies were not compounded by being accompanied by hot, dry summers causing increased demand for water. In fact, the intervening summers, and the summer of 2012, were cooler and wetter than average. Should hotter summers be associated with dry winters then reducing water demand becomes even more important and some possible exemptions may not be allowed.

We intend to allow:

- customers who hold a Blue Badge to water their own garden with a hosepipe, if no other fully able-bodied person is permanently resident at the property;
- the commercial cleaning of windows using a pole attached to a hose;
- the commercial washing of private motor vehicles;
- watering of playing surfaces used for International or National sporting events; and
- depending on the severity of the drought, and the outcome of studies into their impact, we will consider exempting:

- the filling of domestic swimming pools if they are filled in accordance with Best Practice Guidance;
- the watering of newly laid turf if done in accordance with Best Practice Guidance; and
- the use of certain micro-irrigation systems if proven to be water efficient.

We will also consider, at the time of implementing a TUB, any other reasonable cases made for exempting any particular group or activity covered by the ban.

7.2.4 Reimbursement of licence fees paid by customers

A TUB or Drought Order Ban forms part of the Level of Service we have with our customers and no general refund of any part of the customers water bill is refundable as a consequence of a ban being introduced. However, a very small number of customers who have a large water use, but whose property we are unable to install a meter at, pay for this additional water by an annual licence. The three groups requiring this type of licence are the unmeasured customers with either:

- a swimming pool (circulating);
- a swimming pool (un-circulating); and
- a sprinkler.

In total, there are less than 50 of these customers in Essex and Suffolk combined.

In the years when a TUB is required, each of these customer's will be reimbursed 1/12 of their annual licence fee for each calendar month, or part of any month, for which their use of water for which the licence is required, is restricted.

7.3 Level 3 Demand Side Drought Actions

7.3.1 Non-Essential Use Ban (NEUB)

On average, once every 50 years, a drought and corresponding shortage of raw water may become so acute that we have to implement restrictions on the use of water that are more severe than those introduced under the Temporary Use Ban (TUB). These tougher restrictions are known as a Non-Essential Use Ban (NEUB).

NEUBs are a set of measures granted to water companies to impose further restrictions on the use of water as long as certain legislative test are met. These powers are sought by applying to the Secretary of State at Defra for a drought order.

It is very difficult to estimate the effect of this type of water use restriction on customer demand as very little data is available. We have assumed that further restrictions on water use beyond appeals for restraint (7%) and a temporary use ban (5%) will yield an additional reduction in demand of 2%, giving a total estimated demand reduction of 14%.

Before applying for a Drought Order to restrict water use, water companies are expected to have made full use of their powers under the WIA 1991, as stated in the Explanatory Memorandum to the Water Use (Temporary Bans) Order 2010:

“By extending the water uses that water undertakers may prohibit under section 76(1) of the Act [WIA 1991], water undertakers may be able to delay or avoid the need for drought orders under the Water Resources Act 1991”

The Drought Direction 2011 sets out the restrictions available under an Ordinary Drought Order, as allowed for under Section 73 of the Water Resources Act 1991 (WRA 1991). These are:

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

In order to grant a Drought Order under the WRA 1991 73(2), the Secretary of State must be satisfied that: “By reason of an exceptional shortage of rain (see Appendix 6), a serious deficiency of supplies of water in any area exists or is threatened”.

The potential timescales for introducing restrictions by recourse to a Drought Order are significantly longer than those for Temporary Use Bans under the WIA 1991, and the Secretary of State would typically require a public inquiry or hearing to be held if an objection were received.

Under Schedule 8, paragraph 3(c) of the WRA 1991, we would be required to publish a notice of our application for a Drought Order to restrict water use, which would state that objections to the application may be made to the Secretary of State within seven days from the date on which it is served or published.

The table below summarises the statutory, universal and discretionary exceptions relating to a NEUB that have been agreed between Water Resources South East (WRSE) and Water Resources East (WRE) water companies.

	Drought Order Category	Statutory Exemptions	Universal Exception	Discretionary Exception	UKWIR Suggested Discretionary Exceptions
1	Watering outdoor plants on commercial premises	This includes plants which are in a pot or container that is outdoors or under cover and plants which are in the ground under cover. This does not include plants grown (i.e. cultivated or propagated) or kept for sale or commercial use or plants part of a National Plant Collection or temporary garden or flower display.	None	Use of an approved drip or trickle irrigation system fitted with a PRV and timer is set for use in the evening or night.	Use of an approved drip or trickle irrigation system fitted with a PRV and timer
				Water newly bought plants for the first 28 days after the implementation of the ban.	Watering newly-bought plants
2	Filling or maintaining a non-domestic swimming or paddling pool	This restriction shall not apply to: <ul style="list-style-type: none"> ▪ Pools open to the public (a pool is not open to the public if it may only be used by paying members of an affiliated club or organisation). ▪ Filling or maintain a pool that is used by pupils of a school for swimming lessons. ▪ filling or maintaining a pool where necessary in the course of construction. ▪ filling or maintaining a pool using a hand-held container which is filled with water drawn directly from the tap. ▪ filling or maintaining a pool designed, constructed or adapted for use in the course of a programme of medical treatment. ▪ filling or maintaining a pool that is used to decontaminate animals from infections or disease. 	None	None.	Swimming pools serving industrial training if considered justified
					Swimming pools with covers
					Pools with religious significance
					Pools fitted with approved water conservation or recycling systems
					Pools that are subject to significant repair and innovation

	Drought Order Category	Statutory Exemptions	Universal Exception	Discretionary Exception	UKWIR Suggested Discretionary Exceptions
		<ul style="list-style-type: none"> filling or maintaining a pool used in the course of veterinary treatment. filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity. 			
3	Filling or maintaining a pond	This restriction shall not apply to ponds in which fish or other aquatic animals are being reared or kept in captivity or to filling or maintaining the pond with a hand-held container which is filled with water directly from the tap.	Blue Badge holders on grounds of disability	None	Customers on the company's Vulnerable Customer List who have mobility issues but are not in possession of a Blue Badge
4	Operating a mechanical vehicle washer	None	None	On biosecurity grounds	Washers which recycle water and thus use less than 23 litres per wash On biosecurity grounds
5	Cleaning any vehicle, boat, aircraft or railway rolling stock	Cleaning any vehicle, boat, aircraft or railway rolling stock for health and safety reasons	None	On biosecurity grounds	Low water use technologies Small businesses whose sole operations are cleaning of vehicles using hosepipes Those using vessels as a primary residence Cases where fouling of hulls causes fuel consumption To remove graffiti To prevent or control the spread of non-native and/or invasive species
6	Cleaning any exterior part of a non-domestic	Cleaning any exterior part of a non-domestic building or non-domestic wall for health and safety reasons	None	To remove graffiti by applying to the wholesale supplier	Small businesses whose sole operations are cleaning of buildings using hosepipes Low water use technologies

	Drought Order Category	Statutory Exemptions	Universal Exception	Discretionary Exception	UKWIR Suggested Discretionary Exceptions
	building or non-domestic wall				To remove graffiti
7	Cleaning a window of non-domestic building	Cleaning a window of non-domestic building using a hosepipe for health and safety reasons	None	Small businesses whose sole operations are cleaning of windows using hosepipes.	Small businesses whose sole operations are cleaning of windows using hosepipes
8	Cleaning industrial plant	Cleaning industrial plant using a hosepipe for health and safety reasons	None	Biosecurity	To remove graffiti
9	Suppressing dust	Suppressing dust using a hosepipe for health and safety reasons	None	None	None
10	Operating cisterns on unoccupied buildings	None	None	None	None

The programme for implementing a Drought Order is best considered in 3 stages:

Stage 1: Preparing and lodging an application

Our application will:

- i. state the reasons why a Drought Order is being sought;
- ii. include an environmental report with supporting information, including how we have enacted our Drought Plan up to that time;
- iii. include a section on the social and economic impacts that the additional powers to restrict the use of water will have. Whereas our Temporary Use Ban predominantly restricts the use of our domestic customer base, a Drought Order Ban is likely to have a greater economic effect on commercial businesses.
- iv. Include copies of the required advertisements, meaning that the Drought Order must be advertised prior to the application being made to Defra.

Applicants are required to publish a notice of the Drought Order Application in local newspapers and the London Gazette. The Environment Agency and all Local Authorities in the company's area must be sent a service notice by priority mail. The company must also make a copy of the application available for viewing and advise that objections should be made to the Secretary of State within a seven day period. We would include all of the application documentation and advertisements on our website during the advertising period.

Stage 2: Hearings or inquiries

If any objections are received, the Secretary of State must hold a local inquiry or hearing unless he/she considers the Drought Order must be made urgently.

The process around the inquiry or hearing is a lengthy one. An inspector must be appointed, a location identified, and a date agreed upon. The company is the required to advertise the hearing in the same manner as it advertised the application. Again, a 7 day advertising period is required by statute.

Following the hearing the Inspector must prepare a report setting out their recommendations to the Secretary of State. The Secretary of state will then make their decision and advise the company accordingly.

Although theoretically this whole process could be done in 26 days, in reality at least three months should be allowed. This time scale and the need to minimise any hearing or inquiry to a single event, dictates that we will seek all permissions in one go, but may impose them flexibly.

Stage 3: Implementation

Once the Drought Order has been approved, and before it can be enacted, the company must again advertise, in the same manner as previously, that it will be implementing the drought order that has been granted.

Depending on the prevailing conditions, including the time of year, we would intend to enact all the prohibitions granted under the Drought Order at once, or introduce only those necessary at that time to preserve water. This phased approach of selectively

banning certain actions granted under the Drought Order is the most proportionate response to the situation. The decision on which order to introduce certain restrictions on use will only be decided after the Drought Order is granted. This will ensure that we can restrict the minimum uses of water necessary at any time whilst minimising any economic impact.

A Drought Order can only be granted for a maximum of 6 months and extended for up to a further six months. The order can only be extended by further application to the Secretary of State.

The activities that can be banned under a Drought Order include:

1. Watering outdoor plants on commercial premises
2. Filling or maintaining a non-domestic swimming or paddling pool
3. Filling or maintaining a pond
4. Operating a mechanical vehicle washer
5. Cleaning any vehicle, boat, aircraft or railway rolling stock
6. Cleaning non-domestic premises
7. Cleaning a window of a non-domestic building
8. Cleaning industrial plant
9. Suppressing dust
10. Operating cisterns

Further Non-Essential Use definitions are presented in Appendix 10.

7.3.2 Reduction in Ships Watering

Other potential demand reducing measures to be considered include ships watering in Northern/Central Zone (Suffolk Coastline). Currently ESW supplies around 102MI per year for the purposes of ships watering, predominantly via Great Yarmouth. In a drought this quantity could potentially be reduced by only supplying the essential amount of water required for a ship to get to its next port. It is estimated that only a relatively small quantity (approximately half the 102 MI) would be saved in a year. This option would not require a drought permit or drought order.

7.4 Compensation arrangements

Individuals who suffer a loss or damage as a result of a drought permit or drought order are entitled to compensation (e.g. owners of a water source or those who have an interest in a source). The rules for compensation are set out in Schedule 9 to the Water Resources Act 1991.

In the unlikely event that a third party incurs loss or damage as a result of a drought order or permit overriding their rights to the water, the process to apply for compensation is as follows:

- The claimant must serve notice on our parent company (Northumbrian Water Limited) stating the grounds of the claim and the amount claimed. The Environment Agency is not involved in the claims process;
- Claims must be made within six months of the date of expiry of the permit; and
- Disputes are referred by the claimant or applicant to the Upper Tribunal and are not a matter dealt with at a hearing. The Upper Tribunal may make an award during the duration of the permit in respect of likely damage, though in so doing it may have regard to the amount of water which was likely to have been available to the claimant as against others.

8. SUPPLY SIDE DROUGHT ACTIONS

8.1 Overview

This section of our Draft Drought Plan describes the supply side drought actions that we may employ to address potential water supply shortages during a drought.

Our Level 3 drought actions would require a Drought Permit or Drought Order to temporarily increase water supplies during a drought. Further information on drought permits is presented in [Appendix 7](#). We consider the likelihood of needing to apply for a Drought Permit or Drought Order to be very low. We have demonstrated in our Water Resources Management Plan 2019 that we have a supply surplus in a drought with a return period of 1 in 200 years in all of our Water Resource Zones. Additionally, we have never needed to apply for a drought permit or drought order.

We would only apply for a Drought Permit or Drought Order once we have demonstrated that:

- there has been an exceptional shortage of rain (see [Appendix 6](#));
- we have reduced demand through voluntary savings (through communications with customers), leakage reduction, operational changes to our distribution system and temporary use bans;
- we have made full use of all our available licensed sources of water (as set out in our WRMP);
- Level 1 and 2 drought actions have already been implemented; and
- justification of need exists including the timing of the risk to public water supply.

We do not consider any of our Level 3 drought actions that require a Drought Permit or Drought Order to be “frequent drought permit or orders”. However, for each action, we have prepared an environmental assessment report following the guidance from the Environment Agency and Defra on ‘Drought permits and drought orders’.

8.2 Level 1 Supply Side Drought Actions

8.2.1 Optimising sources

Prior to the implementation of any drought measures, efforts will be focused on averting the effects of drought through maximising existing resources. We will ensure that we maximise abstraction from river sources in order to maintain reservoir storage and groundwater sources during the early stages of drought. This maximises their availability at later stages of a drought when river flows are lower.

8.2.2 Outage Reduction

From time to time we will experience planned outage (e.g. planned maintenance) and unplanned outage (e.g. due to poor raw water quality) at our Water Treatment Works. This could result in one source being used more than is desirable during a drought. Generally, we undertake planned maintenance at treatment works during the winter when customer demand is lower and planned maintenance of raw water pumping

stations after our reservoir refill season. If we were undertaking planned maintenance of our assets during a drought and this was impacting resources, we would look to defer the maintenance. We would also consider bringing forward planned asset improvement works if this had a positive effect on our water resource position.

We continue to invest in our treatment works to reduce unplanned outage which, for example, might be caused by algal blooms. For example, we are investing in a new treatment process at our Water Treatment Works near Abberton reservoir which will enable our processes to maintain output even when we experience a prolonged algal bloom in Abberton reservoir.

8.2.3 Essex Effluent Recycling Scheme

We have an effluent recycling scheme in Essex which is used to support flows in the River Chelmer and subsequent refill of Hanningfield reservoir. The Essex reservoir storage control curves used for calling on the Ely Ouse to Essex Transfer Scheme are also used for calling on the effluent recycling Scheme.

8.2.4 Ely Ouse to Essex Transfer Scheme

The Ely Ouse to Essex Transfer Scheme is an Environment Agency owned and operated scheme that transfers water from fenland rivers through a series of rivers, tunnels and pipelines down to the headwaters of the River Stour on the Suffolk / Essex border. These transfers are used to support refill of our Abberton reservoir near Colchester. Additionally, water from the River Stour can be transferred to the River Pant which becomes the River Blackwater and used to support refill of our Hanningfield reservoir. We have agreed control curves for calling on the Ely Ouse to Essex Transfer Scheme.

8.2.5 River Waveney Augmentation Groundwater Scheme

The Waveney Augmentation Groundwater Scheme (WAGS) is an Environment Agency owned and operated scheme that is used to support flows in the River Waveney during dry weather / drought. When flows in the River Waveney fall below flow thresholds (as detailed in the WAGS abstraction licence), the WAGS scheme is run at a level that will meet our forecast demand and therefore abstraction requirement.

8.3 Level 2 Drought Actions to Obtain Additional Water

8.3.1 Lowering Borehole Pumps

Based on our experience from previous droughts in the 1990s, we consider that our submersible borehole pumps are already at a level whereby they would remain operational even during a 1 in 200 year drought. Nevertheless, there is scope to lower the pumps in our boreholes should a more severe drought result in increased drawdown of the pumped groundwater level. This would be achieved by adding

additional lengths of rising main (the pipe that connects the pump to our raw water mains).

The trigger for this would be when the groundwater level is less than 5m above the pump intake.

8.3.2 Road Tankering (Suffolk Only)

The potential drought action is to transport water from areas with spare resource (other resource zones inside or outside the Company's Suffolk Supply Area) to areas of water shortage via road tanker.

Following implementation of road tankering of water in the south Suffolk area during 1997, a similar strategy could be adopted in the event of a severe drought. Due to the relatively small quantities of water that can be provided even with a rigorous operation, tankering's main benefit in Suffolk is seen as maintaining levels in water towers rather than replacing lost output from water treatment works.

As was the case in 1996 and 1997, water required in the Hartismere resource zone via tankering would be available from Carlton Colville Pumping Station, sourced from within the surface water dominated Northern/Central zone. Historically the Northern/Central zone has been able to maintain demand much deeper into a drought than the groundwater dominated Hartismere and Blyth zones.

The Company's tankering strategy may be summarised as follows:

- Carlton Colville Reservoir will be the base for filling operations, utilising its purpose built overhead filling gantry;
- Hartismere Borehole 1 and Hartismere Borehole 2 towers will be the base for the discharge operations;
- A Tanker Control Officer will be appointed; and
- Staff from outside the Company's Water Supply team will operate tankers.

Following on from experiences in 1996, a large number of improvements were made to equipment and procedures in 1997 including tanker turnaround rates, chlorination/disinfection procedures, sampling procedures and transportation, access to tanker filling and discharge points and overall logistics. As a result, arrangements for tanker filling, discharge and staffing worked well in 1997. The Company is therefore confident that in the event of tankering being required in the future, the plant and procedures would quickly be in place for when required during a drought.

8.4 Level 3 Drought Actions to Obtain Additional Water - Essex Water Resource Zone

The current balance between supply and demand in our Essex Water Resource Zones means that we should not need to apply for Drought Permits or Drought Orders to seek additional abstraction. However, during an unprecedented drought, this may become needed.

The following potential drought measures have been identified as viable drought actions to obtain additional water for the Essex Water Resource Zone, some of which would require a drought permit or drought order:

- Increased bulk transfers from Thames Water Utilities (by agreement)
- Drought Order to increase abstraction from SAGS
- Drought Permit to reduce the compensation flow from Hanningfield Reservoir into Sandon Brook

The frequency of needing these supply side drought actions would be greater than 1 in 200 years on average. This is because all of ESW's Water Resources Zones have a supply surplus during a drought with a return period of 1 in 200 years.

The order in which the supply side drought actions would be implemented would be decided by ESW's Drought Management Group. However, the most likely order would be as listed above. This is because an increase in the Thames bulk transfer would be by agreement with Thames Water and would not require a Drought Permit or Drought Order. The Environment Agency confirmed on 22 January 2018 that cessation of the Sandon Brook compensation discharge would not be possible and so the drought action has been amended to a reduction in the daily rate of the compensation discharge instead. The Environment Agency confirmed that even this may be difficult to licence and so it is the least preferred of the Essex supply side drought actions.

ESW's Essex Effluent Recycling Plant will be in operation prior to consideration of the above measures.

The measures are described in the following sections.

8.4.1 Increased bulk transfers from Thames Water Utilities by Agreement

The drought action would be to negotiate with TWU as to the possibility of temporarily increasing the Chigwell bulk supply during a drought. The potential to do this assumes that TWU's own resource situation would be robust, and that the spatial distribution of drought impact would not cover the Thames supply areas.

Within the bulk supply agreement is a statement that during an "unusual drought" Thames Water shall supply to ESW such quantities as shall represent "fair apportionment" of the water available. We have agreed with Thames Water that "unusual drought" will in future be defined as when Thames Water have entered their stage 3 drought restrictions (implemented powers from a non-essential use ban). Fair apportionment will not be pre-emptively defined as the circumstances of each particular drought differ spatially and temporally (evidenced by 1995/97 and 2005/06). It will be considered at the time that stage 3 restrictions are put in place. However, the apportionment will be derived from the relative shortfall in deployable output that each company is experiencing.

Therefore, in future droughts affecting ESW, the potential for temporarily increasing the bulk supply will be dependent on TWU's own resource situation, the nature and spatial distribution of the drought, and demand in the Chigwell area. In summary the drought

action option is only realistic in the event that a drought affecting ESW does not materially affect TWU. This drought action would need the support of Thames Water.

Further details on the agreement are presented in Section 2.5.2.

8.4.2 Drought Order to Increase Abstraction from SAGS

Support the Environment Agency in making an application to the Secretary of State for a drought order to increase the 15-year abstraction licence volumes in respect of their SAGS boreholes.

There are sixteen Agency owned boreholes which can be operated under the Stour Augmentation Groundwater Scheme (SAGS), four of which are pond support boreholes, and twelve boreholes that augment flows in the River Stour to support ESW abstractions and transfers to Abberton reservoir.

The Agency's abstraction licence authorises during any period of fifteen years a maximum of:

- 25,000 MI to be abstracted from boreholes 1 to 8;
- 9,450 MI to be abstracted from boreholes 11 and 12; and
- 4,750 MI to be abstracted from boreholes 15 and 16.

Daily licences for the SAGS boreholes are 10 MI/d each for boreholes 1, 2 and 5, 12 MI/d each for boreholes 11 and 12, and less than 4.5 MI/d each for boreholes 6, 7 and 8. These daily licensed quantities reflect the results of borehole yield testing originally carried out at these sources. Thus, there is no scope for increase to the daily licensed volumes in the event of a drought.

The 15-year licence conditions are the only potential constraint on SAGS operation in a prolonged, severe drought that could be considered for a drought action. ESW, being the primary beneficiary of the scheme, will be expected by the Agency to provide the necessary information required to support a drought order application. In practice, the potential requirement for a drought order to increase the 15-year licensed volumes will be assessed and decided on by the EOETS Operators Group, i.e., both ESW and Agency personnel in collaboration.

Historical borehole utilisation until 31 December 2020 has been provided by the Agency and used to calculate the volumes remaining available on the 15-year licences.

Boreholes	Utilisation (%) 2006 – 2020 (inclusive)	Volume remaining on 15-year licence (MI)
1 to 8	14	21,385
11 and 12	28	6,831
15 and 16	35	3,082

If the daily licensed volumes are taken to be maximum capacities, and using the volumes remaining on the 15-year licences, the number of days of augmentation that in theory could be made by the three groups of boreholes is as follows:

- boreholes 1 to 8 could be run at maximum capacity for 337 days
- boreholes 11 and 12 could be run at maximum capacity for 285 days
- boreholes 15 and 16 could be run at maximum capacity for 257 days

This is a similar position to our previous Drought Plan.

The Environment Agency has a preferred switch-on order based on which boreholes have the highest and most reliable yield, and they also look to balance recharge to the aquifer over time. It is not possible to say beforehand which boreholes would be prioritised for use in any particular drought. This would be determined at the time of application in collaboration with the Environment Agency based on their groundwater monitoring information, and their preferred operational strategy.

The licence utilisation in 1997 totalled 7,442MI, reflecting the 1996/97 drought, which was the last time ESW implemented a hosepipe ban. There is sufficient volume remaining on the three group 15-year licences combined, to pump the same volume on an annual basis for the next 4.2 years. Therefore, it is highly unlikely that the 15-year licence will become restrictive. Additionally, since we published our 2013 Drought Plan, the Abberton Scheme has now been completed meaning the need for this drought action is extremely unlikely.

These calculations indicate that there would be ample lead-in time, at least 12 months, to identify the potential need for the SAGS drought action and complete work to support any potential drought order application. If substantial support from the SAGS boreholes was required in a prolonged dry period, annual abstraction returns would be reviewed with the Agency to monitor 15-year licence utilisation and determine remaining volume availability. This would trigger the initiation of supporting monitoring or modelling.

This drought action would need the support of the Environment Agency which owns the abstraction licence.

8.4.3 Drought Permit to Reduce the Compensation flow from Hanningfield Reservoir into Sandon Brook

The drought action would be to apply for a Drought Permit to reduce the compensation discharge from Hanningfield Reservoir to Sandon Brook.

ESW is required under abstraction licence number 8/37/37/*S/0025 to make a compensation discharge of 0.909 MI/d into Sandon Brook from Hanningfield Reservoir. A reduction of this discharge would potentially conserve additional, albeit very small quantities of water for public water supply use.

No specific permissions over and above the drought permit would be required. ESW already has permission from the landowner to access the site.

8.5 Level 3 Drought Actions to Obtain Additional Water - Suffolk Resource Zones

8.5.1 Overview

The Suffolk supply system is only semi-integrated and has three distinct water resource zones called Blyth, Hartismere and Northern/Central. There is little scope for the transfer of water between Water Resource Zones.

Previous droughts in Suffolk have particularly affected the groundwater-dominated Hartismere supply area, most recently in 1997/98 when a headroom deficit determined in the supply demand balance was confirmed by the need for tankering. However, the headroom situation was addressed through the development of an additional groundwater source and treatment works at Hartismere Borehole 1 to provide additional resources in the zone. In addition, a large number of network improvements have been made to improve security of supply within the supply area.

The following potential drought measures have been identified as viable drought actions to obtain additional water for the Suffolk Resource Zones, some of which would require a drought permit or drought order.

Suffolk Hartismere Resource Zone

- Drought permit to increase restricting annual quantity on Hartismere Borehole 1 licence
- Drought permit to Increase restricting annual quantity on Hartismere Borehole 4 Group licence
- Drought permit to reduce the compensation flow from Hartismere Borehole 5 borehole

Suffolk Blyth Resource Zone

- Drought permit to increase restricting daily quantity on Blyth Borehole 6 licence
- Drought permit to modify the compensation flow and / or abstraction from Blyth Borehole 2

Suffolk Northern/Central Resource Zone

- Drought permit to increase the annual licence and April to Oct quantities on the Lound abstraction licence
- Drought permit to increase the restricting annual quantity on Ormesby/Bure abstraction licence

Suffolk - All Resource Zones

- Tankering

The frequency of needing these supply side drought actions would be greater than 1 in 200 years on average. This is because all of our Water Resources Zones have a supply surplus during a drought with a return period of 1 in 200 years.

The order in which the supply side drought actions would be implemented would be decided by our Drought Management Group. However, the most likely order would be as listed in the table above. Those drought actions to reduce compensation discharges are the least preferred options as the risk of significant adverse environmental effect is greater given it would be a direct reduction in flow at a time when it would be most required.

There are a number of drought actions that involve increasing the annual licensed quantity. The level of abstraction during a drought is determined by customer demand. During previous droughts such as in 1996/97, customer demand was such that some of the annual licensed quantities in our abstraction licences were fully utilised. This was a reflection of the extended dry weather and elevated customer demand during what was an extreme drought.

8.5.2 Blyth to Hartismere Transfer

In order to increase resilience in the Hartismere Water Resource Zone, we will be delivering a new transfer main that will enable water to be transferred between our Blyth and Hartismere Water Resource Zones. We expect this scheme to be operational for summer 2022.

This scheme can be operated such that abstraction in the Blyth Water Resource Zone remains within daily and annual licensed quantities as detailed in our abstraction licences. However, operating the scheme, particularly during a drought, might mean that we abstract at levels that are above a recent actual level. Currently, the Environment Agency requires us to maintain abstraction below a recent actual level while we undertake abstraction sustainability investigations under our part of the Environment Agency's National Environment Programme. This drought action is considered a Level 3 drought action for that reason.

8.5.3 Drought Permit to Increase Restricting Annual Quantity on Hartismere Borehole 1 licence

The potential drought action is to apply for a Drought Permit/Order to increase the annual quantity of the Hartismere Borehole 1 abstraction licence. A suggested increase would be from 200 MI/annum to 250 MI/annum. The daily licensed quantities would remain unchanged.

The daily licence allows for 1.6 MI/d of groundwater to be abstracted from Crag boreholes. This compares to an annual licence quantity of 200 MI which equates to 0.55 MI/d.

The abstraction licence was fully utilised in 2000 with utilisation exceeding 90% of the annual licence in most years since. Consequently, the annual licence is likely to be a key constraint in a drought.

Permission from landowners to access land to implement mitigation measures will be required.

8.5.4 Drought Permit to Increase Restricting Annual Quantity on Hartismere Borehole 4 Group licence

The potential drought action is to apply for a Drought Permit/Order to increase the annual quantity of the Hartismere Borehole 4 Group licence. A suggested increase

would be from 2500 MI/yr to 3000 MI/yr. The sources that would be utilised more to facilitate this are Hartismere Boreholes 2, 3 and 7.

The Hartismere Borehole 4 Group Licence allows abstraction from a number of groundwater sources as follows:

Source	Daily Licence (MI/d)	Aquifer
Hartismere Borehole 2	1.091	Chalk
Hartismere Borehole 3	0.9	Chalk
Hartismere Borehole 5	3.637	Chalk
Hartismere Borehole 7	5.364	Chalk & Crag

The annual licensed quantity for all the sources combined is 2,500 MI/annum. This quantity was exceeded during drought periods in the 1990's although this would not have been the case if Hartismere Borehole 1 and treatment works (constructed in 1998) had been available then. Nevertheless, a viable drought action could be to increase the annual quantity as this could be a key limiting factor during future droughts. The scope for increases in daily licensed quantities are limited.

Permission from landowners to access land to implement mitigation measures will be required.

8.5.5 Drought Permit to Reduce Compensation flows from Hartismere Borehole 5

The potential drought action is to apply for a Drought Permit/Order:

- to reduce compensation discharges from Hartismere Borehole 5 during peak demand periods to Hall Farm Meadows, Hall Farm Pond; and Hall Farm Stream; and additionally
- to potentially abstract, in addition to current daily licensed quantities for public water supply, the daily licensed quantities currently earmarked for compensation discharge purposes.

The Hartismere Borehole 4 Group Licence requires a compensation discharge from Hartismere Borehole 5 to be made at the request of the Agency to:

- Hall Farm Meadow to maintain local groundwater levels (0.13 MI/d);
- Hall Farm Pond to maintain surface water levels (0.13 MI/d); and
- Hall Farm Stream to augment flows in the River Waveney (0.432 MI/d)

The maximum daily compensation quantity is therefore 0.69 MI/d.

The compensation quantities are included as a separate part of the licence (they are in addition to the Hartismere Borehole 5 daily licensed quantity for public water supply purposes). Cessation of the compensation discharge alone may assist in preserving the groundwater resources at Hartismere Borehole 5 for later abstraction. However, additionally, ESW may consider the option of abstracting the quantities currently prescribed for compensation discharge purposes, in addition to current licensed quantities for public water supply purposes.

No specific permissions over and above the drought permit would be required. ESW already has permission from the landowner to access the site.

8.5.6 Drought Permit to Increase Blyth Borehole 6 Daily licence

The potential drought action is to apply for a Drought Permit to increase the Blyth Borehole 6 daily licensed quantity from 0.91 MI/d to 1.2 MI/d.

At Blyth Borehole 6, the daily licence and treatment works capacity are 0.91 MI/d and 1.2 MI/d, respectively. Therefore, a small daily increase at this site may also be possible.

Permission from landowners to access land to implement mitigation measures will be required.

8.5.7 Drought Permit to modify Compensation and/or Abstraction at Blyth Borehole 2

Potential drought actions may include Drought Permit applications to:

- Reduce the compensation discharge and maintain the daily licence; or
- Reduce the compensation discharge and increase the daily licence by an appropriate quantity. A suggested increase would be 3.0 MI/d (10% increase).
- Retain the compensation discharge and increase the daily licence by an appropriate quantity. A suggested increase would be 2.8 MI/d.

ESW, at the request of the Agency, is required to make a compensation discharge of 0.205 MI/d (25 MI/annum) between July and October inclusive from the Company's Blyth Borehole 2 to the Hundred River.

The high demand period for the Blyth zone is likely to be within the period that compensation discharges are required. Hence, one potential drought action is to reduce the compensation discharge and potentially look towards making the same daily quantities available for additional abstraction for public water supply purposes. Additionally, an increase to the daily licence may make additional quantities available for supply.

Permission from landowners to access land to implement mitigation measures will be required.

8.5.8 Drought Permit to Increase Annual Licence and April to Oct Quantities on Lound Abstraction Licence.

The potential drought action is:

- to apply for a Drought Permit/Order to increase the licensed annual quantity of water that can be abstracted from Lound Ponds. A suggested increase would be from 2,955 MI to 3,250 MI (10% increase); and

- to apply for a Drought Permit/Order to increase the quantity of water that can be abstracted during the period April to October inclusive. A suggested increase would be from 2,216 MI to 2,438 MI (10% increase).

Surface water abstraction at Lound is constrained by a seasonal licence condition not to abstract more than 2,216 MI during the period April to October inclusive. This is equivalent to 10.36 MI/d which is significantly less than the daily licence of 20.4 MI/d.

The annual licence is 2,955 MI/annum, which has previously been a restriction during a drought year. Hence, the drought action to increase the annual quantities by 10% is seen as a prudent measure.

No permissions over and above the drought permit would be required as ESW owns the lakes and has access to the lake shore.

8.5.9 Drought Permit to Increase Restricting Annual Quantity on Ormesby/Bure licence.

The potential drought action is:

- to apply for a Drought Permit/Order to increase the licensed annual quantity of water that can be abstracted from the Trinity Broad and the River Bure. A suggested increase would be from 10,000 MI to 10,500 MI (5% increase); and
- to apply for a Drought Permit/Order to increase the quantity of water that can be abstracted during the period April to October inclusive. A suggested increase would be from 7,500 MI to 7,875 MI (5% increase).

ESW is currently licensed to abstract 10,000 MI per year from the River Bure and Trinity Broads combined with four Chalk boreholes. Additionally, the governing abstraction licence indicates that abstraction from the sources must not exceed 7,500 MI in the period from April to October inclusive. The current annual licence quantity has been approached in previous drought periods. Hence, an appropriate increase via drought permit/order may release additional water for supply in dry years.

The Environment Agency has previously stated that it would only support a drought permit application to increase supplies from the Trinity Broads and the River Bure where ESW has a resource shortfall caused by an acute shortage of rain and that it would expect the company to have maximised its use of licensed resources prior to applying for a drought permit/order, and to move water within its resource zone to meet demand.

In terms of maximising use of existing resources, the recently commissioned Northern Central Transfer Scheme will allow north Gorleston (currently supplied only by Ormesby TWs) to utilise surplus resource in the south of the Water Resource Zone. The new pumping station and pipeline significantly increases resource zone resilience and reduces the likelihood of this drought action being required.

Nevertheless, the drought action remains valid. As agreed with the Environment, if this drought action were to be implemented, the additional water would need to be abstracted from the River Bure and not from the Trinity Broads. The additional abstraction from the River Bure would be subject to the Hands Off Flow conditions

outlined in the existing abstraction licence. The drought permit application would not look to change these. Additionally, it would not look to change the Trinity Broad abstraction cessation level.

Permission from landowners and the Broads Authority to access land to implement mitigation measures will be required.

8.5.10 Drought Permit / Order Compensation arrangements

Individuals (e.g. owners of a water source or those who have an interest in a source) who suffer a loss or damage as a result of a drought permit or drought order are entitled to compensation. The rules for compensation are set out in Schedule 9 to the Water Resources Act 1991.

In the unlikely event that a third party incurs losses or damages as a result of a drought order or permit overriding their rights to the water, the process to apply for compensation is as follows:

- The claimant must serve notice on our parent company (Northumbrian water Limited) stating the grounds of the claim and the amount claimed. The Environment Agency is not involved in the claims process;
- Claims must be made within six months of the date of expiry of the permit; and
- In default of agreement, disputes are referred by the claimant or applicant to the Upper Tribunal

8.5.11 All possible actions to avoid emergency drought orders including Pressure Reduction

Please see Section 9 (Extreme Drought Measures).

8.5.12 All possible actions including major environmental impact drought permits and orders

Please see Section 9 (Extreme Drought Measures).

8.6 Environmental Drought Actions

We will increase dry weather messaging during periods of prolonged dry weather, i.e. before an environmental drought. We will work closely with the Environment Agency to implement actions to mitigate an environmental drought. Actions would include continued enhanced dry weather messaging and the operation of compensation discharges as set out in our abstraction licences.

8.7 Drought Actions to support other sectors

As was the case in 2018, we will consider on a case by case basis proposals put forwards by agri-abtractors. Our assessment will consider:

- forecast utilisation (by NWL) of individual abstraction licence licensed quantities in the current reporting year and what headroom, if any, we have. In terms of groundwater abstraction, headroom would be assessed against the recent actual baseline; and
- the EA's current trading position (specifically with regard to the water body / catchment that the EA will consider trading within).

Any short term trade would need to be discussed and approved by the EA.

Given the potential for animal welfare issues, we will consider on a case by case basis how we can help livestock farmers without mains water (e.g. tankered water), should they have drought related issues with their private abstractions.

8.8 Discounted Drought Actions

8.8.1 Deepening boreholes

We do not consider that this it would be necessary to deepen boreholes given the resilience of our current operational boreholes. Additionally, if borehole depth was a constraint, we would consider drilling a new borehole to be preferable to deepening an existing borehole. Consequently, deepening boreholes is not an action in this Drought Plan.

8.8.2 Reducing Process Losses

Process losses are the waste waters generated from our water treatment processes. For example, in order to maintain the output of our filters, we have to regularly back wash them to remove the particulates that the filters have removed from the incoming raw water source. The back wash water is a process loss.

We regularly monitor process losses to ensure our treatment processes are optimises. Consequently, we do not consider there to be further scope to do this during a drought.

8.8.3 Re-commissioning unused sources of water that are still licensed

We only have one source in South Essex that falls into this category. However, for it to be used, it would need a new water treatment works to be developed to remove naturally occurring metals in the groundwater. This would not be possible to implement as a drought action.

9. EXTREME DROUGHT MEASURES

9.1 Section Overview

This section identifies the drought actions we could implement in an extreme drought (after Level 3 restrictions such as non-essential use bans) to delay the need for Level 4 severe drought restrictions such as emergency drought orders that authorise standpipes or rota cuts.

We have considered whether the actions:

- are practical to implement during an extreme drought;
- are likely to be temporary;
- are technically feasible; and
- will generally not result in permanent increases to deployable output i.e. usually distinct from WRMP options

We have explored the full range of potential actions included within the ordinary drought order legislation (section 74(2) of the WRA 1991) when planning for an extreme drought. The options include applying to:

- take water from any source specified subject to conditions;
- prohibit or limit the use of water for any purpose specified;
- discharge water to any place specified subject to restrictions;
- prohibit or limit taking of water by an appropriate agency; and
- suspend or modify restrictions relating to abstraction, discharge, supply, filtration of water.

The extreme drought measures we have identified for the ESW area are provided in the table below and include:

- a summary of the actions that are available up to the point of needing to apply for an emergency drought order;
- the type of action (supply or demand);
- the Water Resource Zone(s) in which it would apply;
- a description of the action and the likely trigger for needing it (where appropriate related to reservoir storage);
- an indication of the likely benefit or saving;
- identification of significant barriers, and
- an indication of the timescale for implementation.

In prioritising the implementation of these extreme measures, we will ensure that the demand actions are implemented before more extreme supply side actions. Additionally, those actions which have the most significant adverse environmental effects would be implemented last. We also commit to scrutinising and consulting with, among others, Natural England prior to implementing any Drought Order or "Extreme Drought Options".

9.1.1 Viable Extreme Measures

The table below summarises the extreme drought actions we have identified.

Type of action	Water Resource Zone	Summary of action	Trigger for action to be used	Likely benefit / saving	Barriers	Environmental impacts	Timescales	Priority order
Demand	All	Media & Communications: National campaigns to change culture, excessive water use seen as socially unacceptable, keeping customers aware of the current storage situation, Day Zero language, guides for customers to show how to restrict water use to 50 litres/ person/day. Hard hitting messages and images.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Logically, this action will result in a reduction in demand. However, we do not believe it is possible to quantify the saving.	Hygiene - Covid	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	2 weeks	1
Demand	All	Supply pipe repairs: Free and fast supply pipe repairs for customers	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	0.14MI/d	Need customer's permission which is not guaranteed (impacts on driveways); Availability of ESW resource (inhouse or contractors)	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	3 weeks	2
Supply	All (where opportunities exist at the time)	Trades/transfers: Short term trades between companies/sectors.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Would be determined on a case by case basis taking account current resource position and water availability.	Donor permission; EA Trading Policy	This option might require abstraction above recent actual levels. The action would not be pursued if it required abstraction above their own licensed quantities.	6 weeks	2
Supply	Hartismere	Emergency Treated Water Transfer from Anglian water to our Hartismere Water Resource Zone	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Benefit of up to 0.75MI/d peak	The network connection already exists. Operation of the transfer dependent on AW's supply position and their approval as per AW / NWL agreement.	This option might require AW to abstract above recent actual levels. The action would not be pursued if it required abstraction above their own licensed quantities.	2 weeks	3
Demand	All	Removal of Statutory Exception 3:- Cleaning any area of a private leisure boat which, except for doors and windows, is enclosed by a roof and walls.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Small reduction in demand. Unquantified	May need emergency powers	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	4
Demand	All	Removal of Statutory Exception 4:- Filling or maintaining a pool where necessary in the course of its construction.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Small, unquantified demand saving	Non-essential use ban. Delay of pool construction and subsequent Impact on business.	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	4

Type of action	Water Resource Zone	Summary of action	Trigger for action to be used	Likely benefit / saving	Barriers	Environmental impacts	Timescales	Priority order
Demand	All	Discretionary Universal Exceptions 3:- Commercial customers that use hosepipes in the course of their day to day business operation for example hand car washing, window cleaning, graffiti, excluding the watering of domestic gardens.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Could be a worthwhile but unquantified saving.	Ban under NEUB (Drought Order Ban)	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Immediate	4
Demand	All	Removal of Statutory Exception 2:- Watering plants that are (1) grown or kept for sale or commercial use or (2) that are part of a National Plant Collection or temporary garden or flower display.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Small reduction in demand. We would still encourage this group to maximise use of re-use water	This would permanently remove collections. Impact on business.	Loss of important National collections	Normally within 28 calendar days	5
Demand	All	Discretionary Universal Exception 2:- Use of an approved drip or trickle irrigation watering system, fitted with a pressure reducing valve and a timer, that are not handheld, that place water drip by drip directly onto the soil surface or beneath the soils surface, without any surface run off or dispersion of water through the air using jet or mist.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Could be significant if use encouraged widespread fitting.	Covered by Ban. Not essential compared to standpipes/rota cuts	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Immediate	5
Demand	All	Removal of Statutory Exception 7:- Filling or maintaining a pool used in the course of a programme of veterinary treatment.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Small, unquantified saving	Animal welfare	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	6
Demand	All	Removal of Statutory Exception 8:-Filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Would ask owners to minimise water use but would not ban	Animal welfare	Could affect fish stocking/conservation.	Normally within 28 calendar days	6
Demand	All	Removal of Statutory Exception 9:-Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Would ask owners to minimise water use but would not ban	Animal welfare	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	6

Type of action	Water Resource Zone	Summary of action	Trigger for action to be used	Likely benefit / saving	Barriers	Environmental impacts	Timescales	Priority order
Demand	All	Removal of Statutory Exception 10:- Filling or maintaining an ornamental fountain which is in or near a fish pond and whose purpose is to supply sufficient oxygen to the water in order to keep the fish healthy.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Would encourage owners to use alternative aeration but would not ban	Animal welfare	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	6
Supply	All	Drought orders: Use full range of powers available with drought orders: - temporary increases to licences that have been reduced or revoked - compensation flow reductions - abstraction from alternative sources.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Would be determined on a case by case basis taking account current resource position and water availability.	Need for emergency drought order. Environmental impacts, WFD objectives.	Potential for long term / permanent impacts on ecology and WFD status. See section below on Overriding Public Interest	Normally within 28 calendar days	7
Demand	All	Discretionary Universal Exception 1:- Watering a garden attached to a domestic dwelling, or watering plants on a domestic premises using a hosepipe by people with severe mobility problems who hold a current Blue Badge as issued by their local authority.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Ask to minimise use. Demand saving thought to be small but unquantified	Discriminatory	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	8
Demand	All	Removal of Statutory Exception 1:- Using a hosepipe for health or safety reasons where they include (a) removing or minimising any risk to human or animal health or safety and (b) preventing or controlling the spread of causative agents of disease	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Logically, this action will result in a reduction in demand. However, we do not believe it is possible to quantify the saving.	We would need emergency powers. Adverse hygiene issues and impact on business	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	Normally within 28 calendar days	8
Reduced mains pressure	All	Pressure management: Further reduce pressure while still maintaining essential services, night-time reductions.	This would be implemented after all Level 3 actions have been implemented and then based on priority order in this table.	Unknown	Customer support; Ofwat, DWi and CCWater approval. Vulnerable customers but we know who they are and would ensure their needs are met.	No significant adverse environmental effects as the measure is to reduce demand and therefore abstraction.	6 weeks	9

9.1.2 Overriding Public Interest

The last extreme drought action in the table above is to use the full range of powers available with drought orders to temporarily increase abstraction licensed quantities or reduce compensation flows. We abstract directly from Natura 2000 sites (e.g. Ormesby Broad) and have a number of other groundwater abstractions that can affect water supply to water dependant Natura 2000 sites. All these abstractions were assessed as part of the Environment Agency's Review of Consents process to ensure that each site's environmental water level / flow targets were met. Consequently, it would now not be possible to conclude that there would be no adverse effect on the integrity of the sites if abstraction were increased or compensation flows reduced. In the event that all alternative actions have been exhausted, we would need to then provide a robust justification of need to the Secretary of State to satisfy him / her that there is an imperative reason of an overriding public interest for granting this extreme measure drought order.

9.1.3 Discounted Extreme Measures

The table below summarises the extreme drought actions which we have discounted because we do not believe that they are viable.

Type of action	Summary of action	Reason for Discounting
Demand	Removal of Statutory Exception 5: Filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment.	Not considered due to effect on health
Demand	Removal of Statutory Exception 6: Filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease.	Not considered on animal welfare/ possible human health grounds
Demand	Tariff changes: Higher tariffs for high use, reward scheme for using less water, incentive scheme e.g. bill rebate, postcode scale targets and reward for all if target met.	Socially discriminatory against those that can still afford verses those that cannot.
Demand	Relocations: Relocate farm stock and/or businesses	No powers (for Government)
Demand	Non-potable use: Temporary rainwater capture systems on buildings, temporary barriers to help capture water in fields, mass fitting of free water butts in homes.	Will be in severe drought, so volumes concerned unlikely to be significant / worthwhile.
Supply	Catchment actions: Water use plans across sectors, link users to share resources.	Farm reservoirs likely to be empty in any case, farm river abstraction under Section 57 notice leaving only groundwater which is not feasible.
Supply	Sea Tankering: Moving water around, sea tankering.	Discounted based on significant water quality / drinking water compliance risks. Additional barriers include availability of tankers.
Supply	Supply schemes: Fast tracking of WRMP schemes.	We are undertaking WRMP24 options appraisal now and none of the schemes could be implemented sufficiently quickly.
Supply	Network changes: Temporary pipelines, new supplies, speed up construction process e.g. overland pipes.	We are undertaking WRMP24 options appraisal now and none of the schemes could be implemented sufficiently quickly.
Supply	Effluent re-use: Redirecting discharge direct to TWs	Would require a reverse osmosis plant. Discounted based on significant water quality / drinking water compliance risks, public perception, suitable blending point, inability to deliver in time. Additional barrier includes permits required to discharge effluent and suitable discharge point.

Type of action	Summary of action	Reason for Discounting
Supply	Effluent re-use: Relocate to other watercourses.	Would require a reverse osmosis plant. Discounted based on inability to deliver in time. Additional barrier includes permits required to discharge effluent and suitable discharge point.
Supply	Desalination: Mobile plants.	See Section 9.2
Other	Towing a water bag	See Section 9.2
Other	Towing an iceberg	See Section 9.2

9.2 Esoteric Drought Options

9.2.1 Overview

Esoteric options are those assumed to be unlikely to be realised at present due to technical complexity, environmental concern, high cost and/or problems of promotion. However, these factors change with time, and certain esoteric measures could eventually be considered viable in times of drought, when more cost-effective measures have been exhausted.

This section provides an overview of options that could potentially be considered as drought actions in the event of an unprecedented prolonged and severe drought. These are as follows:

- Desalination of brackish water via mobile plant;
- Sea tankering from Norway;
- Towing flexible bags from Teesside (Kielder Water);
- Essex road tankering.

Also included is a section on temporary bulk transfers with neighbouring water companies.

9.2.2 Desalination of Brackish Water via Mobile Plant

Although seawater desalination is not currently considered a viable long term water resource option, the costs particularly for brackish water desalination are decreasing such that the option could be examined as a solution for peak lopping and/or as a contingency option in severe drought. This option, for example, is being considered by Water Resources East.

Reverse osmosis (RO) is likely to be the preferred treatment process for brackish water desalination, as it uses less energy than the alternatively used method of multi-stage flash (MSF) distillation. Also unlike MSF distillation, RO plants can be 'packaged' and skid-mounted for simple delivery and installation, although such plants are usually small in yield, largely due to the maximum size of plant that can be transported by lorry. A 5 MI/d capacity temporary plant could however be achievable by connecting a number of smaller 1 MI/d units in parallel.

However, there are two key issues to be resolved in consideration of brackish water desalination as a drought option:

Time

The time period for ordering and agreeing contractual agreements with a supplier, plant delivery, plant commissioning and testing, and providing linkage to the supply network, is such that the minimum time between ordering plant and producing water for use is estimated at 8 to 12 months.

Location

The number of locations for such a unit with an adequate supply of brackish water are limited to coastal or estuarine areas. As most of these areas are on the periphery of the ESW distribution systems in Essex and Suffolk supply areas, this potentially poses a major difficulty.

Given the above issues it is unlikely that this drought option would be employed unless in a very severe drought.

9.2.3 Sea Tankering from Norway

Sea tankering is a proven method of supplementing water resources in a drought, and Northumbrian Water gained experience of this in the 1980s when 425 Ml of water was tankered from Teesside to Gibraltar.

The preferred water source for ESW would be from one of several supplies located at hydro-electric power stations in Norway. The water here is of higher quality and significantly cheaper than raw water which could be supplied from Teesside.

It is likely that the water carried would be treated water thereby limiting the transfer of undesirable species in the cargo. Suitable tanker linings/coatings are available to preserve water quality. It is understood that there is deep water berthing potentially available for use for sea water tankers in the Thames Estuary near Canvey Island. The treated water would then be pumped ashore and could potentially be available for delivery into the supply and distribution network. Both storage and blending are likely to be key issues that would need to be addressed. In addition, if the water were to be directed to Hanningfield, a 19.2km long pipeline would be required to transport the water from the mooring, incurring significant capital cost.

The yield from tankering is constrained by the size and number of tankers being used. Typically, tankers have between 300 and 500 Ml capacity. A single 325 Ml capacity tanker would be able to deliver the equivalent of 50 Ml/d based on a seven day round trip including loading and unloading. The long term nature of contracts associated with tankering operations means that this option would have to provide a continuous and ongoing yield for a number of years.

High unit costs for utilising sea tankering, as a drought option, means that it would only be considered after all other lower cost options have been exhausted. The potential requirement for a pipeline from the tankering mooring point to a suitable storage point (e.g. Hanningfield) makes the option highly unlikely in the short term.

9.2.4 Towing Flexible Bags from Teesside (Kielder Water)

The idea of towing flexible bags filled with freshwater from areas of surplus water to areas of shortfall came into fruition in the 1990s. Technology exists to attach flexible bags, made out of strong polypropylene to tugs that would be able to tow the bags.

Flexible bags could be used to transport water from Kielder water in Northumbrian Water's region to Essex. Kielder water currently has surplus yield and already has a secure supply pipeline that can deliver large volumes of non-potable water to Teesside, via pipelines and rivers. It would be possible to use some of this surplus yield, transferred to the Tees Estuary for filling flexible bags for towing via the North Sea to the Essex coast. As with the sea-tankering option berthing facilities would be required and a pipeline would be required to transfer the water to Hanningfield reservoir.

High unit costs for utilising flexible bags as a drought option means that it would only be considered after all other lower cost options have been exhausted. The potential requirement for a pipeline from the tankering mooring point to a suitable storage point (e.g. Hanningfield) makes the option highly unlikely in the short term.

9.2.5 Essex Road Tankering

Tankering in Suffolk is a viable drought action and is considered separately in Section 8.3.2. Based on the hire of 5,000 gallon tankers, drivers, and tractor units, and a tanker turnaround rate of four hours (three per day), 30 tankers would need to be employed to achieve a 2 Ml/d supply in Essex. Operational costs for just the tankering aspect are estimated at approximately £2.1 million for a three month period. Additional costs include the construction of fill and discharge points at either tower or reservoir sites, chemicals and staff (co-ordination). Capital costs could also be significant.

An objective assessment of tanker fill and discharge sites would need be made, when in the early stages of a drought. Sites should ideally:

- Have adequate space for transport movements;
- Have access to pumping and reservoir storage
- Have good access to main roads
- Have few close neighbours, thus minimising the risk of causing nuisance.

This option is considered esoteric as water would have to be sourced from outside the company's supply/resource area, it is also very expensive and would provide minimal benefit in supporting supplies. In this respect tankering in Essex is viewed more as a publicity campaign. In addition, ESW could only start negotiating with another water companies once they in turn had established whether they have any surplus supplies.

10. CUSTOMER COMMUNICATIONS

10.1 Overview

We recognise the importance of customer communication during prolonged dry weather and drought, both in terms of how we explain our water resources position and how we secure customer co-operation in reducing water use.

The overall objective of our Drought Plan Communication Plan is to encourage customers to reduce their own water consumption voluntarily and help to reduce their mains water demand.

Drought communications are in addition to our ongoing water efficiency programme. However, where possible, the messaging will be aligned to emphasise the importance of using water wisely during a drought.

We will encourage our customers and water retailer's customers (i.e. businesses) to use less water through our communications campaigns. We will do this through additional targeted water efficiency initiatives which will focus on water use and customer behaviour both in the home and garden. In developing our communication campaigns, we will liaise with a range of organisations including but not limited to neighbouring water companies, Water Resources East (WRE), the Environment Agency (EA) and National Farmers Union (NFU).

Our full Drought Plan Communications Plan is presented below. In developing it, we have taken account of:

- the findings in the UKWIR report '[Drought and demand: potential for improving the management of future drought](#)';
- our experience of prolonged dry weather and drought; and
- the conclusions of the Consumer Council for Water's 2013 report '[Understanding drought and resilience](#)'.

In summary, our Communications Plan is an agile plan that:

- aims to balance the needs of the three customer groups identified by CCWater:
 - Social Conscious – those that see drought as an environmental issue and want practical water efficiency tips
 - Unengaged urban who are not sure about the causes of drought but want to know more about the bigger picture; and
 - Service motivated – those who see it as being a water company issue and want to know what we are doing about it first.
- confirms what actions we will take and when we will communicate with our customers about our drought status and what we are asking of them;
- sets out how we will communicate in a clear and timely way with customers, partners and other interested groups during a drought.
- promotes using varied and innovative communications channels to help customers reduce water use;

- covers all stages of drought and is flexible and adaptive to changing supply and demand situations;
- confirms we will engage early with our customers (i.e. before we need to implement a Level 1 Appeal for Restraint); and
- outlines how we will join up communications with neighbouring companies, regional groups and with regulators (e.g. joint press briefings).

When planning communications with our customers, we will consider best practice and international examples as well as the conclusions of the Consumer Council for Water's report '[Understanding drought and resilience](#)', 2013.

10.2 Keeping customer and stakeholder informed during drought

Once we have entered a period of prolonged dry weather, we will ensure that we inform our customers, retailers, regulators and other stakeholders (such as local resilience forums, fire and rescue services and power plant operators) about:

- how a drought is developing;
- what we're doing to manage it;
- how it might affect their supply; and
- the actions they can take to help reduce water use.

We will do this in a timely, proactive way to help mitigate the impacts of prolonged dry weather and drought on the environment.

As a drought takes hold, we will increase our engagement with customers and other stakeholders to raise their awareness of our water resource position and the impact of water use on the environment.

We have developed with Anglian Water and Wheatley Solutions a web-based application called Watersource. Watersource comprises several modules, one of which is to show the current drought status; e.g. no drought, environmental drought, water resources drought and whether level 1, 2 or 3 drought actions are live, in all water company water resource zones. Currently, Watersource covers Essex & Suffolk Water, Northumbrian Water, Anglian Water, Cambridge Water, Hartlepool Water and Yorkshire Water, although the ambition is for it to cover all water companies in the future. We believe that this will be a useful tool for sharing information with stakeholders (e.g. retailers).

10.3 Monitoring the Effectiveness of Communication Activities

We will monitor and evaluate the effectiveness of our communications activities during a drought by tracking the daily demand for water and through customer feedback via our website and social media channels. This information will be used to refine our messaging and also to help develop more effective communication plans for future drought events.

10.4 Communication Channels

10.4.1 Overview

Drought communications will focus on key water resource, demand and water efficiency messages and will provide advice on how customers can save water.

Depending on the severity of drought, the following tools could be used:

- Local press and radio advertising;
- Mailouts to all customers;
- Text messaging to customers;
- Boosted social media posts;
- Website / banner advertising; and
- roadshows (e.g. use our road show Vehicle, Flo) in key town centre locations so staff can engage directly with customers to communicate our water resources position and to promote our Water Efficiency campaigns, Every Drop Counts and Whole Town Approach.

10.4.2 Channels

- Media Releases
- ESW website: www.eswater.co.uk
- Media Interviews (spokespeople will be selected and briefed by the Communications team)
- Letters to key stakeholders (MPs, district/borough councillors, parish councils)
- Postings on local partner websites (e.g. local councils)
- Briefings for Customer team
- Employee communications
- Social media

10.4.3 Media

As well as trade and industry press, all local media for ESW would include:

- BBC Look East
- ITV Anglia
- Essex Live
- Basildon/Southend Echo
- Thurrock Gazette
- Eastern Daily Press
- Lowestoft Journal
- East Anglian Daily Time
- BBC Radio Suffolk
- BBC Radio Essex

10.4.4 Social Media

ESW social media accounts include:

- Twitter – 4160 followers

- Facebook – 3266 followers
- LinkedIn – 2719 followers

10.4.5 Stakeholders

We would consider contacting the following stakeholders to encourage them to share and reinforce our messaging, for example, by including our messages in their newsletters or distributing them to members:

- Essex Chamber of Commerce
- Suffolk Chamber of Commerce
- New Anglia LEP
- South East LEP
- Norfolk Rivers Trust
- Norfolk Wildlife Trust
- East Suffolk Council
- Great Yarmouth Council
- Suffolk County Council
- Essex County Council
- Southend Borough Council
- Thurrock Council
- Havering Council (London Borough)
- Dagenham and Barking Council (London Borough)
- Redbridge Council (London Borough)
- Broads Authority
- Suffolk Wildlife Trust
- Norfolk Wildlife Trust

Additional Groups to target include:

- Caravan parks/holiday homes
- Leisure centres
- NFU
- SME's
- Housing associations
- Allotment groups

10.4.6 Advertising

We will consider creating a series of radio, newspaper and public transport adverts which can be cascaded across the Essex and / or Suffolk Drought Management Units. Paid for advertising will help us cover all bases and communicate with customers that are not as accessible in hard to reach places or who are engaging with us digitally.

10.4.7 Internal Communications

Sharing the golden thread messaging with our employees is crucial in supporting our customers. We are able to send employee text messages, newsletter updates and attend regular team briefings to make sure our people understand the impact of drought on the business and how we can help our customers. From ensuring that our

operational teams are only cleaning mirrors, lights and windows on fleet vehicles to reporting leaks on our leakage portal while out in the field.

10.4.8 Direct customer communications

Sending text messages direct to customers on a postcode or network supply area basis allows us to keep the tone of being honest and transparent and provide customers with the need to know information to support them through a period of drought.

10.4.9 Our Website

www.eswater.co.uk is a one stop shop for information for our customers. They can check if there is an issue in their area by entering their postcode, access their accounts as well as reporting leaks through our leakage portal.

During drought, we will create website alerts and instant pop-ups to make customers aware of any relevant information. Our website has dedicated *Save Water* pages for our customers with information covering how they can reduce water consumption in their homes and gardens throughout the year.

In the event of a drought, we will be creating a FAQs page for our customer to ensure any queries or worries they may have are answered. Our website chat function is linked directly to Facebook Messenger where customers can contact a quick response, freeing up our phonelines for emergencies, hard to reach and vulnerable customers.

10.5 Drought Messaging Actions

10.5.1 Overview

Our drought messaging will be reinforced with facts covering the current rainfall, customer demand, reservoir storage, groundwater level and river flow position. We will provide a consistent message to our customers and other stakeholders including but not limited to neighbouring water companies, WRE, NFU and the media. The messaging for 'Water's worth saving' from Water UK will help emphasise this at a national level.

Our messaging will generally be accompanied with or a signpost to a list of top water saving tips for the garden and home.

10.5.2 Triggers for Drought Messaging

The triggers for enhanced dry weather messaging and formal Appeals for Restraint are illustrated on our worked examples in Appendix 3.

10.5.3 Dry Weather Messaging and Level 1 Appeals for Restraint

A key part of customer engagement during dry weather and drought is informing customers how they can reduce their water use. Examples of water saving tips that we might use in our business as usual dry weather messaging include:

- Turn off the tap when brushing your teeth and save 6 litres of water each time;
- Use a water butt to collect and store your rainwater;
- Put a save-a-flush device in your toilet cistern and save up to 1 litre of water every time you flush;
- Use full loads in your dishwasher and washing machine;
- Replace washers on dripping taps - they can waste up to 26 litres of water in 24 hours - that's enough for a shower;
- Use a bucket rather than a hose to wash the car;
- Shower rather than bath and save 10 litres every time;
- Use a bowl when hand washing dishes 7 litres every time;
- Water plants in the evening to retain moisture in the soil;
- Report any leaks you spot so that we can fix them quickly - ring the leak line on 0800 526 337; and
- Get a water butt to collect rainwater and use in the garden.

Actions at this stage will include:

- General update press releases confirming a period of dry weather, that we are managing resources and encouraging customers to report leaks and to use water wisely;
- Frequent water efficiency messaging across all of our social media channels. This will include engaging infographics / animations and we will ask our partners to share these posts;
- A dedicated dry / warm weather advice section on the website which will be regularly updated with press releases / media statements; and
- Q&As prepped and given to customer team in the event of difficult questions being asked via telephone. External Q&As will also be put on the dedicated page of our website.

Example messages include:

- Water supplies remain healthy for this time of year. However, due to dry weather and more people working at home, demand for water is high.
- We are managing the situation carefully and have plans in place to help keep the water flowing for our customers.
- We are doing X, Y, Z to help maintain water supplies.
- There are currently no plans for a temporary use ban.
- We would encourage customers to use water wisely now in case the dry weather turns into a drought.
- Customers can do X, Y, Z to help save water around the home and garden.
- Warm weather can cause ground movement which can lead to burst pipes. We are asking customers to help us out by reporting these to us so we can get them fixed as quickly as possible.

As a drought deepens and once the trigger for a Level 1 Appeal for restraint has been reached, we will repeat the actions detailed above and will confirm the latest escalated position. Additionally, we will:

- enhance our social media posts to include tips and advice on using water wisely; and
- Contact key stakeholders such as the Chamber of Commerce, the NFU and other related parties within the affected areas and ask that they share our messaging;
- send e-newsletters to customers in affected areas providing tips and advice on using water wisely; and
- consider running an advertising campaign targeted at those areas affected.

10.5.4 Level 2 Temporary Use Ban (TUB) Messaging

If our Drought Management Group (DMG) concludes that we need to implement a TUB, then we will ensure we follow the legal requirements as outlined in Section 7.3.1. We will also ensure that we effectively communicate to our customers how the bans will affect their use of water.

Once our DMG has agreed a TUB is required, we will undertake a two-week consultation, after which the temporary use ban will be in place. We will ensure we are resourced to be able to effectively manage our messaging as well as to deal with increased media interest.

Where appropriate, we will issue joint customer communications with Water Resources East and its members (see Appendix 8).

Prior to announcing the TUB, we will ensure:

- press releases are drafted and approved, with appropriate FAQs included;
- location and timing for media interviews are agreed;
- our spokesperson is fully briefed;
- our website is updated;
- Social media posts are agreed and scheduled;
- emails to stakeholders are drafted with draft social media posts included so they can also share our messaging; and
- we have liaised with neighbouring water companies, WRE, EA, NFU and other interested groups.

Announcing a Ban

The following tasks will be undertaken:

- Press releases will be issued one day in advance, under embargo;
- Media interviews to be carried out at agreed locations;
- Website update will go live; and
- Social media posts will be scheduled in advance and monitored to manage enquiries.

Example messages include:

- Rainfall for the proceeding 3 / 6 / 9 / 12 months is x% below average
- Reservoir storage is currently at x% which is x% below average for the time of year.
- Groundwater levels are currently below average for the time of year.
- Demand is currently running at x% above average.
- A combination of prolonged dry and warm weather and elevated demand has led to our water resources being at levels which are significantly below average for the time of year. With no rain in the forecast, to ensure we are able to maintain resilient supplies should the drought deepen, we will be implementing a temporary use ban (TUB) across our supply area from XX/XX/XX.
- This is not a decision we have taken lightly, and we thank customers who have already been doing their bit to save water to help us preserve supplies.
- We ask customers to abide by the restrictions and to do everything they can to save water at this time.
- Those who do not adhere to the TUB can be subject to a £XXX fine.
- Warmer weather causes ground movement which can lead to burst pipes. We are asking customers to help us out by reporting these to us so we can get them fixed as quickly as possible.
- We have one of the best records in the water industry for dealing with leakage and are continuing to invest and find new ways to improve on this.
- We will lift the TUB once rainfall, reservoir storage and groundwater levels return to more normal levels for the time of year.

Following Ban Announcement

The following tasks will be undertaken following the announcement of a TUB:

- Daily social media posts reminding customers of planned restrictions and pointing them to our website for more information. Continue daily messaging on how customers can save water (a separate social media plan will be required);
- Record video with key spokesperson explaining why temporary use ban is needed, how customers are affected and urging them to continue to use water wisely;
- Press release 'mythbuster' – Providing some more detail on the temporary use ban, and how customers will be affected (to cover some of the most common questions asked on social media); and
- Reminder press release – Issued 1 or 2 days after implementation.

Post Ban Implementation

Proactive communication in the week following the introduction of the TUB will be limited to reinforcing our key messages, providing factual information about the TUB and encouraging customers to reduce their water use. Following this initial period, more proactive communication will be introduced, focusing on other ways we are managing the situation (tackling leakage / bursts etc). Other actions include:

- Press release on surviving without a hosepipe. Promoting the alternatives to using a hosepipe and confirming what is/isn't covered by the ban;

- Social media focussing on confirming that the ban is in place, what is/isn't covered, pointing customers to website as main source of information.
- Continue to push water efficiency messages; and
- Website FAQs to be reviewed and updated depending on enquiries received.

Ban Withdrawal

We will liaise with neighbouring water companies, WRE, EA, NFU and other interested groups on our plan to withdraw the TUB. Once agreed, we will issue press releases and social media posts confirming that the TUB is withdrawn but that everyone should continue to use water wisely. Additionally, we will update our website, media interviews will be facilitated with agreed a spokesperson and our Customer team will be briefed to handle enquiries.

Key messages might cover the following points:

- Thanks to the excellent response from our customers to our appeals to use water wisely, and increased rainfall in our region, we will be lifting the hosepipe ban on XXXXXX;
- The ban was required due to extremely low levels of rainfall, more people spending time at home and increases in demand for water;
- We ask our customers to continue conserving water as much as they can this time, as it will take some time for our reservoir and groundwater levels to return to normal levels. This will help us avoid the prospect of further restrictions;
- We ask customers to continue with the water saving habits they have adopted during this time as much as possible, as this will help us maintain supplies all year round; and
- We thank customers for their help and patience during this period.

10.6 Working with others during Drought

10.6.1 Overview

We will work with a wide range of interested groups and partners to enhance our messaging in order to reduce demand for water during a drought.

10.6.2 National Drought Group (NDG)

The National Drought Group (NDG) was set up by the Defra Secretary of State in February 2012 to manage that drought. It will meet in future droughts to provide a multi sector overview and strategic management of the drought. It commissions working groups to undertake specific pieces of work and includes senior decision makers from the EA, government and principal drought stakeholders.

Once re-formed, we will work with the NDG in order to contribute to the cross sector coordination of drought issues.

10.6.3 Other water companies and Water Resources East

We will work collaboratively with other regional water companies, the Environment Agency and other sectors to ensure that dry weather / drought communications are consistent and that they do not contradict each other. This will cover the environmental and water resources position, water efficiency messaging and the implementation of and communication around customer restrictions where there is a common water resources drought.

We will use language that is consistent across neighbouring water companies and seek to work collaboratively at a regional level, especially when imposing customer restrictions.

We have categorised our drought plan drought actions using the Level 1 to 4 definitions (see Section 6.2) and will be consistent in our language around temporary use bans and possible exemptions. For Temporary Use Bans (see Section 7.3.1 and Appendix 8) and Non-Essential Use Bans (see Section 7.4.1 and Appendix 10), we have agreed common text in this Draft Drought Plan which covers among other aspects, TUB and NEUB exemptions.

10.6.4 The Environment Agency

We work closely with both area and national Environment Agency teams and outside of drought have quarterly liaison meetings and senior manager meetings. During prolonged dry weather, our water resources position would be discussed at both of these meetings. Additionally, we attend the Environment Agency's Ely Ouse to Essex Transfer Scheme quarterly meeting which takes a foreword look in terms of water availability and the need for the scheme to run to support refill of our Essex reservoirs. During prolonged dry weather, we will also attend the Environment Agency's own regional drought meeting.

Outside of drought, we share our water resource position (surface water storage) with the Environment Agency on a weekly basis. Our Drought Action environmental reports include Environment Agency hydrometric data which is requested every 1 to 2 years when the reports are updated.

10.6.5 Non-household Customers

Our Wholesale Team will work closely with:

- non-household retailers whose customers (i.e. non-household businesses) we also supply; and
- New Appointments and Variations (NAVs) - limited companies that provide a water and/or sewerage service to customers in an area which was previously provided by the incumbent monopoly provider.

Our Wholesale Team have agreed contacts with each of the NAVS and retailers. We would like them to relay all of our key drought and water efficiency messages and asks to minimise water use to their customers. Likewise, they will need to comply with any restrictions on water use that we impose on our own customers.

We will also work closely with business organisations such as the Chamber of Commerce and the LEP. We will create business-specific press releases with advice on how businesses can use water wisely. We will also create social media posts with info for Small/Medium Enterprises (SMEs) and tag in the Chamber of Commerce and other SME groups and boost LinkedIn posts to target specific job titles. We will create an e-leaflet with guidance on what to do in hot weather conditions and send this on an email with guidance and draft social media posts to stakeholders such as MPs, Chamber of Commerce, Councillors and other local authorities. We could also create a specific business-focused section of the website where SMEs can go to get info. We could also ask the Chamber of Commerce to share our messaging with all of their members.

10.6.6 Priority Services Register (PSR) Customers

During a drought, the priority would be to ensure PSR customers have water supplies and bottled water in case of an emergency. To get this messaging across we would send letters to customers and would also work with partners such as Age UK, the local NHS and the Trussell Trust. During the earlier summer months, we would also do some proactive social media posts encouraging people to sign up to the PSR register.

10.6.7 Schools

During the summer months, we will continue to promote the Ripple Effect, which is our brand-new education programme that teaches children about the importance of water. We will continue to push this across our social media channels, and we can reach out to schools in effected areas and supply them with our educational resources.

10.6.8 Local Resilience Forum

We always maintain a close relationship with our Local Resilience Forums, and this would continue during a drought. We would engage with them to increase awareness and engagement with local responders.

10.6.9 Housing associations

We will work closely with housing associations to create a specific press release encouraging housing associations to ask tenants to save water and to share this message in any newsletters they put out. We would also create social media posts for housing associations to share or boost on their accounts. As well as this, we will create an e-leaflet that housing associations could share with tenants. We will also create our own bespoke social media posts and tag in housing associations.

10.6.10 Landlords

Similar to the housing associations, we will work closely with the Landlord Association and create a specific press release which would encouraging landlords to get tenants to save water. We will also ask local landlords associations to share this in any newsletters they put out. We will create social media posts for landlords/association to share/boost on their accounts and also e-leaflets that they can share with tenants. Alongside this we will create our own social media posts and tag in associations.

10.6.11 Shared Homes / Student Accommodation

We will work closely with the universities in the region (University of Essex and Anglia Ruskin University) to create a specific press release with guidance for students and will engage with the university radio station or publications and offer up a spokesperson for interview. We could also potentially engage with journalism / communications course students and see if they could use and distribute our messaging.

We will also create social media posts across all platforms, as well as boosted posts targeting specifically 18-25-year-olds and we will create posts for the universities/SU's to share. An e-leaflet would also be created, and we could ask the university to distribute this to all of their students.

10.6.12 High rise flats

We will create a specific press release with advice for people living in high rise flats, and work with the local councils to share this messaging. We will create social posts and boosted Facebook posts focussing on areas with a high number of high rise flats and provide the councils with an e-leaflet with guidance on what residents should do during the hot weather. We would ask local councils to share this with tenants and could also potentially look at producing bespoke customer letters.

10.6.13 Farms

We have built a strong relationship with the National Farmers Union (NFU), and we would utilise this to our advantage. We would work with the to create a farm-specific press release with details on what farmers can do to use water wisely. We would ask the NFU to include this with their weekly newsletter. We would also create a farm-specific e-leaflet with advice and ask them to share this with their members on our behalf. We will also use social media to post and tag in farming groups with our messaging.

10.6.14 Caravan/Holiday homeowners

For holiday homeowners or caravan owners we will create a specific press release with guidance on how to use water wisely and create social media posts across all platforms to raise awareness and create e-leaflet with advice on what to do. We will also reach out to larger holiday park brands such as Parkdean and Haven to see if they can share our messaging and take actions at their sites. We could potentially send out customer letters to the site managers with bespoke messaging.

10.6.15 COVID-19

In the event that COVID-19 and lockdowns are still active throughout a period of drought, our face to face and experiential communications and engagement with customers will be postponed. If this is postponed there will be flexibility to use this budget for highly targeted marketing and advertising to our customers, including direct mail outs and text messages to support them throughout.

11. ENVIRONMENTAL ASSESSMENT

11.1 Section Overview

This section provides a summary of the environmental assessments we have carried out for each of our supply side drought actions (including drought permits / drought orders) (see section 8.4). The environmental assessments and associated environmental monitoring plans document how we will monitor, assess and, where possible, mitigate for the environmental impacts of our supply side drought actions and demonstrate how we are trying to balance protecting the environment whilst maintaining a secure supply of water for our customers.

The sections below provide a high-level summary only, with technical detail of the environmental assessments and environmental monitoring reports being provided in separate technical appendices.

We have prepared our environmental reports (covering environmental assessment, monitoring and mitigation) following the guidance set out in the Environment Agency's "Environmental assessment for water company drought planning supplementary guidance" (July 2020) and the UKWIR report "Environmental Assessments for Water Resources Planning (21/WR/02/15)" (March 2021). We have also checked that our environmental assessments meet all the expectations set out in relevant environmental legislation.

For each of our supply side options we have:

- completed an environmental assessment to demonstrate our understanding of the impact on the environment of our proposed action
- set out the environmental monitoring we will put in place to understand the environmental impacts of our action and
- identified the mitigation measures we will implement in order to minimise the environmental impact of our action.

This information will help us to prioritise the use of options which free up the most additional water supply with the least environmental impact. We have also considered the combined environmental effects of our supply side drought management actions and, where relevant, the combination effects of our actions with those of our neighbouring water companies and other abstractors.

We will review and update our environmental assessments and associated monitoring plans everyone to two years to ensure that the evidence remains up to date. If we have to implement a supply side drought action during a drought event we will refresh our relevant environmental assessments afterwards. This will help to improve our environmental assessments, by incorporating datasets generated from in-drought and post-drought (recovery) monitoring and enable us to ground-truth predicted environmental impacts against observed impacts.

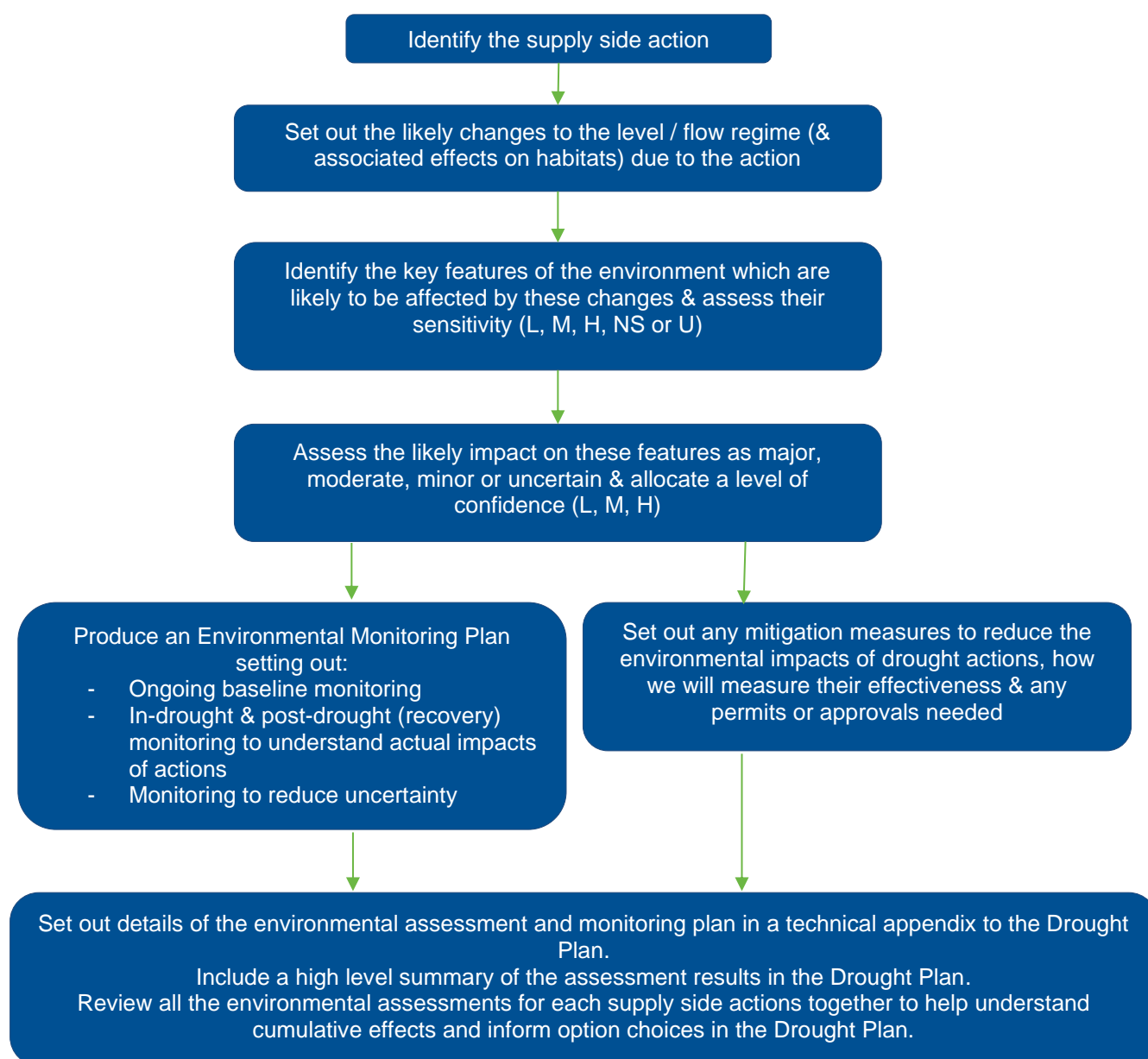
We have discussed our environmental assessments (including our mitigation measures) and monitoring plans with the Environment Agency and, where our drought actions affect a nationally or internationally protected site, with Natural England. We have agreed which sites we need to be 'application ready' for.

We have contacted the Broads Authority as one of our drought actions affects the River Bure, which is within the Broads National Park boundary. We have contacted the relevant local authority for any local wildlife sites potentially affected by our drought actions.

We meet regularly with the Environment Agency and Natural England, at operational and management levels, to discuss various aspects of our operations and conversations around our drought plans are part of this discussion. This ensures that we understand if there are any changes that may affect our drought plans and require our environmental assessments to be updated.

11.2 Approach to environmental assessment

Each of our environmental assessments follows the approach below:



A key part of our environmental assessments is to understand how sensitive each environmental feature of interest is to the likely changes in hydrology or hydrogeology, and likely associated habitat changes caused by each drought action.

The features we have considered within our environmental assessments include:

- Hydrology (water flow or level regimes) and hydrogeology (where appropriate);
- Water quality;
- Ecology – including ecological status, the quantitative status of groundwater as identified in river basin management plans (RBMPs) and fish populations;
- Habitats and geomorphology;
- Designated sites and priority habitats and species;
- Conservation of biodiversity in our role as a public authority under the Natural Environment and Rural Communities Act 2006 (NERC);
- Other physical, economic, cultural and heritage issues;
- The spread of invasive non-native species (INNS).

Having access to good quality, long term environmental datasets is beneficial to aiding our understanding of how the environmental features at the site of each drought action respond to changing water flow and level conditions and how likely they are to be affected by our drought actions.

We have used a qualitative scale (High, Medium, Low, Not Sensitive, Uncertain) to categorise the sensitivity of the features of interest.

Carrying out this initial step of categorising the environmental sensitivity to hydrological changes helps us to then predict the likely impacts of our drought actions on the environmental features of interest. For example, if a feature is categorised as ‘not sensitive’ it is unlikely that the drought action will cause an impact on this part of the environment. We also take into consideration the importance of the site and / or feature and categorise the likely environmental impacts of each drought action as major, moderate, minor or uncertain. The types of evidence that we have used to inform our environmental assessments include:

- Observed historical datasets;
- Observed datasets from ongoing monitoring programmes;
- Expert judgement relating to specific habitat types;
- Evidence from other nearby sites which are similar to our site of interest;
- Modelled / simulated datasets.

The type and quality of environmental datasets available for each drought action affects the level of confidence we can have in the results of our environmental assessment, and which sources of uncertainty that we need to reduce. We have allocated a level of confidence of low, medium or high to our environmental assessments. This is based on the quality of the datasets and the evidence and analysis methods we have used to inform our assessments. Where one of our environmental assessments is categorised as low confidence, for example, because it is based on very limited datasets, we have set out in the associated monitoring plan what additional baseline monitoring we will carry out to help reduce this uncertainty.

In the sections below we have used tables to summarise the findings of our environmental assessments, setting out the environmental sensitivity, the likely predicted impacts and any mitigation measures we plan to implement, in order to minimise the environmental impact of our drought actions, as well as the level of confidence allocated to each environmental assessment.

Within the environmental assessments themselves (provided in separate technical appendices) we have provided more detail around how we intend to minimise the environmental impact of our drought actions, the mitigation measures we will take to reduce any impacts and how we will assess the effectiveness of the mitigation measures and, where required by legislation, how we will compensate for the environmental impacts where it is not possible to minimise them or mitigate for them.

In our environment monitoring reports we have identified the environmental monitoring we will carry out to support and ground-truth our environmental assessments, including in-drought and post-drought (recovery) monitoring.

Within the environmental assessment of drought actions requiring drought permits or orders that may affect a Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site or SSSI we have also completed an 'in combination' assessment to take into account other relevant permits, plans and programmes. We have considered the licences, consents and plans of neighbouring water companies to ensure that we can take appropriate actions to reduce any environmental impacts to avoid an adverse effect on a designated conservation site.

We have not needed to implement any of our supply side drought actions in the last 20 years, so we have little observed data from previous droughts with which to supplement our environmental assessments. Where such observed data does exist we will include it within our environment assessments to better understand how our drought actions have actually affected the environment and to ground-truth our predictions of likely environmental impact. Should we need to implement any of our supply side actions during a future drought, we have set out in our environmental monitoring plans how we will generate appropriate in-drought datasets to understand actual environmental impacts.

We have taken steps to ensure that we comply with all relevant environmental legislation, particularly where our drought actions may affect protected areas or designated sites. We have undertaken a high level refresh of our environmental assessments based on new guidance because all of our supply side drought actions are only likely to be required under infrequent (i.e. not likely to reoccur within several decades) or exceptional drought conditions and based on previous environmental assessments, the potential damage caused is likely to be low (e.g. limited impact on unprotected sites) or moderate (e.g. impacts that a site could quickly and easily recover from).

Each environmental assessment includes the following information:

- Summary – description of the proposed action to maintain water supply

- Proposal – the evidence to justify the action, what changes are proposed to abstractions / discharges and which sites and waterbodies will be affected, plus any alternative measures.
- Assessment of the likely short, medium & long term environmental impacts of the drought action, including the baseline environment, the hydrological / hydrogeological impacts, the features or aspects of the environment assessed, their sensitivity and likely impacts on them, the importance of the site / feature, how we will assess the actual in-drought and post-drought impacts, potential impacts on designated sites, priority species and habitats, the likely impact on water body status and risk of deterioration, the risk of spreading INNS, whether impacts are likely to be temporary or permanent and the potential for cumulative effects.
- Features to consider
- Mitigation measures to reduce the environmental impact of the action
- Evidence to demonstrate compliance with relevant legislation
- Supporting evidence such as datasets and technical information, within a technical appendix to this Draft Drought Plan
- Environmental monitoring plan including the baseline, in-drought and post-drought (recovery) monitoring.

11.3 Environmental monitoring

Environmental monitoring is a key component of the drought planning process, helping to inform understanding of the likely and actual environmental impacts of our supply side actions.

Baseline monitoring helps to inform understanding of the nature of the environment under normal (non-drought) circumstances, and how sensitive the environmental features might be to changes in flow. It is also fundamental to assessing the actual environmental impact of our supply side actions by allowing comparison of the environment under normal conditions against observed environmental datasets collected during and after a drought. While the level of monitoring required is risk-based and potentially different for each drought action, the importance of long-term, high quality datasets is recognised, given that normal environmental conditions are variable and indeed may demonstrate a trend of change over time, for example, due to climate change, water quality improvements etc.

In-drought monitoring helps to assess the actual environmental impacts of a drought action during the drought and informs the choice and implementation of mitigation measures. Post-drought (recovery) monitoring helps to assess the longer-term environmental impacts of, and recovery of the environment from, the implementation of our drought actions. Potentially not all sites will require in-drought and post-drought monitoring, for example where a drought action has a low risk to the environment.

We have tailored our environmental monitoring programme to the needs of the specific environmental assessment for each of our supply side actions, however, key types of environmental monitoring likely to be required include:

- Ecological (e.g. macro-invertebrates, fish, macrophytes, INNS, protected habitats and species);
- Hydrological (e.g. flow and level);
- Geomorphological (e.g. River Habitat Surveys or geomorphology walkover surveys);
- Water quality (e.g. biological oxygen demand and dissolved oxygen);
- Temperature;
- Other supporting information (e.g. fixed-point photography).

The table below presents various types of monitoring considered alongside the environmental effect they are relevant to.

Effect	Potential Monitoring
Base flow Impact of groundwater abstractions on: <ul style="list-style-type: none"> • base flows to rivers • discharges to wetland fen, littoral margin and open water habitats • wetland open water levels 	Wetland groundwater levels River Flow Spot Gauging / Gauging Station
Surface and Groundwater levels Impact of surface water abstractions on: <ul style="list-style-type: none"> • river levels and flows • wetland groundwater levels 	Wetland groundwater levels River Flow Spot Gauging / Gauging Station
Desiccation Desiccation of wetland habitats (fen, river corridors, river corridor margins, reed bed etc.)	Open water surface water levels Wetland groundwater levels
Derogation / Protected Rights Impact of surface and groundwater abstractions on other abstractors.	Groundwater levels River Flow Spot Gauging / Gauging Station
Fish / Invertebrate Stress / Kills Concentration of pollutants as the volume of water in the river is reduced with consequent impacts on sensitive species of fish and invertebrates Higher water temperatures and reduced oxygen levels in the water may cause stress to fish and invertebrates. During low flows fish congregate in pools where they are more susceptible to pollution, predation and spread of disease and parasites.	Water Quality Analysis (Particularly BOD and DO concentrations) River Flow Spot Gauging Fisheries surveys Temperature, BOD and DO & Visual Fisheries surveys
Turbid Water Concentration of nutrients, reduced flushing and increased algal residence times which could lead to turbid water conditions.	Water Quality Analysis (Particularly N and P and algal counts)

Effect	Potential Monitoring
Aesthetics Aesthetic quality of the habitat reduced.	Visual
Siltation Reduced flows can lead to siltation of channels which can clog up fish spawning grounds or cover eggs that have already been laid, starving the developing embryo of oxygen;	Channel depth Siltation using mats
Fish Spawning Fish may not be able to access shallows for spawning.	Fisheries surveys
Fish Migration Trout may not be able to migrate due to low water levels and associated obstructions.	Fisheries surveys
Saline Intrusion Lower flows on tidal rivers could result in the movement of saline water further upstream.	Water Quality Analysis (EC)

In addition to our own monitoring we also make use of monitoring carried out by our regulators (e.g. Environment Agency) and third parties (e.g. wildlife trusts and rivers trusts). We have set out in our environmental monitoring plans where here we have, or plan to, use such datasets. We check with these organisations regularly to keep our data up to date and to understand whether their monitoring remains ongoing.

We have considered carefully how we can design our monitoring programmes to try to understand the difference between natural environmental variance, the impact on the environment of natural drought, our normal level of licensed abstraction and the implementation of our supply side drought actions. We will work with our environmental regulators to understand how we can adopt a Before-After-Control-Impact (BACI) approach. This uses paired control and impact sites monitored under baseline, in-drought and post-drought (recovery) stages. We will work with our environmental regulators to try to identify, where possible, control and impact sites and employ appropriate monitoring.

In our monitoring plans we have set out all the monitoring that we will carry out to understand the environmental impact of each of our supply side actions, including baseline monitoring, in-drought and post-drought monitoring. These plans are included, alongside our environmental assessments in separate technical appendices to our Drought Plan.

Our monitoring plans include:

- the elements / features of the environment that we will monitor;
- the location and frequency of monitoring / sampling / surveying
- any changes in approach between phases (e.g. increasing the frequency of sampling for the in-drought phase)
- who is responsible for carrying out the monitoring;

- the existing environmental datasets that we have, and how our monitoring will complement these and improve our environmental assessments;
- how we intend to analyse our monitoring data, including any data analysis tools that we might employ.

We will update our monitoring plans to take account of the refreshed HRA assessment and if required, SEA. We will agree with Natural England what additional baseline monitoring is required and will implement it from 1 April 2022. A qualitative assessment of cumulative impacts has been undertaken and reported in the EAR. However, we will refresh this following completion of the HRA assessment and, if required, the SEA.

Protected and priority species and habitats

Our Environmental Assessment Reports (EAR) assess the potential effects of the drought actions on flora and fauna and identify what monitoring and mitigation may be required. As agreed with Natural England, we will update the EARs to specifically mention protected species and priority habitats, and to include any new ecological monitoring of them by 30 April 2022, following completion of the updated HRA assessment.

Abberton and Hanningfield reservoirs are the main winter storage reservoirs in our Essex Water Resource Zone. However, there is not a drought permit supply drought action for Abberton Reservoir. There is a drought action to reduce compensation releases into Sandon Brook. However, this action would leave more water in Hanningfield reservoir.

We will ensure that all ecological monitoring is undertaken either by qualified inhouse ecologists, else by approved NWL consultants using our standard procurement procedures. All monitoring will be undertaken using agreed monitoring methods.

11.4 Mitigation measures

In our environmental assessments we have set out how we will mitigate for or reduce the adverse impacts on the environment of our supply side drought actions. We have broken these down into:

- Pre-drought mitigation actions that we will implement before a drought, or while a drought is developing to reduce the likely environmental impact of our drought actions;
- In-drought mitigation actions that we will implement during a drought to minimise the environmental impact of our drought actions;
- Post-drought mitigation actions that we will implement following a drought to reduce any environmental impacts that may occur as a result of the actions we implement.

We have also considered:

- Whether the mitigation measures we are proposing will be effective for the features that could be at risk from our drought management actions;
- How we will monitor the effectiveness of implementing these mitigation measures;
- Any additional permits or approvals that we would need to obtain in order to implement our mitigation measures.

Examples of the kinds of mitigation measures we have considered include:

- Abstraction management
- Compensation discharges to augment surface water bodies
- Aeration to raise dissolved oxygen concentrations to prevent fish stress/kills.

As a drought unfolds we would review our planned mitigation measures before implementing them, taking into consideration the unique features of the specific drought and using our monitoring data to inform our choice of mitigation measures to implement.

We have discussed our proposed mitigation activities with the Environment Agency, Natural England and other affected parties.

11.5 Relevant legislation

We have taken steps to ensure that our environmental assessments fulfil the requirements of the legislation below.

11.5.1 Habitats Regulations

We recognise that Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites (together referred to as Internationally designated sites) all require a high level of confidence for decision making due to their designated status. They may require a more detailed assessment depending on the effects on their designated features. Habitats Regulations Assessment (HRA) is intended to protect such sites. As the Competent Authority we have an obligation to assess our Drought Plan under the Habitats Regulations.

Due to the proximity of our Blyth Borehole 1 group licence, Hartismere Borehole 4 group licence and Ormesby / Bure licence drought action abstraction points to European sites, we undertook an assessment, for a previous drought plan, to establish whether significant effects are likely. The results of this assessment are presented in a separate report entitled, "Revised Drought Plan Habitats Regulation Assessment Screening Report (2012)", which was approved by both the Environment Agency and Natural England. We reviewed this report as part of preparing our draft Drought Plan and concluded that no changes to the report were required.

For the Ormesby / Bure, Blyth Borehole 1 and Hartismere Borehole 4 Group Licence drought actions, given the quantities of additional licence and the proposed monitoring and mitigation measures we would implement, the 2012 assessment concludes that it is unlikely that significant adverse effect would be caused. Consequently, a conclusion

of no likely significant effects was reached meaning that an Appropriate Assessment for these drought actions is not required.

However, in discussion with Natural England (16 August 2021) we have agreed that we will undertake a new HRA assessment to reflect new data collected since the last one. We plan to complete this by 31 March 2022. We will include a summary table which sets out which designated sites have drought actions and which required and have undergone HRA, with the outcomes in the associated environmental report. A source pathway receptor approach will be used with sites screened out in the absence of a pathway. The HRA assessment will be presented as Appendix 12 of the Drought Plan.

11.5.2 Wildlife & Countryside Act 1981 (WCA) & Countryside & Rights of Way (CROW) Act 2000

We have a duty under the WCA to take reasonable steps, consistent with the proper exercise of our functions, to further the conservation and enhancement of SSSI features. To this end we have taken a similar approach to that for Natura 2000 sites in assessing whether a drought action is likely to damage an SSSI. We have taken into consideration the potential impacts of our drought actions on the animals and plants protected under the WCA 1981 as amended by the CROW Act 2000 and the Conservation of Habitat & Species Regulations 2017.

11.5.3 Priority habitats & species and locally important sites

We have duties under the Natural Environment and Rural Communities (NERC) Act 2006 to have regard, so far as is consistent with the proper exercise of our functions, to the purpose of conserving biodiversity. We have taken account of this duty, and the list of species and habitats published, in accordance with section 41 of the Act, in our Drought Plan. This duty applies to Local Wildlife Sites (formerly called County Wildlife Sites). For these sites we have used available information to consider environmental impacts and followed the mitigation hierarchy for any potential impacts identified:

- 1) Avoid impacts where possible
- 2) Mitigate impacts that are unavoidable.

11.5.4 Fish and fisheries

The principal fisheries legislation comprises the Salmon and Freshwater Fisheries Act 1975, Water Resources Act 1991 and Environment Act 1995. Certain fish species and fish stocks are also protected by the Habitats Regulations, the Wildlife and Countryside Act 1981, Eels Regulations 2009 and the requirements of the Water Environment (Water Framework Directive) Regulations 2017.

Fish that are protected priority species under the UK Post-2010 Biodiversity Framework as required under the Natural Environment and Rural Communities (NERC) Act 2006 include salmon, trout, eel, lamprey and shad. These fish are features of interest of a number of Habitats Directive sites and SSIs.

We have considered in our environmental assessments the potential impact on the important fish stocks and fisheries and especially on migratory species and eel passage, in the waters our proposed drought measures could affect. Potential impacts considered include:

- delayed/restricted migration
- loss of habitat (in particular salmonid spawning or nursery habitat)
- fish stranding
- fish distress leading to disease outbreaks
- fish kills
- transfer of invasive non-native species
- impacts on angling (for example, closure of fisheries and/or cancellation of fishing events).

11.5.5 Invasive non-native species (INNS)

We have considered whether any of our supply side drought actions will risk spreading INNS and if so whether there are any mitigation and risk reduction measures that we can apply. We do not have any drought actions that involve temporary transfers of raw water, which can pose a significant risk of transferring INNS. We have considered the impact that changes in operations such as the movement of pumps, machinery or people may have on the risk of spread of INNS and ensured the appropriate biosecurity measures are in place. Where relevant we have included monitoring or surveying for INNS in our monitoring plans.

11.5.6 River basin management plans (RBMPs)

In preparing our drought plan, we have considered how our drought management actions will support the environmental objectives set out in the river basin management plans. We have identified the impacts of our drought actions on all water bodies affected and for all relevant classification elements, and if deterioration (temporary or otherwise) is likely to occur. In any case where we believe deterioration is likely to occur as a result of our actions, we have set out what we think this will be and how we will mitigate it.

We have not needed to apply for a drought permit or drought order in the previous 20 years. The last time we imposed a hosepipe ban (now a temporary use ban) was in 1997/98. There have been subsequent dry / drought years, notably in 2012, when only an appeal for restraint was required. We therefore think that it is reasonable to conclude that a Suffolk drought worse than 1996/97 (Suffolk design drought year) and an Essex drought worse than 1933/34 (the Essex WRZ design drought year) would be required before we would even need to consider drought permits. Consequently, we consider that article 4.6 would allow for any temporary deterioration caused by ESW drought permit applications.

Nevertheless, in line with the WFD Regulations, we would ensure that all practicable steps were taken to prevent any deterioration in status and to limit it where possible and we have undertaken a WFD assessment and have considered the effects of our supply side drought actions on WFD objectives and water body classification. The results are presented in each of the supply side environmental assessment reports.

We have undertaken an initial assessment of each of our supply side drought actions and have concluded that this Drought Plan is WFD compliant. This is because one of the following conclusions can be drawn:

- i. It has been possible to demonstrate that a proposed drought action is not likely to have a significant effect on the environment and therefore that it is also possible to conclude compliance against the WFD environmental objectives; or
- ii. Although a drought action has been assessed as likely to temporarily effect WFD objectives or temporarily cause deterioration to a water body, appropriate mitigation measures to prevent deterioration have been proposed as part of the monitoring and mitigation plan within the drought plan.

11.5.7 Strategic Environmental Assessment (SEA)

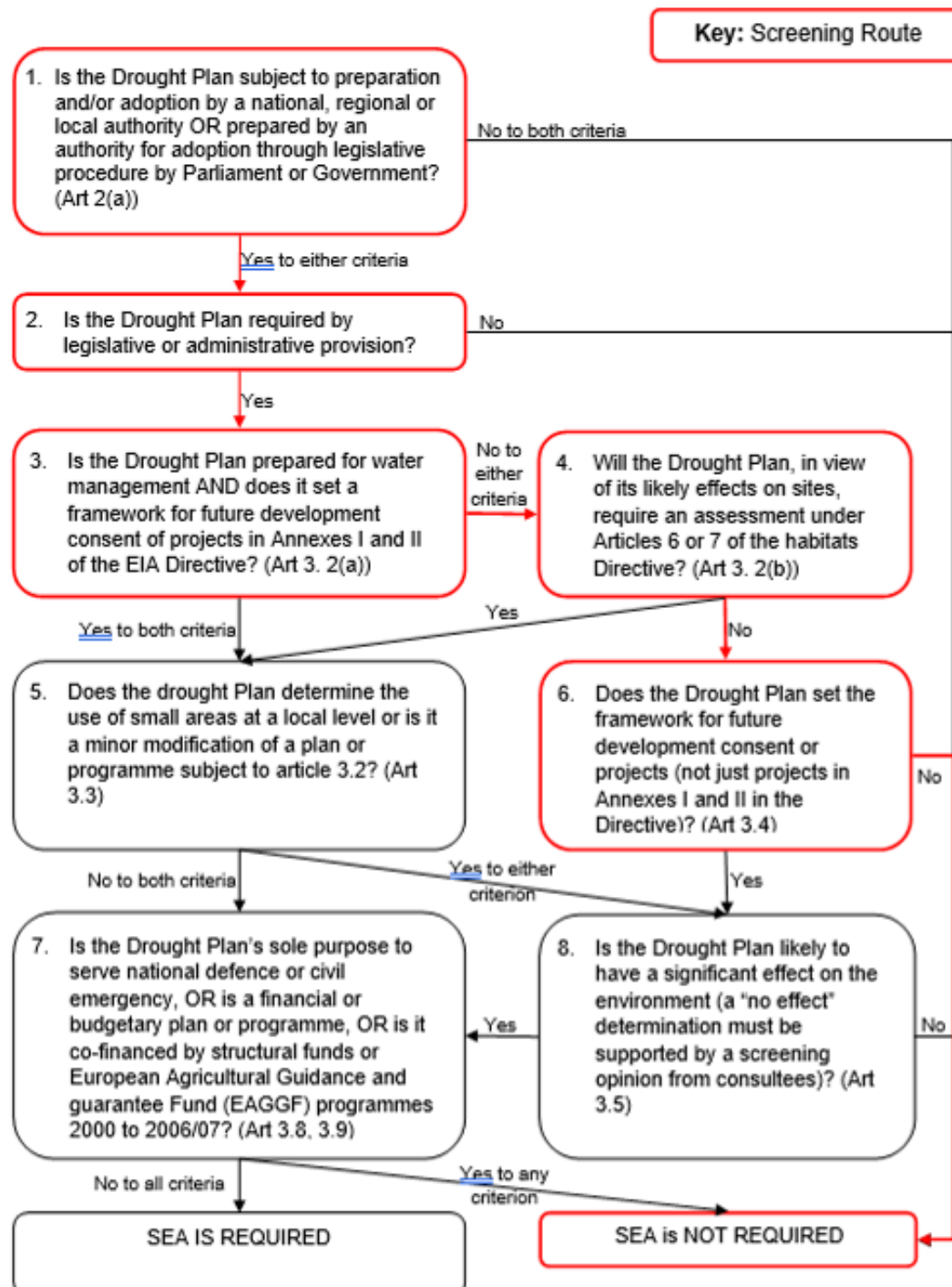
We have completed a screening exercise (see diagram below) to understand whether a Strategic Environmental Assessment (SEA) is required for our Drought Plan. The results of this exercise are presented below:

1. The Drought Plan will be prepared and adopted by NWL which, under the EIA Directive, is considered an “authority”;
2. The Drought Plan is required by legislative provision, being a statutory document under the Water Act 2003 amending the Water Industry Act 1991;
3. The Drought Plan will be prepared for water management but does **not** set a framework for future development;
4. We do not believe that the Drought Plan, in view of its potential likely effects on sites, requires an assessment under Articles 6 or 7 of the Habitats Directive;
5. Our Drought Plan will not set the framework for future development consent of projects.

While preparing our previous Drought Plan (in 2017), we agreed with Natural England (15/03/2017) and the Environment Agency that SEA of our Drought Plan 2018 was not required, providing there were no new supply side drought actions. This was because the existing supply side drought actions were assessed, after mitigation, not to have a significant effect on the environment.

We are not proposing any new Level 1 to 3 supply drought actions in this Draft Drought Plan. While there may be additional “More before 4” drought actions (i.e. those to be implemented after Level 3 drought actions but before Level 4 drought actions), we are not including any that are hydrologically linked to Natura 2000 sites.

Therefore, following the completion of our (SEA) screening, the Environment Agency agreed that SEA of our Drought Plan was not required. Natural England initially agreed that SEA was not required but has since indicated that it believes it may be required after all. We still do not believe that an SEA is required for the reasons set out above. However, we have agreed with Natural England that we will take further legal advice on this matter and if our position changes, we will undertake an SEA taking account of all the wider SEA points Natural England included in its representation on our draft Drought Plan. If the further legal advice is to undertake an SEA of our Drought Plan, we will complete this alongside our draft Water Resources Management Plan 2024 SEA by 31 March 2021.



11.6 Drought Option Environmental Assessment Summary Forms

11.6.1 Essex Water Resources Zone

We have identified three potential supply side drought actions to obtain additional water for the Essex Water Resource Zone:

- Increased bulk transfers from Thames Water Utilities (by agreement)
- Drought order to increase abstraction from SAGS
- Drought permit to reduce the compensation flow from Hanningfield Reservoir into Sandon Brook.

A summary of the environmental assessment for the two actions requiring drought permits is presented in Appendix 5.

11.6.2 Suffolk Blyth Water Resources Zone

We have identified two potential supply side drought actions to obtain additional water for the Suffolk Blyth Water Resources Zone:

- Drought permit to increase restricting annual quantity on Blyth Borehole 6 licence.
- Drought permit to modify compensation flow and / or abstraction from Blyth Borehole 2.

A summary of the environmental assessment for the two actions requiring drought permits is presented in Appendix 5.

11.6.3 Suffolk Northern Central Water Resources Zone

We have identified two potential supply side drought actions to obtain additional water for the Suffolk Northern Central Water Resources Zone:

- Drought permit to increase annual licence and April to October quantities on Lound licence.
- Drought permit to increase restricting annual quantity on Ormesby / Bure licence.

A summary of the environmental assessment for the two actions requiring drought permits is presented in Appendix 5.

11.7 Suffolk All Resource Zones – Measures to obtain additional water

We have identified a further one potential supply side drought action to obtain additional water across all or any of our Suffolk Water Resources Zones:

- Tankering of water by road from areas of spare resource to where it is required.

As this drought action involves moving relatively small quantities of treated drinking water around within and / or between our supply areas, to maintain levels in water towers, and does not require any additional abstraction, or a drought permit, we do not feel it requires environmental assessment.

12. END OF DROUGHT

12.1 Overview

The recovery or potential recovery from drought will be based on the latest rainfall, reservoir storage, groundwater levels, river flows and customer demand data which will be monitored by our Water Resources team and Drought Management Group. We have defined control curve triggers for our Level 1, 2, 3 and 4 drought actions and have provided surface water and groundwater worked examples in Appendix 3.

The true end of a drought can only be determined retrospectively. However, the trigger we will use for coming out of a drought is when actual reservoir storage or groundwater levels are above the Level 1 Drought Action control curve for 2 weeks. However, we will take an agile approach to deciding whether to return to business as usual (i.e. non-drought) messaging and will consider:

- operational experience;
- water resources forecasts using our Aquator models
- whether there is an improving situation with increasing reservoir levels, lake levels and groundwater levels;
- the time of year (i.e. whether going into summer or winter); and
- the short and medium term weather forecasts.

We will make a careful judgement as to whether to remove restrictions since an apparent ending of drought conditions could easily be confused with a temporary respite in a prolonged drought sequence. Additionally, decisions will be balanced with the need to avoid impacting on customers and business for longer than is necessary.

Prior to concluding a drought has ended, we will consult neighbouring water companies, Water Resources East and other interested stakeholders to obtain their view on drought recovery. We will only declare the end of a drought after confirming with the Environment Agency that the water resource situation and associated threat to public water supply has returned to normal. We will communicate this to our customers as outlined in our Communications Plan.

If Level 3 drought permits were required, we will continue to carry out environmental monitoring and assessment for a period after hydrological triggers have recovered to understand how the environment is recovering. We recognise that some species and habitats will take longer to recover from drought and potential drought actions than others. Consequently, we confirm that recovery monitoring (ecological and hydrological) will continue until full recovery is observed and agreed with Natural England.

12.2 Post Drought Review

We will complete a Post Drought Review (PDR) comprising data collation and report writing within four months of a drought ending. It will be overseen by our Business Continuity Team and all members of the Drought Management Group will be expected to contribute.

The review will identify lessons learnt and consider potential improvements both to our Drought Plan and wider drought management strategy. Additionally, where appropriate, the need for future investment to limit the impact of similar drought conditions occurring in the future will be considered, as will the need for any additional monitoring. The PDR will examine:

- the hydrological conditions leading up to the drought and the effectiveness of our drought indicators;
- the effectiveness of drought trigger levels and whether they should be amended;
- the effectiveness of our drought actions (including the effects of restrictions on water use, communications campaigns and leakage management);
- the actual environmental impacts of our drought management actions;
- the effectiveness of any mitigation measures;
- lessons learnt to improve your environmental assessments, monitoring plans and mitigation measures in our drought plan;
- the effectiveness of our communications plan;
- implications of the drought for future levels of service; and
- what longer term improvements to resilience may be needed and to reflect this in our next WRMP.

Recommendations for improvement to our drought management process will be made where appropriate and shared with the Environment Agency.

12.3 Revision of Drought Plan

We will review our drought plans annually and will update them in line with the Drought Regulations if there are any material changes. Additionally, our drought action environmental reports and monitoring plans are a snapshot in time and will be reviewed and updated every 1 to 2 years.

13. REFERENCES

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14. GLOSSARY

Abstraction	The removal of water from any source, either permanently or temporarily.
Abstraction licence	The authorisation granted by the Environment Agency to allow the removal of water from a source.
Baseline	Information on the environment that details conditions prior to implementation of a drought action.
Bulk transfers	A legal agreement for exporting and importing water between a donor and recipient operator.
Control curves	A diagram or graph presenting drought triggers levels.
Demand management	The implementation of policies or measures which serve to manage control or influence the consumption or waste of water.
Drought management zones	The area (within a resource zone) that a particular drought management action will apply to as specified.
Deployable output	The output of a commissioned source or group of sources or of bulk supply as constrained by the environment, abstraction licence, pumping plant and/or well or aquifer properties, raw water mains and/or aquifers, transfer and/or output main, treatment or water quality.
Drought order	An authorisation granted by the Secretary of State under drought conditions which imposes restrictions upon the use of water and/or allows for abstraction/impoundment outside the schedule of existing licences on a temporary basis.
Drought permit	An authorisation granted by the Environment Agency under drought conditions which allows for abstraction/impoundment outside the schedule of existing licences on a temporary basis.
Environmental assessment	An assessment of environmental sensitivity and likely impacts from implementing drought management actions.
Environmental monitoring plan	A plan describing how the company will address gaps in the environmental assessment of the supply-side drought management action; baseline monitoring (including pre drought monitoring); in- drought monitoring; and post drought monitoring.
Environmental report	The report that accompanies an application for a drought order or drought permit. It is based on the information from within the environmental assessment and updated with any additional information.
Feature	A way of describing an ecological, chemical, habitat or morphological element to be assessed. For example a species of plant or animal, habitat type or sub-habitat type.
Government	Central Government (Defra)
Habitats Regulations	The Conservation of Habitats and Species Regulations 2010. The domestic legislation which transposes the EU Habitats and Wild Birds Directives into UK law and replaces the Conservation (natural habitats &c) Regulations 1994.

In-drought monitoring	Monitoring that is undertake during the implementation of a drought management action.
Levels of service	The standard of service that water company customers can expect to receive from their water company, commonly setting out the frequency of restrictions that a company expects to apply to its customers.
NNR	National Nature Reserve - designation to protect the most important areas of wildlife habitat and geological formations in Britain, and as places for scientific research.
Ramsar site	Internationally important wetland site.
Water Resource Zone	The largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall.
SAC	Special Area of Conservation - Designated under the European Habitats Directive (1991)
SPA	Special Protection Area - Classified under the European Birds Directive (1979)
SSSI	Site of Special Scientific Interest - A site given a statutory designation by English Nature or Natural Resources Wales because it is particularly important, on account of its nature conservation value.
Strategic Environmental Assessment (SEA) Directive	The Strategic Environmental Assessment Directive ensures significant environmental effects arising from proposed plans and programmes are identified, assessed, subjected to public participation, taken into account by decision-makers and monitored.
Water resource management plan (WRMP)	A water company long-term strategic plan for water supply and demand over 25 years.
Resilience options	Additional options to deal with plausible droughts worse than those in the recorded record.
Habitats regulation assessment (HRA)	A HRA identifies whether or not drought actions will have an adverse effect on a site's (SPA or SAC) integrity.

15. MAPS

Figures 1, 2 and 3 below illustrate the water resource zones for our Suffolk and Essex supply areas.

Our Drought Management areas (i.e. the smallest area we would plan to implement temporary use bans (TUBs) at include:

- **Suffolk** which comprises of three water Resource Zones including Blyth, Hartismere and Northern / central; and
- **Essex** which comprises of our Essex Water Resource Zone only.

The maps also show the location of our surface and groundwater sources as well as our existing bulk imports / exports.

Figure 4 shows the location of all our potential drought permit and drought order sites and the locations of important ecological sites that our actions could affect.

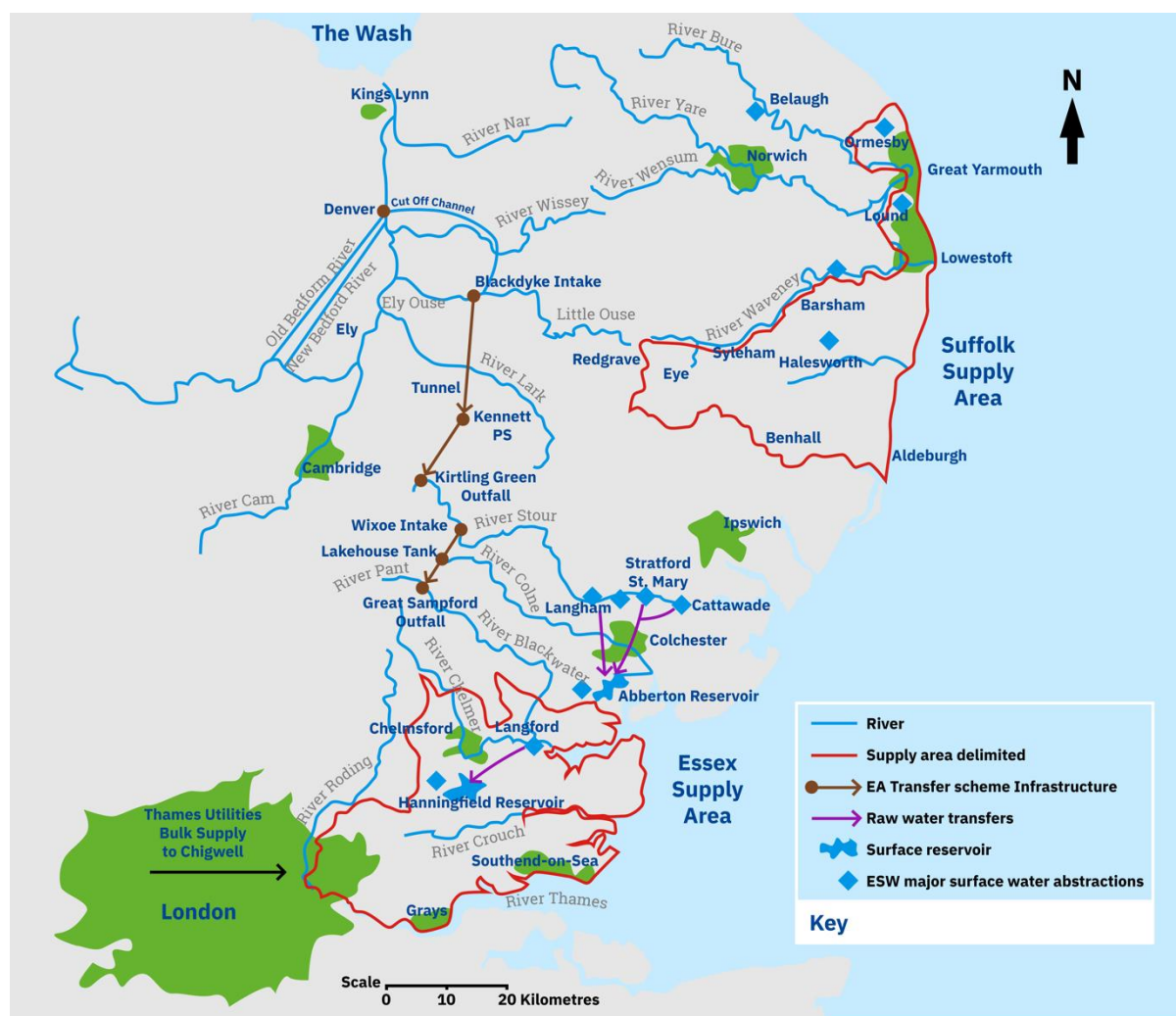


Figure 2
Essex Resource Zone and Associated Infrastructure



Figure 3
Suffolk Supply Area and Associated Infrastructure

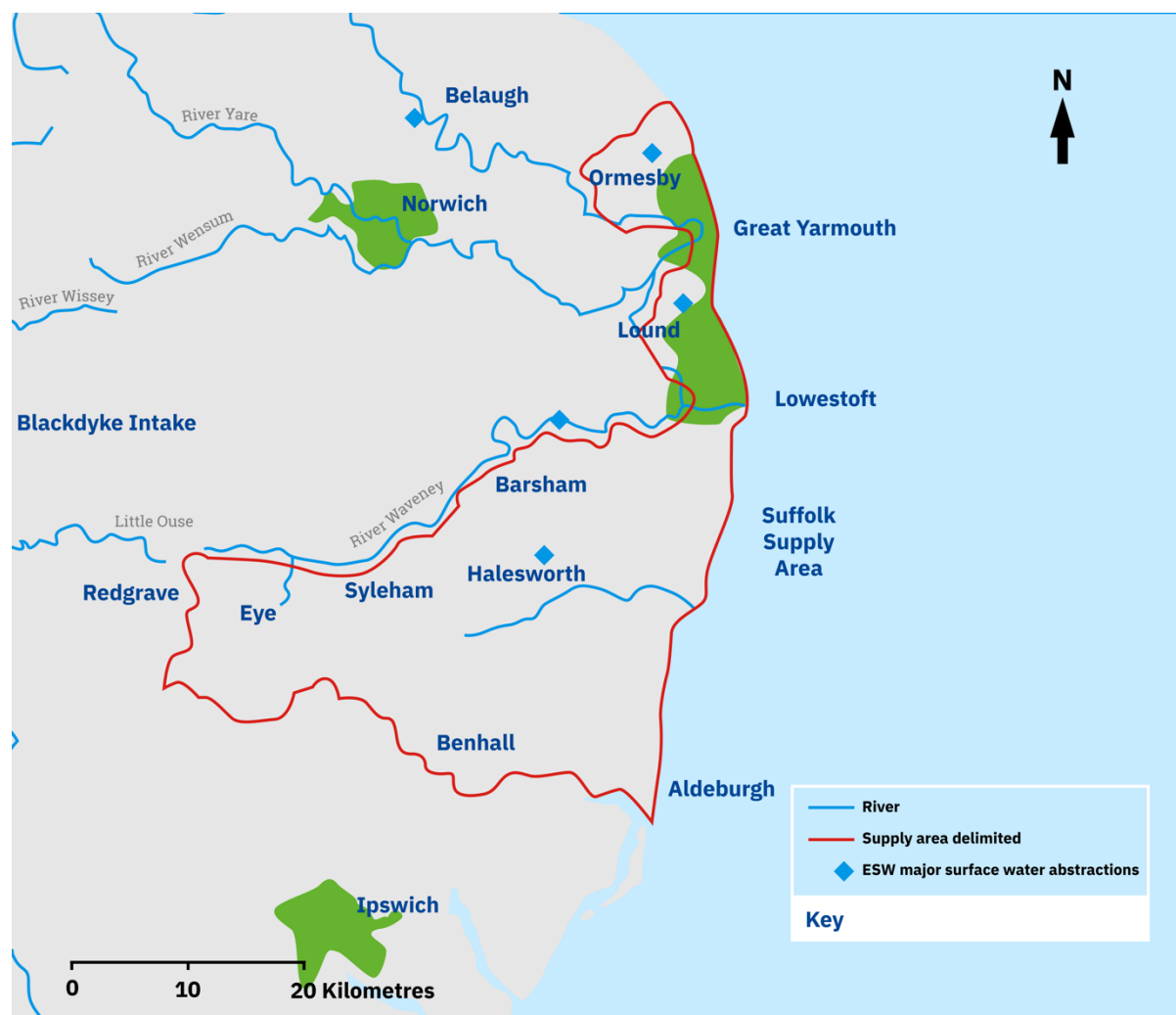
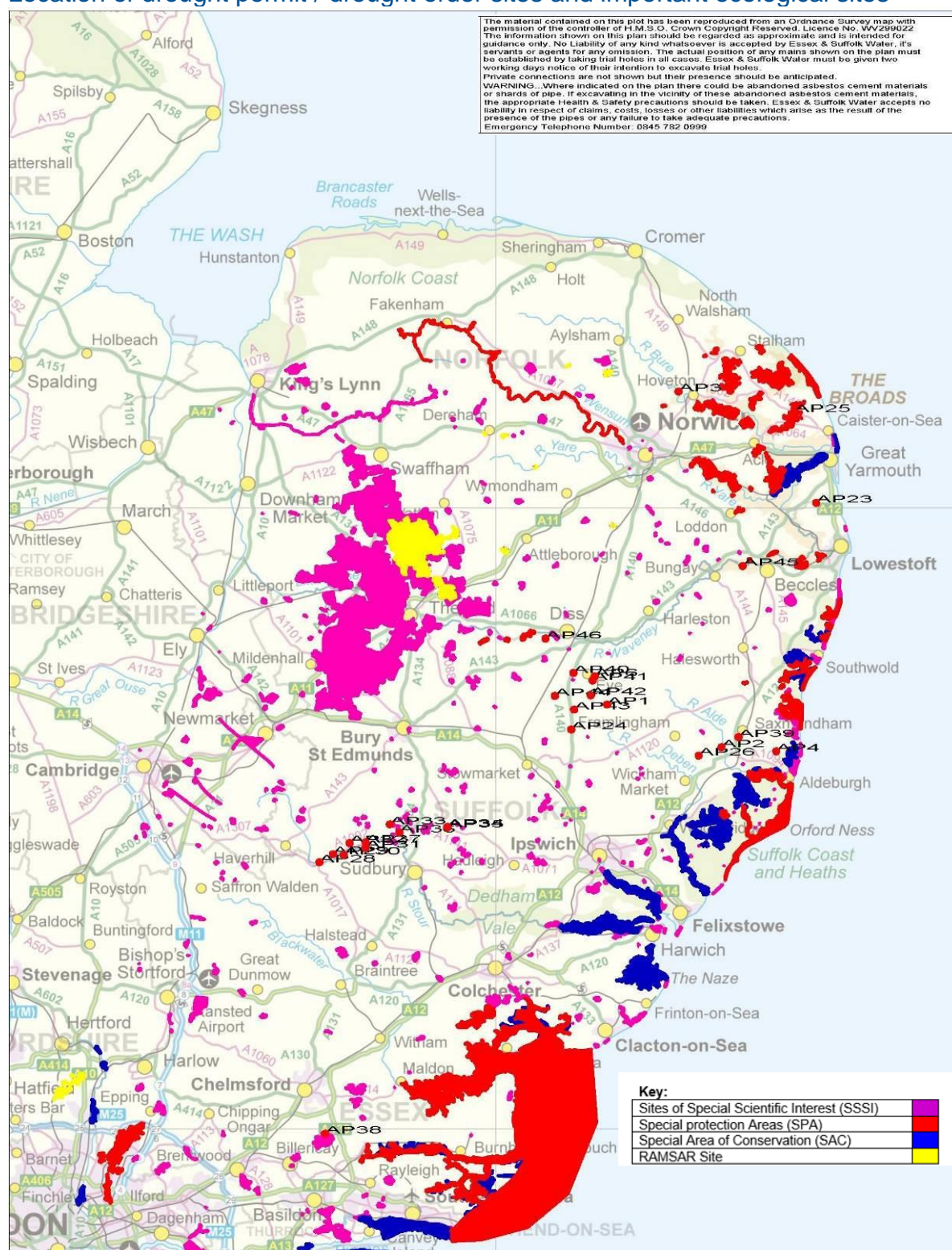


Figure 4
Location of drought permit / drought order sites and important ecological sites



APPENDICES

APPENDIX 1:

ESSEX DROUGHT VULNERABILITY ASSESSMENT

We are required to understand and demonstrate the resilience of our systems to a range of droughts. The UKWIR guidance (*Drought Vulnerability Framework*, 2017) provides an approach that water companies can use to improve the understanding of the vulnerability of their systems to drought and demonstrate this graphically by producing 'drought response surfaces' (DRS) for their water resources zones (WRZs).

The guidance recommends several different calculation approaches based on the data availability and the level of modelling available for each WRZ. These approaches are detailed in the table below.

Nature of Drought Rainfall Data and Hydrological Modelling	Nature of WRZ and Deployable Output Assessment	Approach Number	Notes/Comments
Stochastically based rainfall data (normally includes hydrological models, but can include multi-site flow generation)	Conjunctive with <i>rapid</i> simulator	1a	Where direct flow generation has been used then rainfall deficit/flow analysis required
	Conjunctive but <i>no</i> rapid simulator	1b	Uses a sample of the full stochastic data set ('drought libraries')
Synthetically based rainfall data	All	2	Requires Extreme Value Analysis (EVA) to estimate risk/return period
Historic rainfall data with rainfall/runoff and/or groundwater models	SW storage dominated (with behavioural model)	3a	Requires EVA of rainfall, and yield/return period behaviour
	Groundwater or run of river only	3b	Requires EVA of rainfall and flow/level return period behaviour
Historic rainfall data with no hydrological models	SW storage dominated (with behavioural model)	4a	Rainfall EVA and rainfall deficit/inflow relationships needed
	Groundwater or run of river only	4b	Rainfall EVA and rainfall deficit/level/flow relationships needed

Essex WRZ constitutes the 'Essex System', plus a surface water and two groundwater treatment works in South Essex. The Essex System represents the highly integrated network connecting the Essex rivers and their associated intakes, the pumped storage reservoirs at Abberton and Hanningfield, and the associated raw water transfer pipes, pumping stations and treatment works. The DI of the Essex System is around 80% of the total Essex WRZ DI. ESW have an Aquator model representing the Essex System, along with rainfall-runoff models for the rivers within the system.

On this basis, approach 3a is appropriate for carrying out this assessment for the Essex System. The calculation steps for approach 3a as set out in the UKWIR guidance are detailed here:

1. Carry out Extreme Value Analysis (EVA) to determine the probability of each deficit/duration cell.

2. Generate synthetic events (intensity & duration) using rainfall-runoff models for a selection of deficit/duration cells using the historic record.
3. Run the synthetic events through the behavioural model for the selected level of demand.
4. Calculate the number of days deficit for each synthetic event.
5. Compare the EVA plot of minimum levels or flows against the critical duration drought outputs, to scale the DRS inputs.
6. Plot DRS.

The resilience of the Essex System was assessed for the following drought durations and return periods:

Return Period/ Duration	100 yr	200 yr	500 yr	1000 yr
6 months	X	X	X	X
12 months	X	X	X	X
18 months	X	X	X	X
24 months	X	X	X	X
36 months	X	X	X	X

Selection of 'month end' of drought events

The guidance recommends that for a WRZ with a high level of storage driven by the annual average demand, the month end of the droughts is set three months apart. Historically the lowest storage levels experienced have been in October, and given the large amount of storage available within the WRZ the system is more vulnerable to a dry winter than a dry summer, therefore the month ending parameters have been set three months apart in October and December.

Level of demand used

The behavioural modelling is carried out for a single specified level of demand. The guidance suggests a few options, including:

- Total demand (DI)
- Total demand plus Target Headroom
- Total demand plus Target Headroom plus Outage
- Demand equivalent to DO

The guidance states that the primary analysis for regulatory returns should be run at DI plus Target Headroom. We therefore chose to run the analysis at this level of demand, using the actual DI and target headroom allowance for 2018/19, the most recent Dry Year affecting the Essex WRZ.

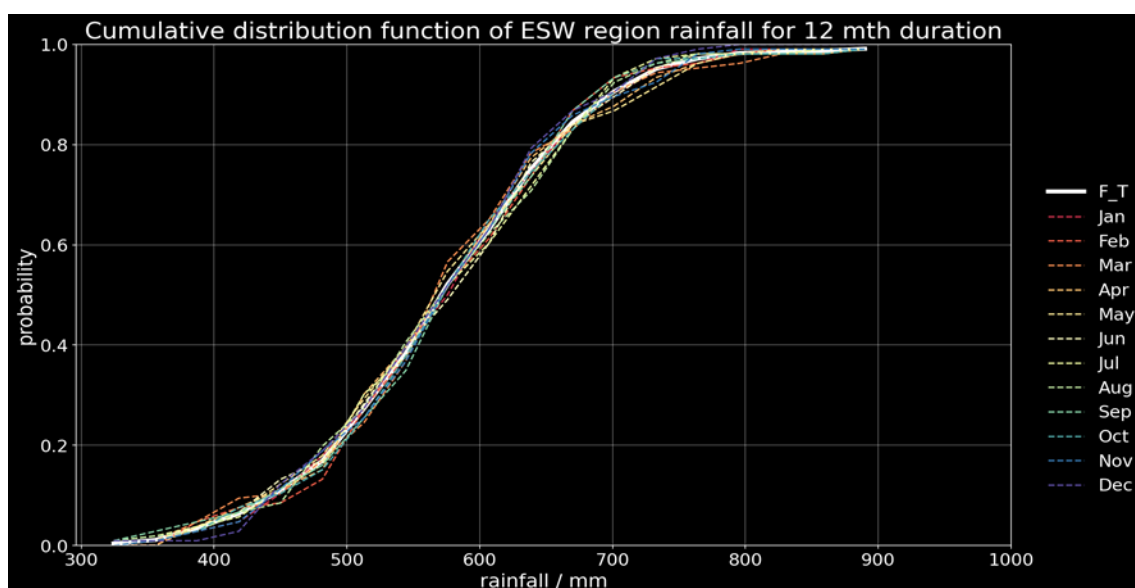
Rainfall data analysis

The rainfall datasets used for this study were originally derived from the CEH-GEAR gridded daily rainfall dataset. The rainfall series were averaged for all sub catchments to produce a single daily rainfall time series for the whole Essex System area, which was deemed an appropriate assumption given that the mean annual rainfall for each individual sub catchment lay within 5% of the regional mean.

The guidance requires rainfall frequency analysis for different drought durations to be based upon the same end-months as the selected drought end-month for the water resources system. Therefore, as October and December were deemed to be the critical end-months for reservoir drawdowns, rainfall analysis should be based upon the rainfall totals up to the end of October and December for every year of record.

To assess if the October and December end-month durations were representative of the population rainfall distribution, a Kolmogorov-Smirnov (K-S) test was carried out for all month ends, for each duration. This tests whether the rainfall totals for various durations at a given end-month are significantly different from the daily running 6-month rainfall total for the entire record, which was taken as the parent population distribution.

This assessment demonstrated that there is no significant difference between end-month rainfall totals for whole-year periods (figure 1a), therefore all whole-year period rainfall totals should be included in any assessment of frequency of occurrence, regardless of end-month. The situation for durations that include half-years is more complex, as there is a degree of seasonality demonstrated at this level (figure 1b). For the purpose of this study, the sampling regime was therefore extended to include month-end durations that were not significantly different from the central duration of interest.



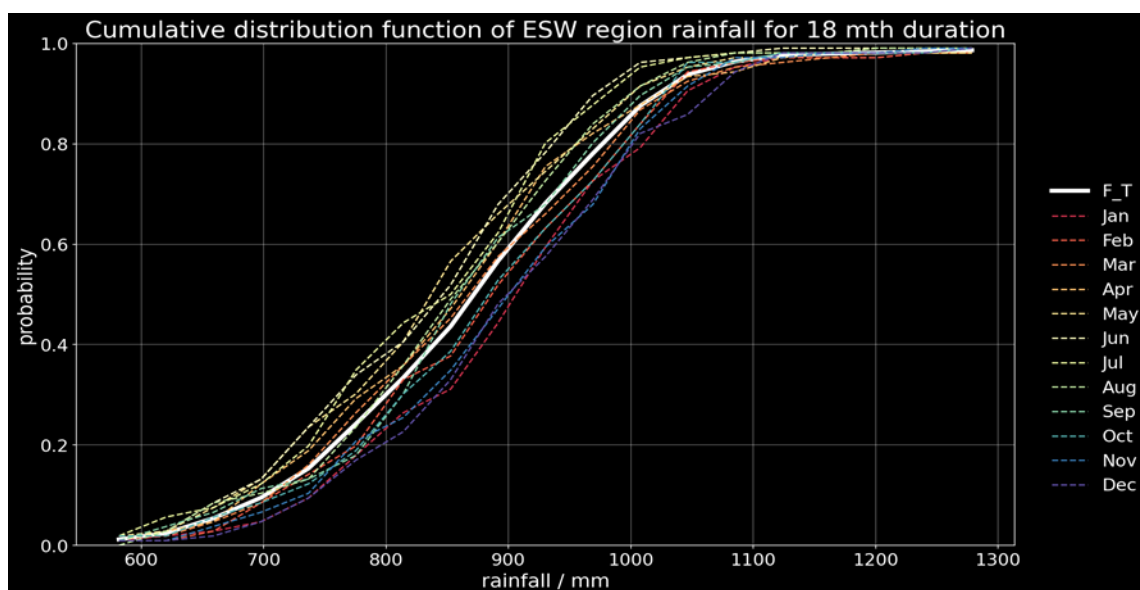


Figure 1: Cumulative distribution function for Essex regional rainfall a) 12-month and b) 18-month duration droughts for different month endings.

Rainfall series of various durations were tested against several extreme value distributions, and overall, they fitted best with a three-parameter GEV distribution. All rainfall depths were divided by the regional standard annual average rainfall (SAAR) for the period 1971-2000, to allow standardised rainfalls from each duration to be easily compared.

GEV factors were derived for the rainfall datasets as a ratio of the SAAR to calculate the rainfall required for each return period and duration. The resulting rainfall depths in mm for each duration and return period are presented in the table below.

Duration	6 months	12 months	18 months	24 months	36 months
1 in 100	119.7	342.1	561.6	827.6	1362.9
1 in 200	109.4	322.5	532.0	788.4	1311.9
1 in 500	97.7	301.8	504.6	746.6	1265.8
1 in 1000	90.4	285.1	489.7	740.2	1243.0

Creation of artificial drought rainfall sequences

Approach 3a requires the creation of artificial drought rainfall sequences, for use in rainfall-runoff modelling. In order to generate droughts with a realistic daily rainfall pattern, the guidance states that an existing historic year close to the average should be used. A rainfall year with a low monthly mean squared error (MSE) to the overall average monthly values, and with a mean close to SAAR, was selected to be the “warm-up” and “cool-down” year.

At least two “warm-up” years were attached before each drought event, and then four years of “cool down”. We have several 5-year rolling abstraction licences, which can hold the ‘memory’ of a drought in the licence utilisation total for an extended period. The long duration between drought events is necessary in order to avoid one drought impacting on the next. The droughts for each of the four return periods were stitched together to create a continuous time series containing all the drought events for each individual duration.

Rainfall sequences for each sub catchment rainfall-runoff model were then generated. The ratio of each sub catchment’s rainfall to the SAAR was calculated, and this factor was applied to the regional average to generate sub catchment artificial rainfalls for each drought length, return period and month-end.

Derivation of river flows

The generated rainfall sequences for each sub catchment were used as rainfall input to the rainfall-runoff models. The models also require an input for potential evapotranspiration (PET). After the artificial rainfall sequences had been created, the regional PET was matched from the entire record for each drought. PET values were left as regional averages across all catchments. Pycatchmod, a Cython implementation of a Catchmod rainfall-runoff model, was utilised to generate the flows for all catchments in the Essex System Aquator model.

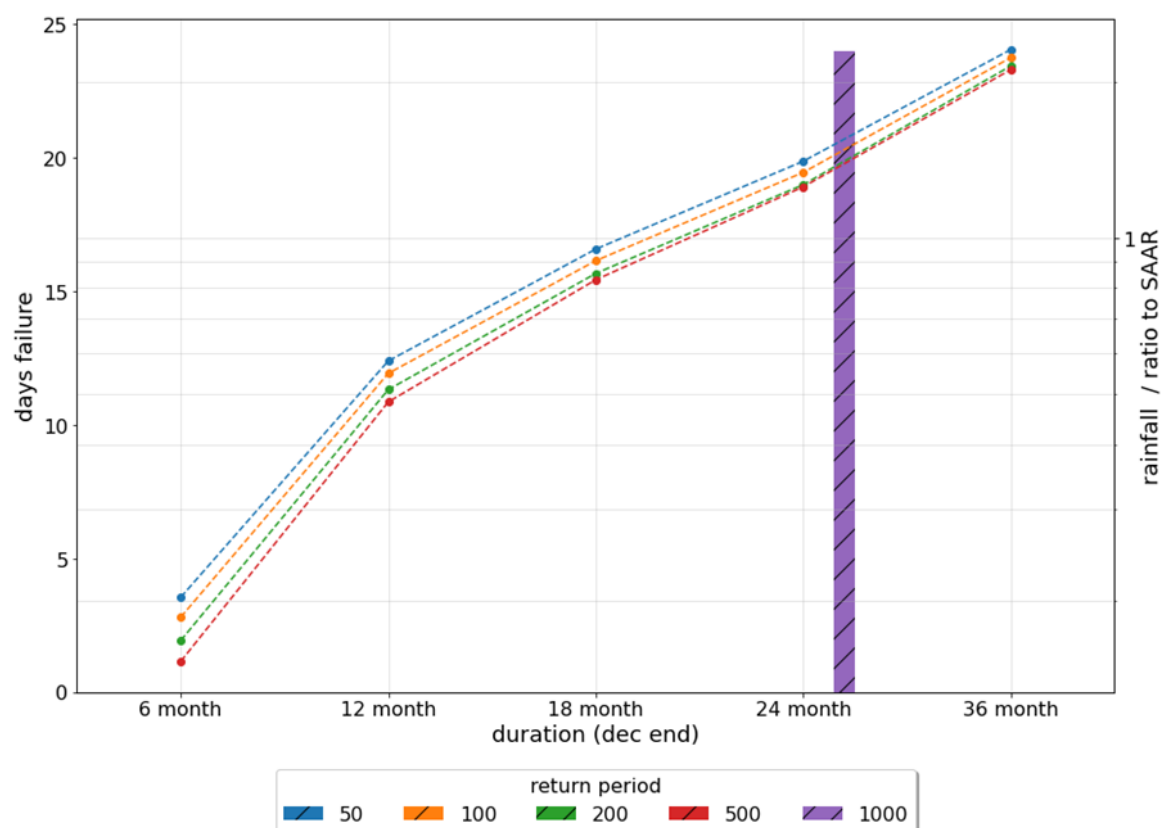
Aquator modelling

The drought scenarios were run through the Essex System Aquator XV model with demand set at 2018/19 DI plus Target Headroom allowance, and the number of days of failure of the system were recorded for each October- and December-ending drought. Failure occurred when the demand could not be met, or the emergency storage level of a reservoir was reached.

Only the December-ending 24-month 1000-year return period drought scenario caused failure (24 days).

Drought Response Surface

An alternative plot to the DRS in the form that it was recommended in the guidance is provided below, that we hope offers clarity whilst conveying the relevant information. This graph displays the number of days of failure on the left-hand axis as a bar chart, and the rainfall as a ratio of SAAR on the right-hand axis as a line plot. Drought durations are along the x-axis, with colours representing the different return periods.



We have now conducted a PR24 drought vulnerability assessment using the preferred stochastic modelling approach. The results will be presented in our draft Water Resources Management Plan to be submitted to Defra in August 2022.

APPENDIX 2:

GROUNDWATER DROUGHT VULNERABILITY ASSESSMENT

Regional Groundwater Modelling

To test the resilience of our groundwater sources to a 1 in 200 year drought, Amec Foster Wheeler (AFW), now Wood Plc, was employed to carry out groundwater modelling in PR19 using the Northern East Anglian Chalk (NEAC) and Essex regional groundwater models. Additional work for the Drought Plan has been completed to test the resilience of our groundwater sources to a 1 in 500 year drought (Wood, 2021).

The groundwater modelling carried out for the 1 in 500 year drought assessment was based closely on the previous 1 in 200 year assessment used for the PR19 Water Resources Management Plan (Amec Foster Wheeler, 2017). Six model runs were constructed – three for the North East Anglian Chalk (NEAC) groundwater model and three for the Essex groundwater model – representing the Naturalised, Recent Actual and Fully Licensed scenarios and running for a period of 1900-90 using stochastic rainfall and potential evapotranspiration.

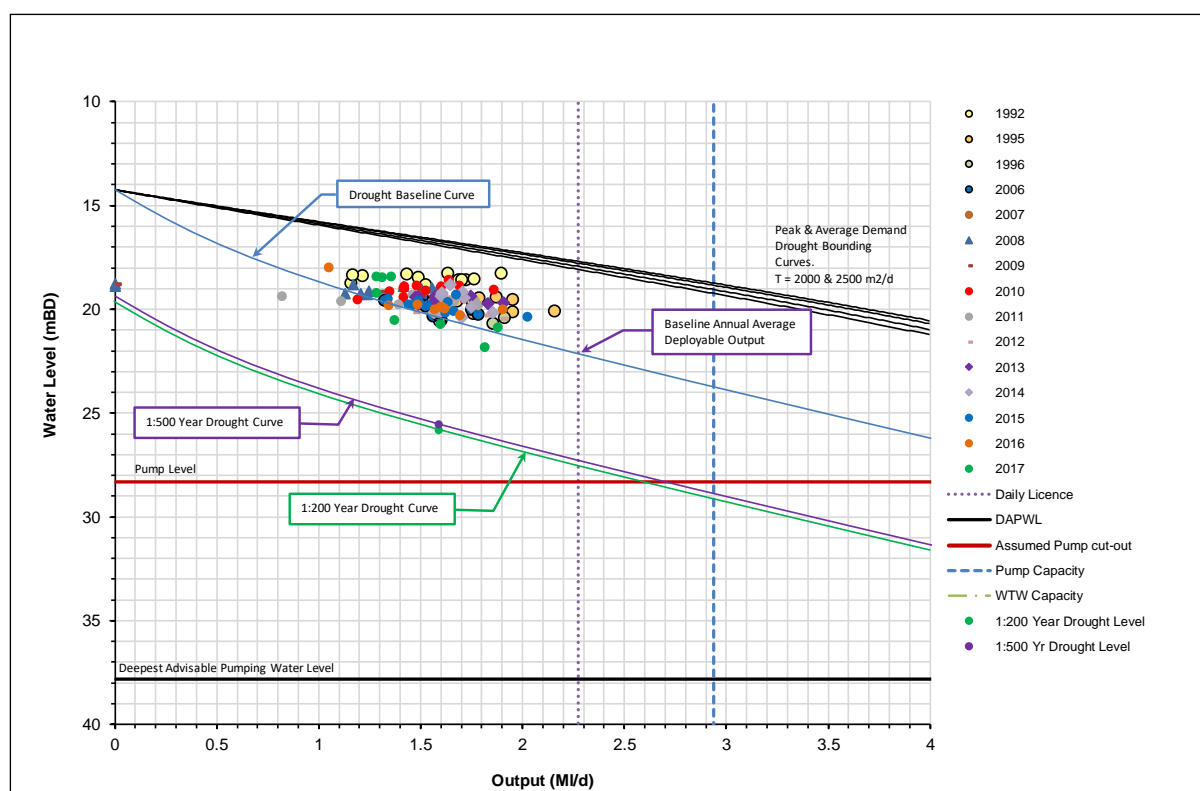
In all cases the hydraulic parameters and artificial influences were identical to those used for the equivalent 1 in 200 year scenarios, while rainfall and potential evapotranspiration (PE) data were derived from work carried out by Atkins (2020) on behalf of Water Resources East (WRE). Rainfall and PE timeseries for 1900-90 were provided for a series of locations across the two models, with each timeseries being assigned to that part of the model falling within the Voronoi polygon constructed from the locations of all the gauges. Output generated from these scenarios comprised groundwater levels and synthesised daily flows.

Further details of the 1 in 500 year groundwater modelling can be found in Wood's technical note (Wood, 2021).

Using Source Reliable Yield Assessment Graphs to Determine Deployable Output for Drought Scenarios

Modelled groundwater heads for all our groundwater sources were determined. For each groundwater source the lowest modelled historical water level experienced between 1970 and 2014 was compared with the lowest modelled 1 in 200 year and 1 in 500 year 24-month drought groundwater level during 1949 and 1950. The difference between these two groundwater level heads was then applied to the drought baseline curve for each groundwater source reliable output graph to determine whether there was likely to be a reduction in DO due to the two drought scenarios.

The following graph presents an example of how the drought baseline curve was adjusted for Blyth Borehole 3 to take into account the modelled change in groundwater level for a 1 in 200 year and 1 in 500 year drought event, to determine whether this would affect the DO of the source.



Results

From the groundwater modelling assessments all Essex and Suffolk groundwater sources were found to be resilient to a 1 in 200 year and a 1 in 500 year drought, with the exception of the South Essex wells.

The deployable outputs determined from the groundwater modelling and source reliable yield assessments are presented in the following table.

Table: Groundwater Deployable Output for Baseline, 1:200-year and 1:500-year droughts

Groundwater Source	PR19 Deployable Output (Ml/d)	1:200-yr Drought Scenario Deployable Output (Ml/d)	1:500-yr Drought Scenario Deployable Output (Ml/d)
Essex			
South Essex Well 1	3.50	3.50	3.45
South Essex Well 2	3.40	1.95	1.95
Colchester Borehole 1	1.93	1.93	1.93
Suffolk Blyth			
Blyth Borehole 1	3.17	3.17	3.17
Blyth Borehole 2	2.21	2.21	2.21
Blyth Borehole 3	2.27	2.27	2.27
Blyth Borehole 4	3.11	3.11	3.11
Blyth Borehole 5	0.29	0.29	0.29
Blyth Borehole 6	0.78	0.78	0.78
Blyth Borehole 7	2.85	2.85	2.85
Suffolk Hartismere			
Hartismere 1	0.548	0.548	0.548
Hartismere 2	0.63	0.63	0.63
Hartismere 3	0.45	0.45	0.45
Hartismere 4	0 (Emergency Use Only)		
Hartismere 5	3.02	3.02	3.02
Hartismere 6	1.25	1.25	1.25
Hartismere 7	2.749	2.749	2.749
Suffolk Northern Central			
Northern Central Borehole 1	7.12	7.12	7.12
Northern Central Borehole 2	3.41	3.41	3.41
Northern Central Borehole 3	2.00	2.00	2.00
Northern Central Borehole 4	2.356	2.356	2.356
Northern Central Borehole 5	0.47	0.47	0.47
Northern Central Borehole 6	1.35	1.35	1.35
Northern Central Borehole 7	1.51	1.51	1.51
Northern Central Borehole 8	0.54	0.54	0.54

1 in 200 year and 1 in 500 year Groundwater Modelling and Proposed Updates for the Revised Draft Drought Plan

The difference between the 1 in 200 year and 1 in 500 year drought scenarios was not significant, with no reduction in deployable output. The only exception was South Essex Well 1, which showed a reduction of 0.05 Ml/d between the 1 in 200 year and 1 in 500 year scenarios.

The same regional groundwater model version and a similar method was followed for the 1 in 200 year and 1 in 500 year drought scenarios. However, some of the model inputs and assumptions were not the same, therefore they are not directly comparable.

We will shortly be undertaking groundwater modelling for our Water Resources Management Plan 2024. This will use new 1 in 200 year drought and 1 in 500 year drought rainfall data from the new Met Office weather generator that has been developed for Water Resources East. The revised assessments will be included in the revised draft of this Drought Plan.

APPENDIX 3:

HOW WE HAVE TESTED OUR DROUGHT TRIGGERS

Overview

The Environment Agency's Drought Plan guidance requires that our Drought Plan be tested against a range of drought scenarios, to assess whether the drought actions and associated triggers ensure that planned levels of service are met.

Before completing this assessment, it is useful to:

- i. Understand the return periods of previous droughts; and
- ii. understand how previous droughts were managed. A summary for the droughts in the 1990s is presented in this Appendix.

The effectiveness of the Drought Plan is then considered against both the worst historic drought on record, and against a drought with a return period of 1 in 500 years.

Drought Plan Return Period Assessment

An assessment of the return period of the worst historic droughts in our record has been undertaken. These include the late-1990s drought for Suffolk and the early-1920s and early-1930s droughts for Essex.

The analysis has been undertaken following a methodology provided by the Environment Agency, based upon papers published by the National Climate Information Centre (Allen, 2012; n.d.) and in the Meteorological Office Scientific Paper No. 37 (Tabony, 1977).

Monthly rainfall totals for a 5 or 6 year period containing the known drought were obtained, and monthly long-term rainfall averages for the 1961-1990 period were calculated, as the 1961-1990 climatology is approximately 5% drier than for the 1981-2010 period (Allen, n.d.). A rainfall deficit for each month in the analysis period was calculated relative to the long-term average, and then summed to obtain a series of cumulative deficits.

Plotting the cumulative deficit series allows a window of analysis to be identified. An example for the late-1990s Suffolk drought is provided in the figure below, in which the plot suggests beginning the dry period analysis in October 1995.

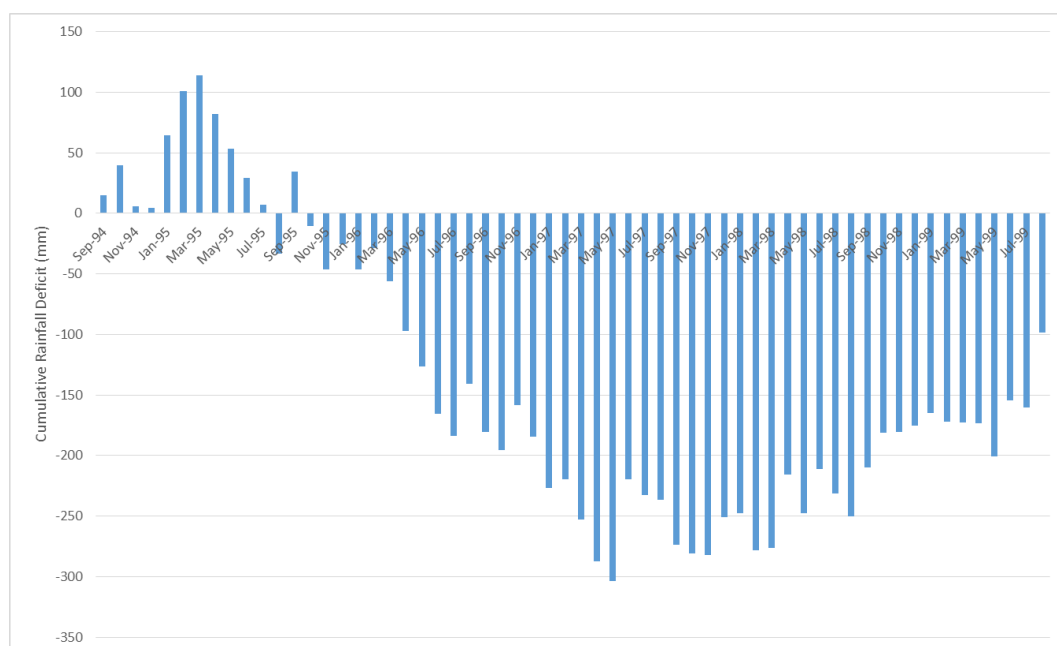


Figure 1: Monthly cumulative rainfall deficits for the late-1990s Suffolk drought

For dry periods lasting one month or more, it is suggested to use Tabony tables for extreme value analysis (Tabony, 1977). The cumulative rainfall and cumulative long-term average rainfall are calculated from October 1995 to the end of the analysis period, and the percentage of the cumulative rainfall in relation to the cumulative long-term average rainfall is calculated for each month. The Tabony table for the Anglian region, which identifies the percentage of long-term average rainfall corresponding to a given return period, was used to estimate a return period for a range of drought durations as illustrated in the table below.

Table 1: Tabony table for the Anglian region (Allen, n.d)

Return periods of dry spells	6 months	12 months	18 months	24 months	36 months	48 months
1 in 5	82	87	89	91	92	93
1 in 10	73	80	84	86	88	90
1 in 20	66	75	79	82	85	87
1 in 50	58	69	74	78	81	84
1 in 100	53	66	71	75	79	81
1 in 200	49	62	68	72	77	80

The return periods quoted in the table are determined from 1961-1990 long-term averages for areal averages of precipitation within the Anglian region, and the return periods are for rainfall of n-months duration starting in any month (Bader and Folland, 1977). Comprehensive uncertainties have not been determined for the return period estimates, but they will be high for the multi-century return periods, which should be viewed as indicative only. Therefore, the return periods are disaggregated into broad categories, and the tables do not specify return periods beyond 200 years (Allen, n.d.).

The results of this analysis are outlined below.

Suffolk: 1995-97 Drought

This drought is characterised by two dry winters, as illustrated in the rainfall deficit graph below.

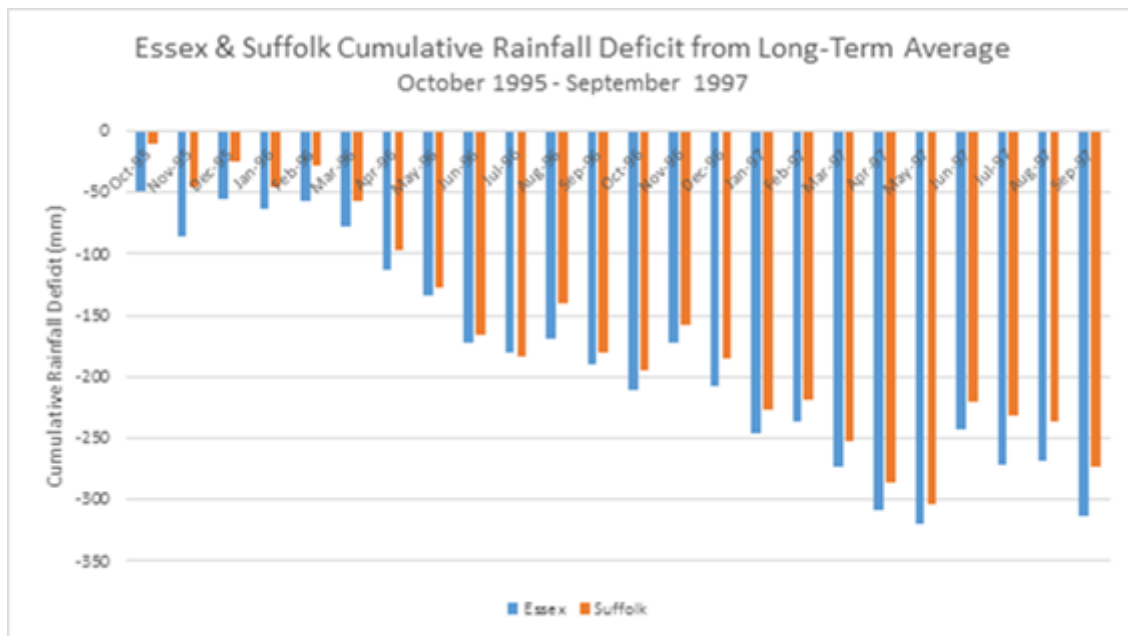


Figure 2: Monthly cumulative rainfall deficits for the late-1990s drought

Indicative return periods for durations of dry weather starting in October 1995 are summarised in the table below.

Table 2: Indicative return periods for durations of dry weather starting in October 1995

Duration	Return Period (years)
6 months	15
12 months	175
18 months	>200
24 months	165
36 months	15

Essex: Early-1920s drought

This drought is characterised by two dry winters, as illustrated in the rainfall deficit graph below.

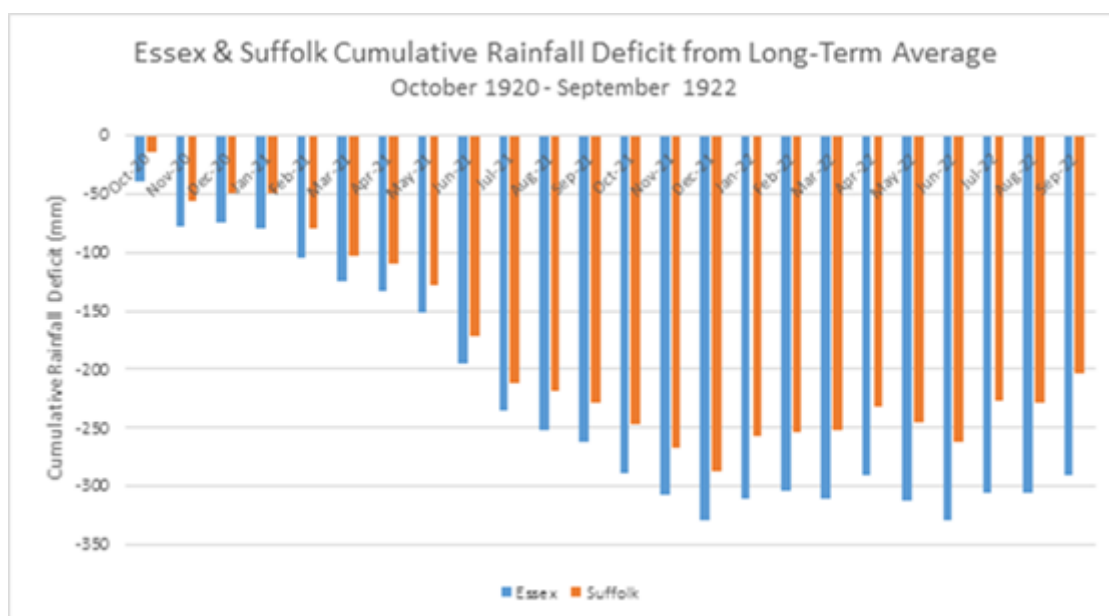


Figure 3: Monthly cumulative rainfall deficits for the early 1920s drought

Indicative return periods for durations of dry weather starting in October 1920 are summarised in the table below.

Table 3: Indicative return periods for durations of dry weather starting in October 1920

Duration	Return Period (years)
6 months	40
12 months	>200
18 months	>200
24 months	85
36 months	200

Essex: Early-1930s drought

This drought is characterised by two dry winters, as illustrated in the rainfall deficit graph below.

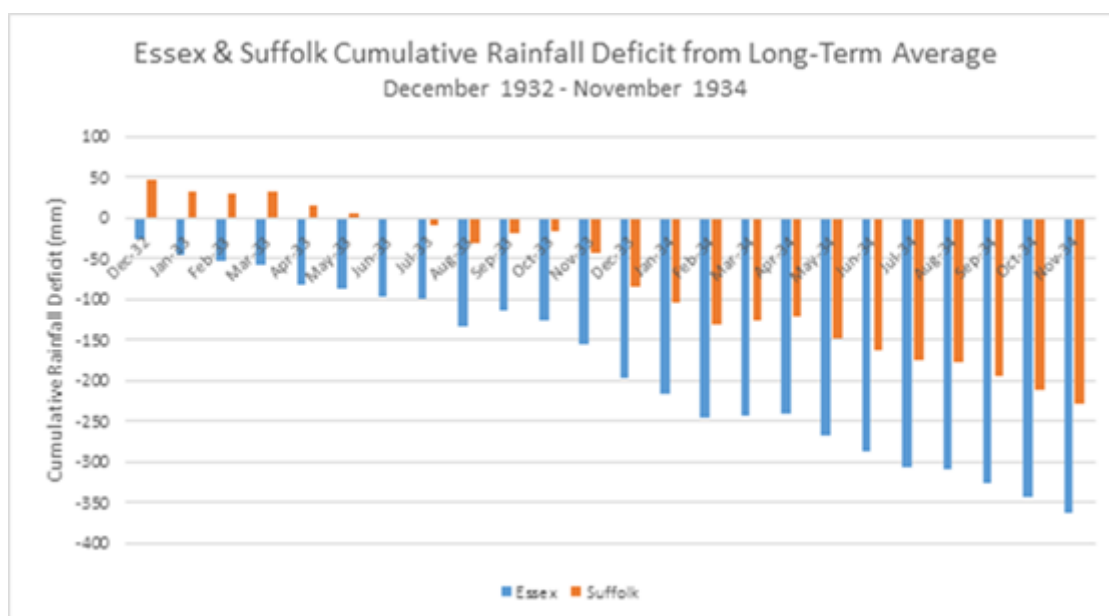


Figure 4: Monthly cumulative rainfall deficits for the early 1930s drought

Indicative return periods for durations of dry weather starting in December 1932 are summarised in the table below.

Table 4: Indicative return periods for durations of dry weather starting in December 1932

Duration	Return Period (years)
6 months	40
12 months	50
18 months	>200
24 months	>200
36 months	50

It can be concluded that the critical historical droughts affecting the Essex & Suffolk supply areas all have a return period greater than 1 in 200 years.

We were not required to apply for drought permits during the 1990s droughts, and modelling of a hypothetical 1 in 200-year return period drought on the current system for WRMP19 concluded that there is still a supply surplus during 1 in 200-year return period drought conditions. Therefore, the likelihood of needing to apply for a drought permit for any of the supply actions identified in this Drought Plan is very low.

Summary of Previous Droughts and Drought Measures

Background

The most recent periods of significant drought to have affected the Essex and Suffolk supply areas were during the 1990s. During these droughts in 1990-92 and 1995-97, we gained extensive experience of drought management. In the later drought, we implemented drought measures, including a hosepipe ban (now known as a Temporary Use Ban), in both supply areas.

A summary of how previous drought measures were implemented in recent droughts affecting Essex and Suffolk is presented below.

Essex

Hosepipe bans imposed in Essex during the 1990s occurred in the period from 29 July 1990 to 13 October 1992 inclusive, and 13 June 1997 to 3 April 1998 inclusive.

The 1990-92 drought was characterised by a prolonged period of below average rainfall that led to a lowering of groundwater levels throughout the southeast and parts of East Anglia, thereby impacting on baseflows to rivers. By contrast the 1995-97 drought was more directly impacted by the lack of rainfall, in terms of the absence of runoff to support the rivers on clay catchments.

The 1995-97 drought is worthy of further note in terms of the conditions that affected us and the actions we took to address supply concerns. Rainfall during 1995-97 in Essex was significantly lower than the long term average. Figure 5 displays monthly rainfall for 1995 to 1997, against the long term average for Hanningfield rain gauge.

A lack of winter rain, particularly in 1995 and 1996 resulted in incomplete reservoir refill. This is illustrated in the reservoir storage profile for Hanningfield Reservoir indicated also in Figure 5. It was this cumulative effect which made 1997 a particularly severe drought in East Anglia and necessitated the convening of our Drought Management Group (DMG), and the eventual imposition of drought restrictions.

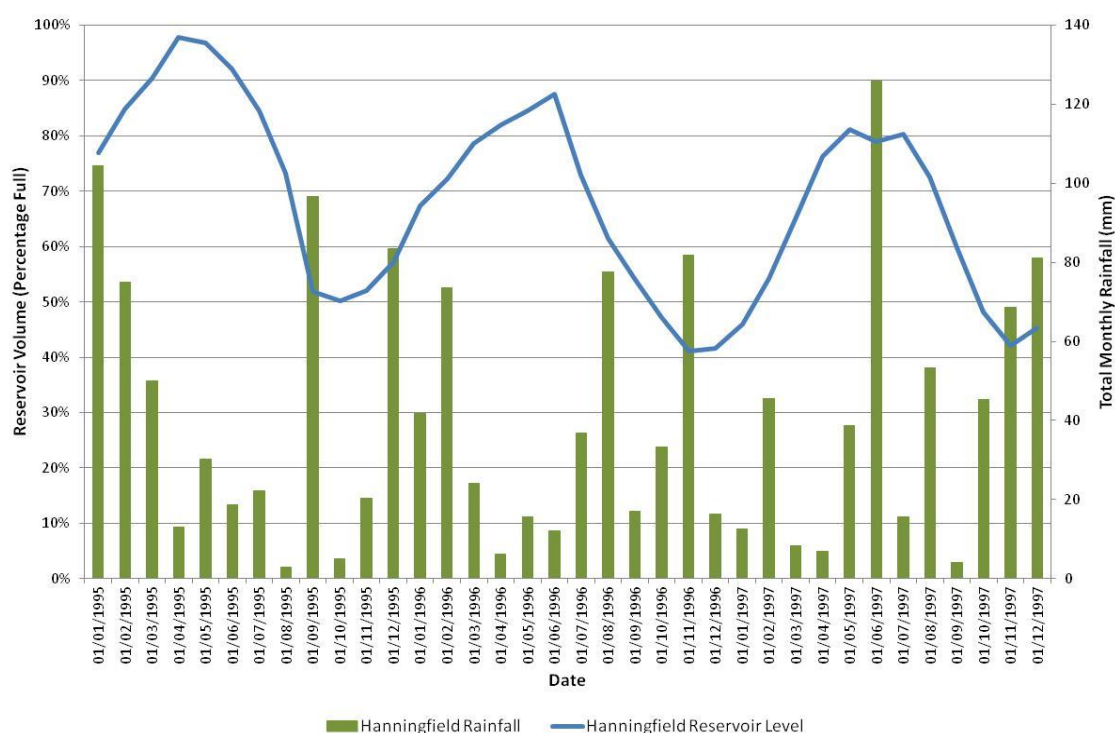


Figure 5: Hanningfield Rainfall and Reservoir Levels

Drought actions were first implemented in 1997 and were included in our Drought Contingency Plan released in March of that year. The DMG considered a wide variety of options, some of which were rejected for a variety of reasons, mainly related to timing

and feasibility. Drought actions that were implemented in Essex in 1997/98 included the following:

- Public relations campaigns (including press releases & radio advertising, fact sheets for opinion formers, posters & stickers, talks to local groups);
- Water efficiency initiatives (water conservation leaflets/newspapers etc);
- Hosepipe bans;
- Commissioning of abandoned sources (e.g. well in south Essex);
- Pumping capacity upgrades;
- Temporary effluent Recycling Scheme near Maldon; and
- Improving abstraction potential at Abberton reservoir via dredging.

A press conference took place on 11 June 1997 to announce the current water resource situation and the hosepipe ban. A press release was circulated beforehand to invite local press. A company-wide hosepipe ban was introduced with effect from midnight on 12 June 1997. It remained in force until we were reassured that there was no need for restrictions during the summer of 1998. The hosepipe ban ended in Essex on 3 April 1998, following a significant improvement in the water resources situation.

We successfully operated a temporary recycling scheme between July 1997 and December 1998. The scheme involved abstracting up to 23 Ml/d of wastewater from the Chelmsford Sewage Treatment Works pipeline and disinfecting with ultraviolet light, prior to mixing with water abstracted from the rivers Chelmer and Blackwater. The water was then pumped into Hanningfield Reservoir. The scheme was applied for through normal discharge consent procedures as opposed to a drought order. A permanent Effluent Recycling Scheme was commissioned in 2002/03.

Suffolk

The only hosepipe ban imposed in Suffolk during the 1990s occurred in the period from 13 June 1997 to 14 May 1998 inclusive.

Although the lowering of groundwater levels during the 1995-97 drought had the potential to impact on public water supplies sourced from groundwater in the Suffolk Hartismere and Blyth water resources zones, this was not the reason that restrictions were required. In reality, borehole yields held up extremely well with the exception of one Chalk source (Hartismere Borehole 6). It was the unprecedented high demand fuelled by a long hot summer, that meant that a hosepipe ban was necessary.

Drought actions that were implemented in Suffolk in 1997/98 included the following:

- Public relations campaigns and water efficiency initiatives (as for Essex);
- Hosepipe bans;
- Hartismere Borehole 4 environmental drought order;
- Development of a new groundwater source and treatment works (Hartismere Borehole 1);
- Hartismere Borehole 3 licence variation (increase in daily licence); and
- Road tankering.

A drought order to permit increased abstraction from Hartismere Borehole 4 to supply Redgrave and Lopham Fen with 8 l/s of water was implemented during the summer. This action safeguarded the breeding conditions required by the Great Raft Spider, and

freed resources enabling the company to use the full licensed quantity for public supply. Hartismere Borehole 4 was later closed and its replacement, Hartismere Borehole 5 was commissioned on 7th July 1999.

A successful tankering operation was implemented in Suffolk during 1997. Water was transported from a treated water reservoir near Lowestoft to discharge facilities in the Hartismere Water Resource Zone.

With an improving water resources situation in early 1998, hosepipe restrictions were finally lifted on 14 May 1998.

Effectiveness of Drought Plan

Approach

The 'dry year' is the fundamental basis of the supply and demand forecasts used in our Water Resources Management Plan. All of our demand forecasts are constrained in the sense that assumptions regarding demand-reducing measures such as metering, leakage control and water efficiency are included. We consider this to be a prudent decision since there is an overwhelming need to incorporate demand management at the heart of our water resource planning strategy. Demand management is seen as an ongoing essential option, regardless of whether a drought is occurring or not.

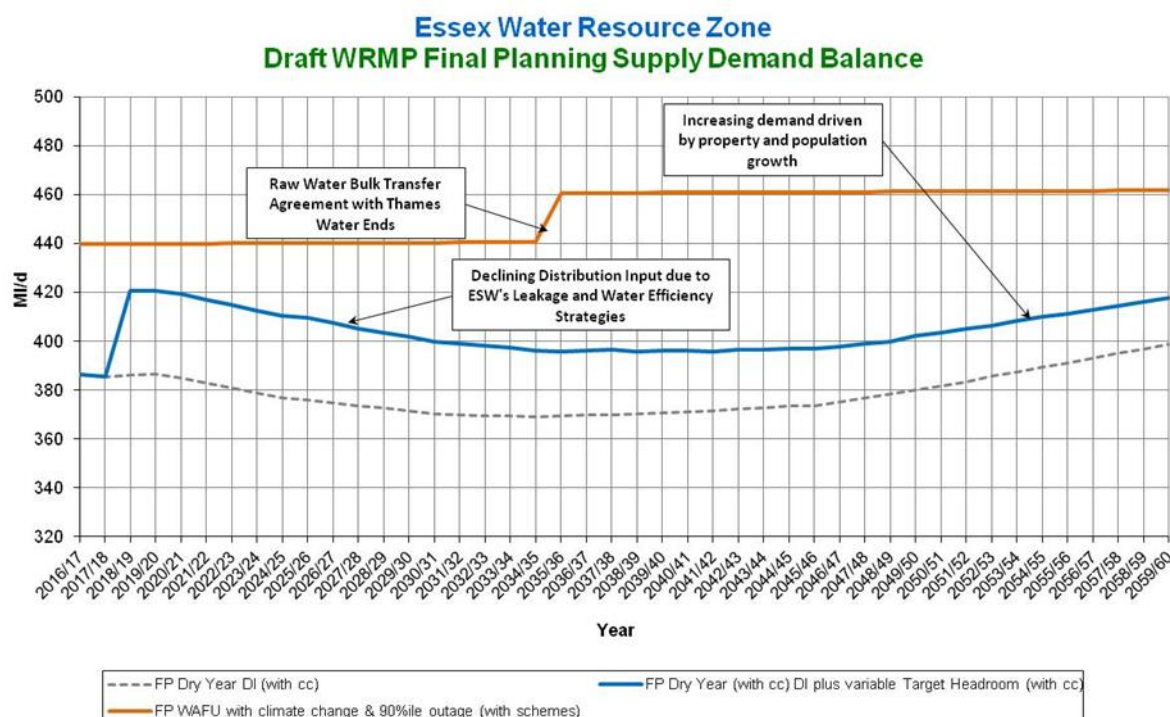
Operational experience has indicated that critical period scenarios such as those based on average day peak week (ADPW) are not appropriate for the Essex and Suffolk Water Resource Zones, as none of the zones are significantly peak constrained from a water resources perspective. In the case of the Essex zone, demand peaks can usually be absorbed due to the integrated nature of the supply network and the storage provided by the two large, pumped storage reservoirs. Similarly, in the Suffolk Northern / Central zone, the flexibility over utilisation of the three main surface water works near Lound, Barsham and Ormesby provide a buffer to impacts from peak demands. The groundwater-fed zones of Hartismere, and to a lesser extent Blyth, previously had peak/critical period concerns last observed in the 1995 to 1997 drought. These have now been addressed through investment in both zones in terms of intra-zone reinforcement and integration, and the development of new sources to support Hartismere. Hence no ADPW or similar peak scenarios are appropriate.

Essex Water Resource Zone

Worst Historic Drought on Record

The WRMP19 Essex DO can be used to demonstrate that drought triggers ensure that our Planned Levels of Service are met. The PR19 Essex System Aquator model was used to determine the rate of supply that can be maintained from the resource zone when the system is operated to meet our levels of service. The DO resulting from this scenario is defined at the point at which either water resources run out (i.e. resource constrained) or abstraction licensed quantities are used up (licence constrained). The DO for the Essex System is defined by the 1920-22 drought. The DO value is then used to determine Water Available For Use (WAFU)

WAFU (MI/d) is greater than Distribution Input (Customer demand plus an allowance for network leakage) plus Target Headroom (an allowance for uncertainty) across the current statutory minimum 25 year planning period, and the 40 year planning period that we considered in our WRMP19. This is illustrated in the supply demand balance graph below. Consequently, for this scenario, it can be concluded that the Drought Plan ensures levels of service are met.



1 in 200-year and 1 in 500-year Return Period Droughts

The resilience of the Essex System to a 1 in 200-year return period drought was assessed for our WRMP19. The Scottish Method DO Analyser in Aquator was used for this assessment. For a drought with a 0.5% Annual Exceedance Probability (i.e. a 200-year return period drought), the result was a DO of 391 MI/d, 1 MI/d higher than our baseline DO, thus maintaining a significant supply surplus across the 25- and 40-year planning periods.

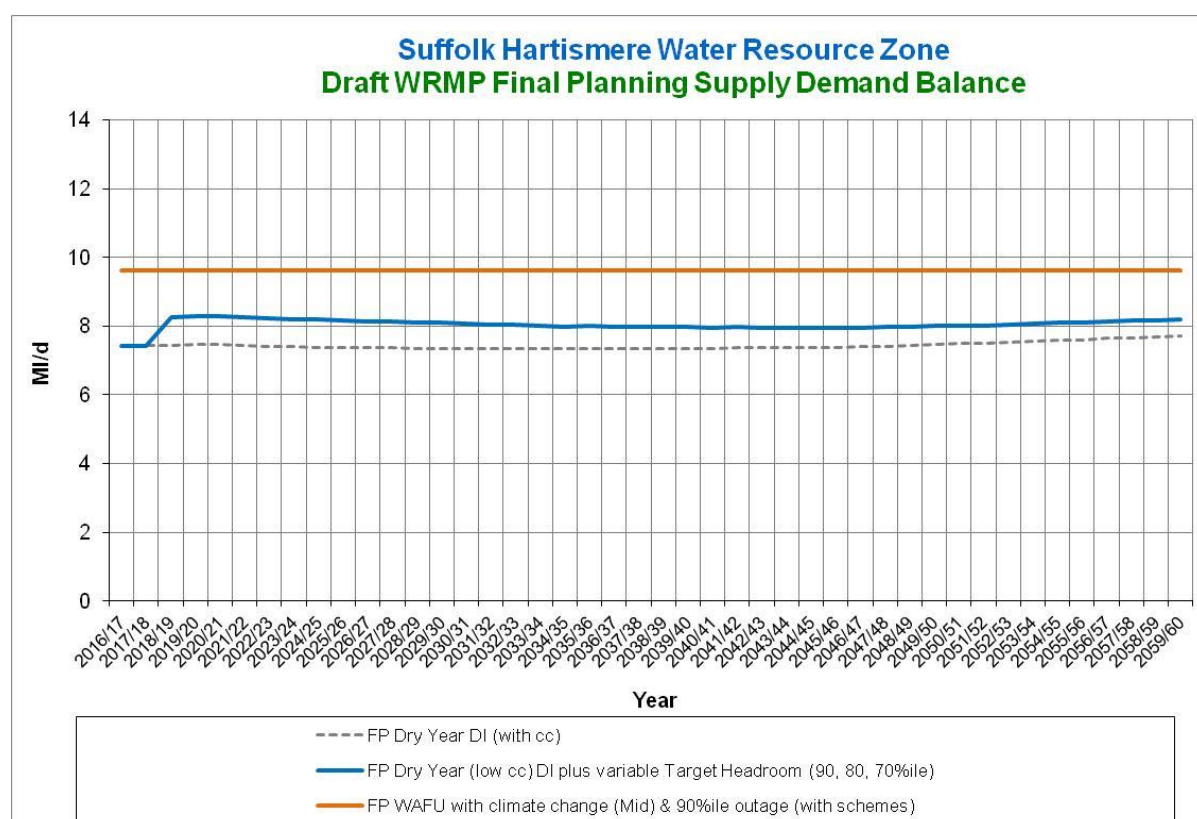
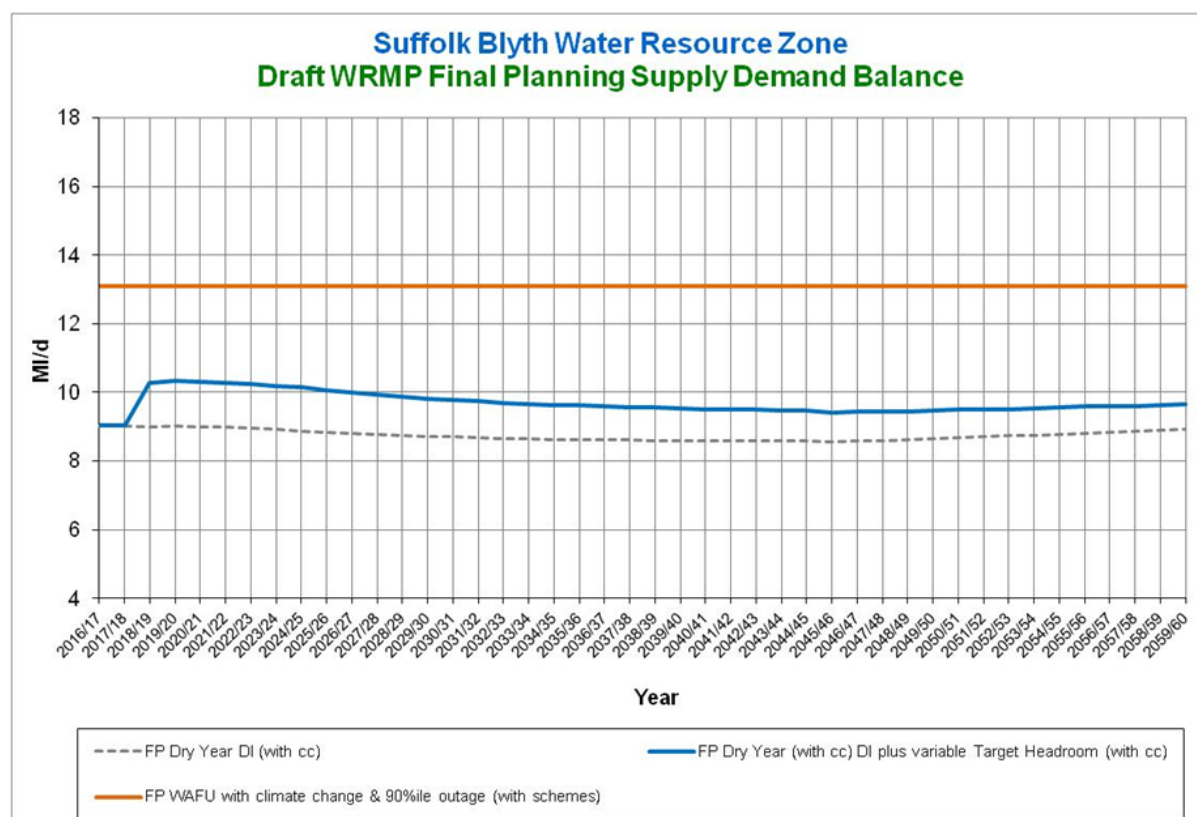
Our assessment of the resilience of the Essex System to a 1 in 500-year return period drought is outlined in Appendix 1.

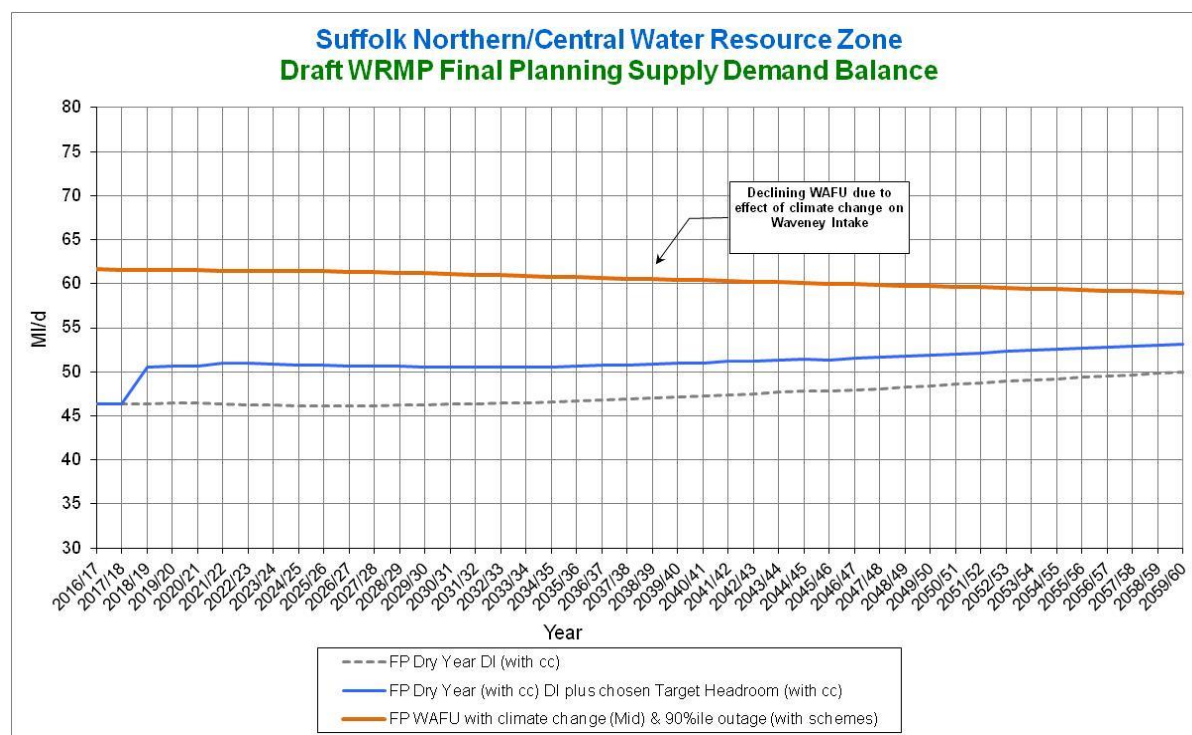
Suffolk Water Resource Zones

Worst Historic Drought on Record

The WRMP19 DO and WAFU assessments can also be used for the Suffolk Water Resource Zones (Blyth, Hartismere and Northern Central) to demonstrate that the Drought Plan ensures that our Planned Levels of Service are met. The design drought year for Suffolk is the 1995-97 drought, which was described earlier in this Appendix as having a return period of greater than 1 in 200 years.

Supply Demand Balance graphs for each of the Suffolk Water Resource Zones are illustrated below.





The supply demand balance graphs show that WAFU (MI/d) is greater than Distribution Input (Customer demand plus an allowance for network leakage) plus Target Headroom (an allowance for uncertainty) across the 25 and 40 year planning periods that we considered in our WRMP19. Consequently, for this scenario, it can also be concluded that the Drought Plan ensures levels of service are met.

1 in 200-year and 1 in 500-year Return Period Droughts

We tested the resilience of our groundwater sources to a synthetic 1 in 200-year return period drought as part of our WRMP19. Amec Foster Wheeler (AFW) was employed to carry out groundwater modelling using the Northern East Anglian Chalk (NEAC) and Essex regional groundwater models.

Modelled groundwater heads for all our groundwater sources were determined. For each groundwater source the lowest modelled historical water level experienced between 1970 and 2014 was compared with the lowest modelled 1 in 200-year return period drought groundwater level during 1949 and 1950. The difference between these two groundwater level heads was then applied to the drought baseline curve for each groundwater source reliable output graph to determine whether there was likely to be a reduction in DO due to a 1 in 200-year return period drought.

From the groundwater modelling assessment, all Suffolk sources were found to be resilient to a 1 in 200-year return period drought, with no decline in DO. Consequently, the supply surplus illustrated in each of the Suffolk Water Resource Zone supply demand balance graphs illustrated above remain. This means that drought permits or drought orders could only be justified by an exceptional shortage of rainfall caused by a drought with a return period greater than 1 in 200 years.

Our assessment of the resilience of our groundwater sources to a 1 in 500-year return period drought is outlined in Appendix 2.

EXPERIENCE OF 2018, 2019 AND 2020

2018

Based upon analysis of cumulative rainfall and the number of days where temperature exceeded 25°C, 2018 was classified as a Dry year in both Essex and Suffolk. Average Distribution Input (DI) was 25MI/d higher than the 2018/19 DI forecasted in WRMP14. Hanningfield reservoir storage was below average from June 2018, reflecting the dry summer and elevated customer demand. Abberton reservoir remained close to the post-enlargement average storage for most of the summer. Given our combined Essex reservoir storage, we did not need to introduce any formal customer restrictions on the use of water although we did escalate our dry weather messaging.

The average available headroom for 2018/19 based upon outturn data was 23.54MI/d in Essex and 22.27MI/d in Suffolk. We did not impose any customer restrictions on the use of water.

The Drought Vulnerability Framework assessment for the Essex System (Appendix 1) was modelling using actual DI from 2018/19, as it was our most recent classified Dry year to test our system with.

2019

Based upon analysis of cumulative rainfall and the number of days where temperature exceeded 25°C, 2019 verged on being a Dry year in Essex, and was classified as a Normal year in Suffolk. Average distribution input was 4MI/d lower than 2018/19.

Combined reservoir storage started the summer slightly below average reflecting the conditions of the previous dry year. Due to a notably warm, dry summer in 2019, combined reservoir storage remained below average throughout the summer although we did not need to introduce any formal restrictions on use but we did enhance our dry weather messaging. River flows were low, with the River Stour measuring the second lowest river levels since the 1976 drought, and demands were higher than in 2018 at some points of the summer. Both reservoirs recovered to over 90% storage by the end of March 2020.

The average available headroom for 2019/20 based upon outturn data was 16.56MI/d in Essex and 25.11MI/d in Suffolk. We did not impose any customer restrictions on the use of water during 2019/20, and so our planned Levels of Service continued to be met.

2020

The rainfall in Essex was classed as Normal for the summer and for 2020 as a whole, with Exceptionally High rainfall in October. The summer had some contrasting periods with two heat waves, notably in May and August. Rainfall in Suffolk was also classed as Normal over the summer and for 2020 as a whole. Ormesby Broad level remained

within the target level band during the summer. Fritton Lake level was below average throughout the summer but remained well above minimum levels. Flows in the River Waveney were exceptionally low in June and July 2020, resulting in support from the Waveney Augmentation Groundwater Scheme in August, to ensure that we met the demand placed up our water treatment works. River Bure flows were below normal for most of the summer, but we were able to meet our abstraction requirements.

Hanningfield reservoir started summer 2020 full. It is the smaller of our two reservoirs and so we managed its storage so that it remained at or above average levels during the summer. It successfully refilled by the start of March 2021. Abberton reservoir storage is now 60% larger than Hanningfield reservoir and so we were able to draw more on its larger storage during the summer. Consequently, its storage reduced to 53% in November 2020 reflecting the exceptionally high customer demand. Abberton storage is now on track to achieve refill by the end of May 2021.

Given our combined Essex reservoir storage, we did not need to introduce any formal customer restrictions on the use of water although we did escalate our dry weather messaging.

The Covid-19 pandemic had a significant impact on customer demand during 2020 which also coincided with two heat waves in May and August. These coincident events resulted in unprecedented demands (25-30% above average on some days) in parts of our supply areas. The factors that influenced demand are described below:

- **Hand washing and home hygiene:** A key Covid-19 measure is enhanced hand washing and home hygiene which in itself, resulted in an increased demand for water.
- **Home working:** Home working had a significant effect on our Essex demand where large numbers of Essex residents normally work in London. This means their working hours water use has been transferred out of Thames Water's area back into our Essex supply area.
- **Garden Water Use:** With so many people at home and some being furloughed, people took the opportunity to spend more time in the garden and to both pressure wash their drives and patios, and to grow more flowers and vegetables.
- **Weather:** The summer was characterised by two heatwaves in May and August. With so many people staying local and postponing holidays, we believe garden water use was much higher than would have normally been the case with increased use of kids "slip and slides", which require a continuous garden hose supply of water, and paddling pools. Some of the latter require a significant amount of water to fill which in most cases may be single use given how dirty the water quickly gets.

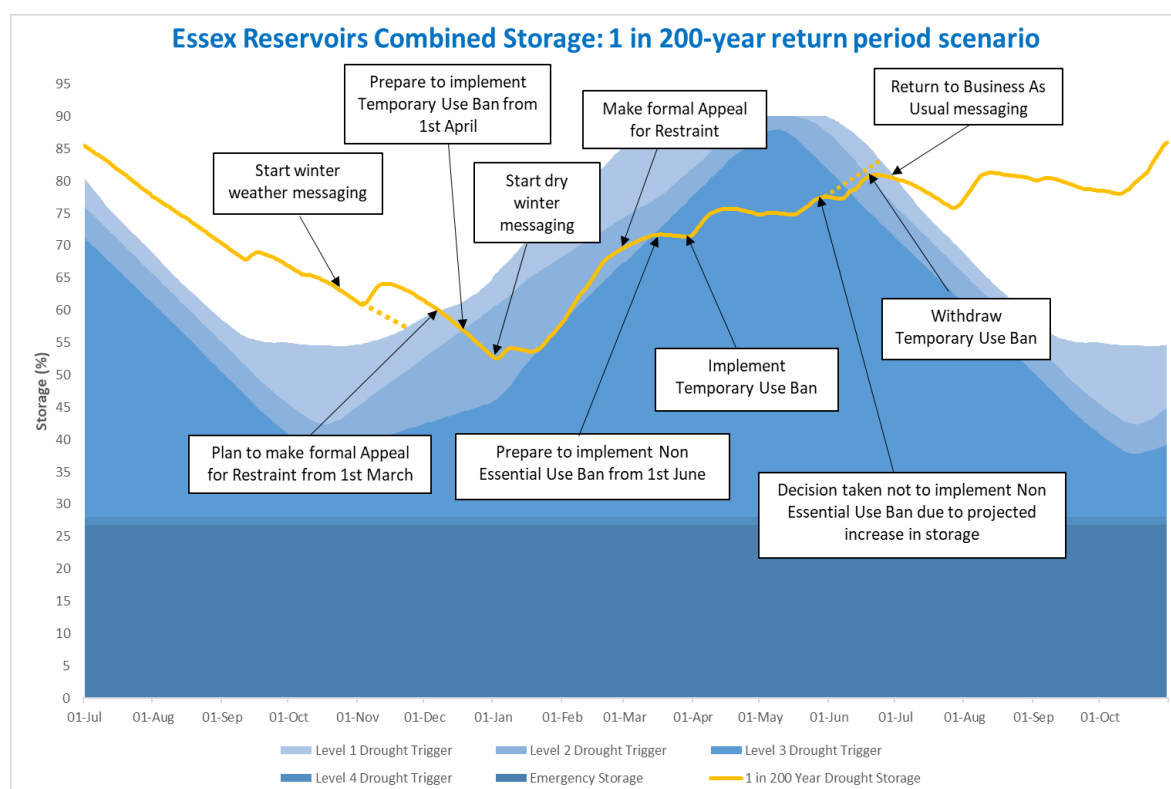
While demand was elevated in our supply areas, sometimes at record levels, we maintained supply to all of our customers.

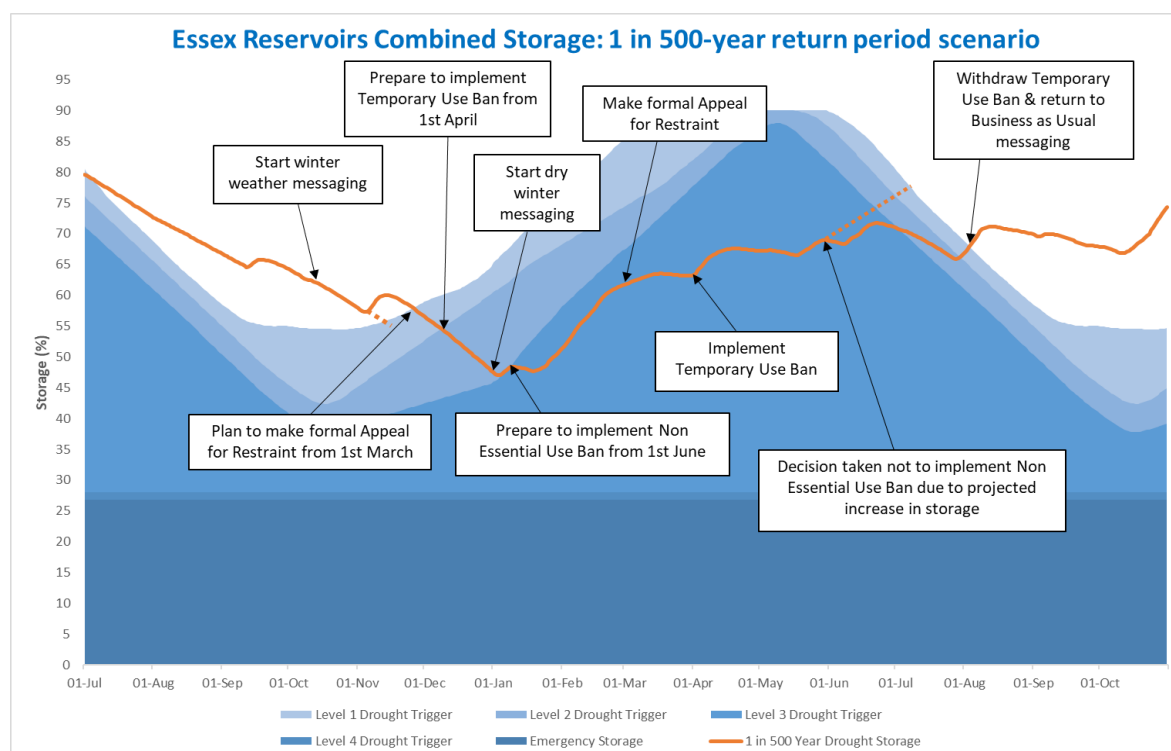
WORKED EXAMPLES

Essex WRZ

Drought triggers for our Essex WRZ are defined by the performance of the Essex System, based upon our combined Essex reservoir storage in relation to Level of Service control curves.

The following worked examples use reservoir storage modelled in our Essex System Aquator model for the Drought Vulnerability Framework analysis (see Appendix 1). The examples use a 1 in 200-year return period and a 1 in 500-year return period scenario, for a 24-month duration December-ending drought. The reservoir storage is based upon a demand on the system of 2018/19 DI plus Target Headroom allowance. The reservoir storage is plotted alongside our Level of Service curves, which are used in our WRMP deployable output modelling.





The graphs are annotated with the points at which we would implement our drought actions during the droughts. During the first autumn, with reservoir storage declining, we would forecast the continuation of decline to estimate when the storage is likely to reach the Level 1 trigger curve. We would decide to start winter weather messaging around a month before this point.

When the storage does cross the Level 1 curve, we would plan to make a formal Appeal for Restraint from 1st March, if the reservoir storage is still below the Level 1 curve at that point. When the storage crosses the Level 2 curve, we would prepare to implement a Temporary Use Ban (TUB) from 1st April, if the reservoir storage is still below the Level 2 curve at that point. The Environment Agency's Drought Permits and Drought Orders Guidance states that TUBs would not be expected to be implemented outside of 1st April to 1st October, when the demand saving is estimated to be minimal even if a measure is adopted. With our drought drawdown occurring in the winter months, we would therefore plan to implement drought restrictions in the spring, rather than implementing in the winter to little benefit.

In January, with the reservoir level still declining, we would decide to start communications about the dry winter we are experiencing. By 1st March, the storage is below the Level 2 curve in the 1 in 200-year scenario and below the Level 3 curve in the 1 in 500-year scenario, therefore we make a formal Appeal for Restraint. When the storage crosses the Level 3 curve, we prepare to implement a Non-Essential Use Ban from 1st June, if the storage is still below the Level 3 curve at that point. By 1st April the storage is below the Level 3 curve in both scenarios, therefore we implement a Temporary Use Ban. By 1st June the storage is still below the Level 3 curve, however we forecast that the storage will recover to 80% within 4-6 weeks. We therefore decide not to implement a Non-Essential Use Ban. As the storage recovers, we withdraw the Temporary Use Ban and revert to Business as Usual messaging.

The graph shows that Level 4 drought actions are not needed for either the 1 in 200 or 1 in 500-year return period scenario, based upon a demand of Dry Year DI plus Target Headroom.

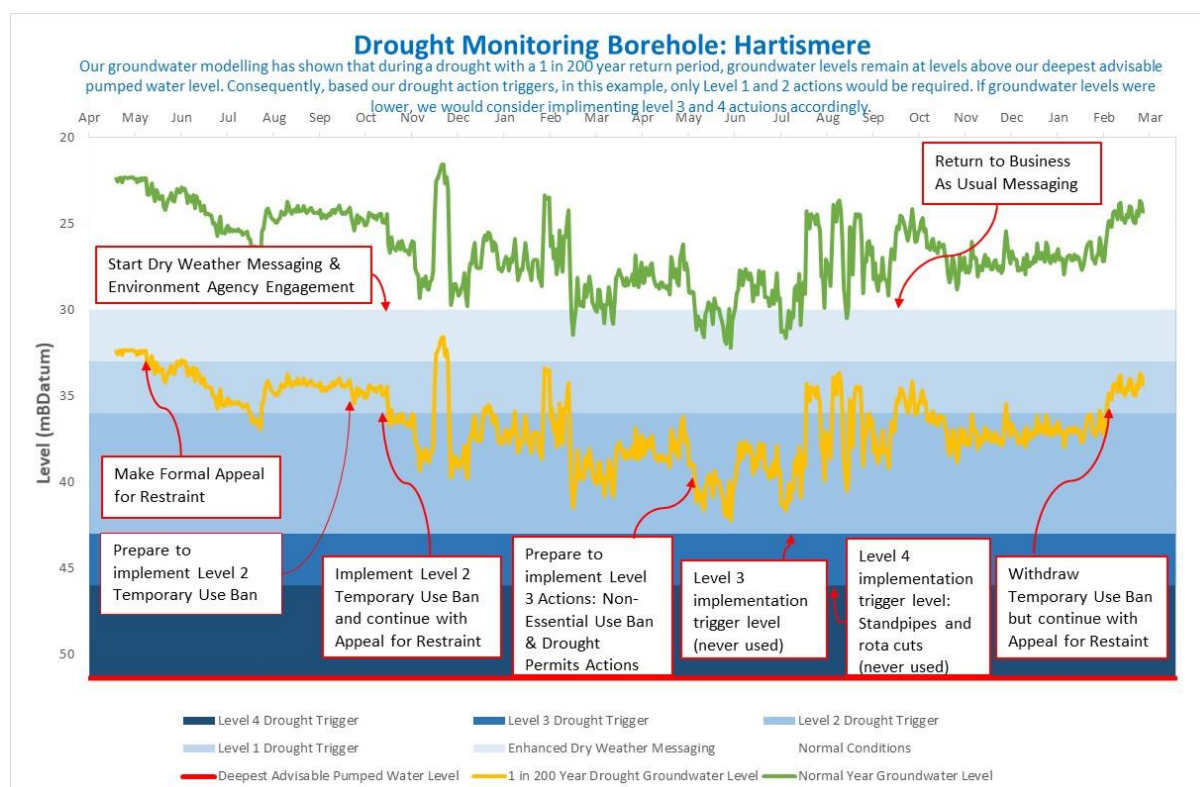
Groundwater Triggers

The drought triggers for the Suffolk groundwater sources have been defined based on our experience from the 1995/1996 drought. This drought was equivalent to at least a 1 in 200 year drought.

The following worked examples use recent actual data as the 'normal year groundwater level'. This dataset is then adjusted so that the lowest groundwater level recorded matches the lowest groundwater level recorded in drought years 1995/1996. This is to provide a representative daily dataset as the groundwater level was only recorded weekly in 1995/1996. Given the recent 1 in 500 year modelling that was undertaken for this draft Drought Plan does not result in any significant additional drawdown and none of the Suffolk groundwater source deployable outputs were impacted, we have now included a worked example for a 1 in 500 year drought.

Groundwater – Suffolk Hartismere 2 Chalk Borehole

Average daily 2018-2020 groundwater level data from the two operational boreholes was used as the 'normal year groundwater level'. The below graph shows the representative 1 in 200 year drought groundwater level, using the lowest 1995/1996 recorded level at Hartismere 2 as the minimum 1 in 200 year drought level.



The above trigger levels would be used in combination with the source reliable yield assessment graphs, groundwater levels in the Environment Agency's observation borehole and the DMG, to determine when to commence the drought action trigger levels.

Enhanced dry weather messages would commence when there has been limited recharge over the Autumn/Winter seasons and there is a declining trend in groundwater level to below average level.

Level 1 Appeal for Restraint and Level 2 Temporary Use Ban will be triggered according to limited recharge over Autumn/Winter and when the groundwater level is below average and declining. Engagement with the Environment Agency would commence when the groundwater level is below average and declining.

The mid-1990s drought was equivalent to at least a 1 in 200 year drought. During this drought the implementation of the Temporary Use Ban (previously named hosepipe ban) worked well and we were never in any danger of running out of water.

We have never implemented a Level 3 (non-essential use ban) or Level 4 (standpipe and rota cuts) drought actions. Therefore, we do not expect these to be required for a 1 in 200 year or 1 in 500 year drought. ESW boreholes have been resilient to previous droughts and only the Essex South Wells showed a reduction in deployable output from the regional groundwater drought modelling. The groundwater modelling determined that all Suffolk boreholes were resilient to the 1 in 200 year and 1 in 500 year drought scenarios.

Annual Licensed Quantity Utilisation Drought Trigger – Worked Example

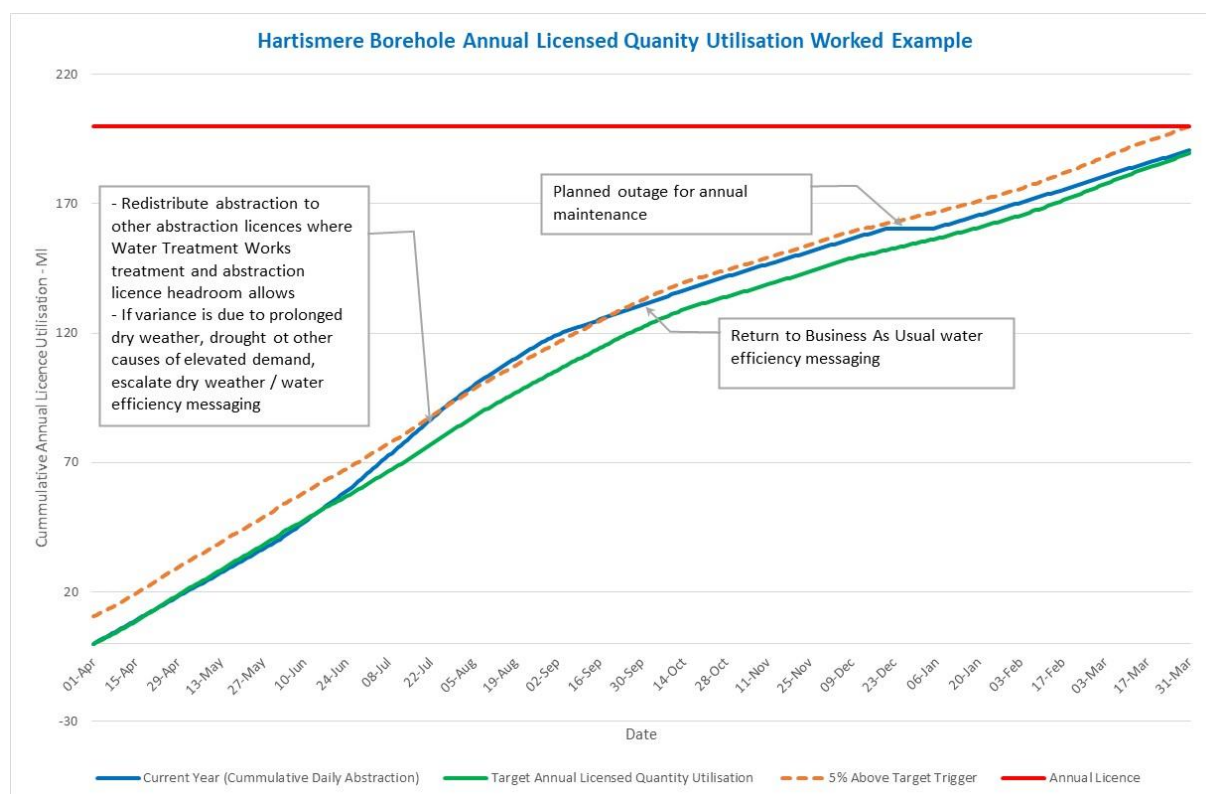
In our draft Drought Plan, we proposed to use a trigger for when utilisation of our groundwater sources is 15% over target. We have since reviewed this and consider a 5% variance to be more appropriate. This metric triggers operational changes and dry weather / water efficiency messaging to bring cumulative utilisation of the abstraction licence annual licensed quantity back to target levels.

Flexibility in abstraction is required within a Water Resource Zone. For example, a planned outage to allow planned maintenance at one Water Treatment Works will temporarily require increased abstraction at another. This can then be rebalance once the maintenance has been completed. However, the proposal to use a trigger for when utilisation of a borehole source is 5% over target is specifically in relation to prolonged dry weather and drought. We recognize the importance of reducing customer demand prior to considering supply side actions. Therefore, the actions associated with this trigger are to:

- redistribute abstraction to other abstraction licences where Water Treatment Works treatment and abstraction licence headroom allows; and
- if variance is due to prolonged elevated demand, escalate dry weather / water efficiency messaging.

We do not intend to use this metric on its own to trigger Level 1 (Appeal for restraint), Level 2 (Temporary Use Ban – TUB) and Level 3 Non-essential use bans drought actions.

The worked example below shows where actual cumulative abstraction (solid blue line) exceeds the target abstraction plus 5% (red dashed line) and where operational changes and dry weather / water efficiency messaging would be implemented.



APPENDIX 4:

DETAILED ENVIRONMENTAL ASSESSMENTS

Available on request:

waterresources@nwl.co.uk

APPENDIX 5: SUMMARY DROUGHT OPTIONS FORMS

Demand Side Drought Actions

Demand Side Drought Action Name	Level 1 Appeal for Restraint
Trigger(s) Or preceding actions	Level 1 drought trigger as per worked examples (See Appendix 3) Would follow enhanced dry weather messaging
Demand Saving or DO of Option (Mld) ⁽¹⁾	~0 to 7% annual average ~0 to 14% peak
Location	By Water Resource Zone
Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: - 1 week to implement campaign Most effective during hot weather (late Spring and summer)
Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None required – at water company discretion. Liaison with WRE, neighbouring water companies and EA
Risks associated with option	Customers already sufficiently water-wise resulting in lower saving.

Demand Side Drought Action Name	Level 2 Temporary Use Ban
Trigger(s) Or preceding actions	Level 2 drought trigger as per worked examples (See Appendix 3)
Demand Saving or DO of Option (Mld)	~0 to 5% annual average ~0 to 10% peak
Location	By Demand Management Area (Essex and / or Suffolk)
Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: - 2 weeks to place adverts in newspaper and plan media communication; followed by 3 weeks for representation after publishing on ESW's website
Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None but liaison with WRE, neighbouring water companies, EA, CCW and Defra would take place.
Risks associated with option	Customers already sufficiently water-wise resulting in lower saving.

Demand Side Drought Action Name	Level 3 Non-Essential Use Ban Drought Order
Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3)
Demand Saving or DO of Option (Mld)	~0 to 2% annual average ~0 to 4% peak
Location	By Water Resource Zone
Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: 2 months to finalise drought order application and determination, communication with public, time to place adverts in newspaper and send prohibition notices. Maximum duration 3 months before extension required.
Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Emergency Drought Order Secretary of State Liaison with EA, CCW and Defra required.
Risks associated with option	Negative impact on affected businesses.

Supply Side Drought Actions

Supply Side Drought Action Name		Increased Bulk Transfers from Thames Water Utilities (By Agreement)
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Infrequent (not likely to occur within several decades)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3)
	Demand Saving or DO of Option (Mld)	Peak: Up to 27 Ml/d dependent on TWU position and availability.
	Location	Essex Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: 1 week.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Agreement with Thames Water required. Constraints include system constraints and WTW capacity at Chigwell WTW.
	Risks associated with option	Additional quantities not guaranteed to be available and may be highly variable
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	We have not completed our own environmental assessment for this action, as water will be provided within the bounds of the agreement with Thames Water Utilities.
	Level of confidence (H, M, L)	N/A
	Summary of likely environmental impacts	N/A
	Summary of baseline information used	N/A
	Summary of additional monitoring required	N/A
	Summary of mitigation measures	N/A
	Permits / approvals needs for mitigation measures	N/A
	Impact on other activities , e.g. fisheries, industry	N/A

Supply Side Drought Action Name		Increase the Stour Augmentation Groundwater Scheme (Sags) Licensed Quantity By 10%
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Exceptional (extreme drought scenario) worse than 1933/34 (Essex design drought year)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) after Increased Bulk Transfers from Thames Water Utilities
	Demand Saving or DO of Option (Mld)	Peak: Highly variable range. 30 to 50 Ml/d plus losses
	Location	Essex Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: 1 to 2 months – time for drought order application and determination. Secretary of State Determination: A decision will normally be made within 28 calendar days from date of application.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Drought Order Secretary of State Liaison with Environment Agency & Natural England.
	Risks associated with option	Perceived and potentially actual negative impacts on environment.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor to moderate – may include short term benefits as low flows in rivers augmented, supporting ecology.
	Level of confidence (H, M, L)	Medium – as drought action has not yet been required, there is no monitoring during or after its implementation.
	Summary of likely environmental impacts	Potential short term positive effect on river flows and associated ecology (fish, invertebrates etc) & water quality (e.g. DO & temperature). Longer term potential for reduced baseflow if increased SAGS use causes increased drawdown and slower recovery of GW levels.
	Summary of baseline information used	Majority of data held by EA as SAGS licence holder. Rainfall data, river flow data, abstraction data & GW level data for SAGS BHs, various ecological surveys.

Supply Side Drought Action Name		Increase the Stour Augmentation Groundwater Scheme (Sags) Licensed Quantity By 10%
	Summary of additional monitoring required	If a drought order is required to operate the SAGS boreholes outside of the 15-year licence conditions then ESW will work with the Environment Agency to analyse the appropriate data to support the application, based on the EA's groundwater level and river flow monitoring information.
	Summary of mitigation measures	If monitoring indicates significant GW drawdown use alternative SAGS BHs to mitigate potential longer term impacts on baseflow to river. For Stour, mitigate potential longer term impacts of reduced baseflow by use of EOETS environmental support in post-drought (recovery) phase. Withdraw drought action if significant effects observed.
	Permits / approvals needs for mitigation measures	ESW & EA would need to agree which SAGS boreholes to use, based on the EA's GW monitoring information and their preferred operational strategy for the particular drought.
	Impact on other activities, e.g. fisheries, industry	Potential impact on tourism, fishing.

Supply Side Drought Action Name		Reduction Of Compensation Flow From Hanningfield Reservoir Into Sandon Brook
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Exceptional (extreme drought scenario) worse than 1933/34 (Essex design drought year)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3)
	Demand Saving or DO of Option (Mld) ⁽¹⁾	Peak: Up to 0.9 Ml/d Annual: N/A
	Location	Essex Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: 2 months – time for drought permit/order application and determination, and communication with public. EA determination: Normally within 12 calendar days from date of application When there is a hearing, a decision will normally be made within seven calendar days of the receipt of the hearing report.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Drought Permit Environment Agency
	Risks associated with option	Potential negative publicity if the compensation discharge is NOT stopped (e.g. why release water from the reservoir when there is a drought on?).
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor – limited impact on undesignated site, as drought action is for a reduction, rather than a complete cessation of the compensation discharge.
	Level of confidence (H, M, L)	Medium – as drought action has not yet been required, there is no monitoring during or after its implementation.
	Summary of likely environmental impacts	Reduction in flow and water level in Sandon Brook could result in increased water temperatures, increasing BOD, reducing DO and potentially resulting in increased stress to fish, invertebrates and riparian desiccation. Reduction in flows could have positive or negative impact on INNS transfer & propagation.
	Summary of baseline information used	Rainfall data, water quality data (Hanningfield Reservoir & Sandon Brook), EA gauging station flow data, ESW spot flow gauging data on Sandon Brook, available ecological survey data.
	Summary of additional monitoring required	Increase frequency of in-drought and post-drought (recovery) monitoring of flow & water quality parameters (incl. DO) in Sandon Brook.

Supply Side Drought Action Name		Reduction Of Compensation Flow From Hanningfield Reservoir Into Sandon Brook
	Summary of mitigation measures	An iterative process with the compensation discharge being gradually reduced in steps and monitored. If environmental impacts observed, re-instate compensation discharge to full licensed flow. Consider aeration to maintain dissolved oxygen levels.
	Permits / approvals needs for mitigation measures	Permissions required from relevant landowners to access land to implement mitigation measures.
	Impact on other activities , e.g. fisheries, industry	None identified.

Supply Side Drought Action Name		Drought permit to reduce compensation flows from Hartismere Borehole 5
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Exceptional
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation.
	Demand Saving or DO of Option (Mld) ⁽¹⁾	Peak: Up to 690 cubic metres per day. Annual: N/A
	Location	Hartismere Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	At least four weeks, assuming 12 day decision time by Environment Agency and no hearing or objections.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Our abstraction licence makes an allowance for 690 cubic metres per day, 69,100 cubic metres per year, at an instantaneous rate not exceeding 50 litres per second, for the purpose of providing a compensation discharge, which is in addition to and separate from the amount allowed to be abstracted for public water supply. The separate conditions describing the three compensation discharge locations specify 'up to' an amount which totals 690 cubic metres per days across the three points. Requires a drought permit for change of purpose of abstraction if any of the amount allowed for compensation discharge is instead used to increase public water supply. No specific permissions over and above the drought permit would be required. ESW already has permission from the landowner to access the site.
	Risks associated with option	Minor – abstraction from groundwater remains within current annual and daily licensed maximum and reducing the compensation flow from the maximum allowed under the licence still maintains some freshwater input into surface waterbodies and near surface wetlands.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Low - an AMP7 WINEP investigation is ongoing with respect to the sustainability of this source and the efficacy of the current compensation discharge arrangements and we have not experienced a drought since this source and drought action have been operational, so monitoring, although long term and ongoing, does not extend through a drought.

Supply Side Drought Action Name		Drought permit to reduce compensation flows from Hartismere Borehole 5
	Level of confidence (H, M, L)	Potential for temporary deterioration due to reduced flows of water into surface waterbodies and near surface wetland features, although still providing some compensation flow input would result in more water input than would be the case 'naturally' at that point in a drought, potential temporary deterioration in groundwater levels, although abstraction remains within daily and annual licensed maximum, potential for temporary impacts on fish and macro-invertebrates in pond receiving compensation discharge flow, potential for temporary drying & desiccation of flora and fauna in near surface wetland receiving compensation discharge flow.
	Summary of likely environmental impacts	ESW abstraction data, groundwater level monitoring at up to 10 points in area around the BH5 and compensation discharge points, across Chalk, Drift aquifers and near surface wetlands, level & flow data from EA gauging station on Waveney, rainfall data, groundwater quality monitoring in Chalk aquifer.
	Summary of baseline information used	Additional in-drought and post-drought (recovery) monitoring of temperature and DO in Hall Farm Pond. Increased frequency of baseline, in-drought and post-drought water level monitoring in shallow observation borehole on Hall Farm Meadow – requires the borehole to be re-drilled in order to accommodate a dip meter.
	Summary of additional monitoring required	Reduction of the compensation discharge flow in steps, with additional monitoring of pond water level, temperature & DO. Potential aeration of pond. Withdrawal of drought action if significant environmental effects identified.
	Summary of mitigation measures	May need additional permission from landowner to increase frequency of site visits for monitoring and to deliver mitigation measures.
	Permits / approvals needs for mitigation measures	None identified.
	Impact on other activities, e.g. fisheries, industry	Minor – abstraction from groundwater remains within current annual and daily licensed maximum and reducing the compensation flow from the maximum allowed under the licence still maintains some freshwater input into surface waterbodies and near surface wetlands.

Supply Side Drought Action Name		Drought permit to increase restricting annual quantity on Hartismere Borehole 4 Group licence from 2500 MI/yr to 3000 MI/yr
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Infrequent (not likely to occur within several decades)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation.
	Demand Saving or DO of Option (Mld)	Annual: 500 MI/yr (from Hartismere Boreholes, 2, 3 and 7), i.e. 1.37 MI/d equivalent. Wouldn't increase BH5. Peak: N/A
	Location	Hartismere Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	At least six weeks, if 28 day consultation with Natural England is required, assuming 12 day decision time by Environment Agency and no hearing or objections.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Requires a drought permit. Permission from landowners to access land to implement mitigation measures will be required.
	Risks associated with option	Risk that drought permit is not granted or that process is longer than envisaged. Risk that landowners do not allow permission to access land to implement mitigation measures.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor – Review of Consents investigation with respect to local SSSI indicates no likely significant effect. Drought action is for a relatively small increase in overall groundwater abstraction, no increase in the daily max. licence at any source, and limited impact indicated by available monitoring.
	Level of confidence (H, M, L)	Low - Monitoring, although long term and ongoing, does not extend through a drought, and an AMP7 WINEP investigation is ongoing with respect to the sustainability of these sources.

Supply Side Drought Action Name		Drought permit to increase restricting annual quantity on Hartismere Borehole 4 Group licence from 2500 MI/yr to 3000 MI/yr
	Summary of likely environmental impacts	Potential temporary reduction in groundwater levels, potential temporary reduction in flows to near surface wetlands (incl. a SSSI), potential temporary reductions to base flows in local rivers, with potential temporary knock-on impacts in terms of water quality (DO), fish stress and desiccation of riparian habitat.
	Summary of baseline information used	ESW abstraction data, groundwater level monitoring at up to 30 points in area across Chalk, Drift aquifers and near surface wetlands, flow monitoring at 3 sites on upper River Dove, DO & temperature sampling on upper River Dove, level & flow data from EA gauging station on Waveney, rainfall data, groundwater quality monitoring in Chalk aquifer, Natural England ecological data for SSSI site.
	Summary of additional monitoring required	Potential increase in in-drought and post-drought frequency of some surface water flow and groundwater level monitoring.
	Summary of mitigation measures	Increased abstraction to come from BH 2, 3 & 7, not BH5, thus mitigating effects on all features (incl. SSSI). Withdrawal of drought action if significant environmental effects are identified.
	Permits / approvals needs for mitigation measures	Permissions required from relevant landowners to access land to implement mitigation measures.
	Impact on other activities, e.g. fisheries, industry	None identified.

Supply Side Drought Action Name		Increase Annual Quantity on Beddingfield Licence
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Infrequent (not likely to occur within several decades)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation.
	Demand Saving or DO of Option (Mld)	Annual: 50 Ml/year (equivalent to an additional 0.137 Ml/day) Peak: N/A
	Location	Hartismere Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	At least four weeks, assuming 12 day decision time by Environment Agency and no hearing or objections.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Requires a drought permit. Permission from landowners to access land to implement mitigation measures will be required.
	Risks associated with option	Risk that drought permit is not granted or that process is longer than envisaged. Risk that landowners do not allow permission to access land to implement mitigation measures.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor – due to small increase in overall groundwater abstraction, no increase in the daily licence, and limited impact indicated by available monitoring.
	Level of confidence (H, M, L)	Low to medium – Monitoring, although long term and ongoing, does not extend through a drought, and an AMP7 WINEP investigation is ongoing with respect to the sustainability of this source.
	Summary of likely environmental impacts	Potential temporary reduction in groundwater levels, potential temporary reductions to base flows in local rivers, with potential temporary knock-on impacts in terms of water quality (DO), fish stress and desiccation of riparian habitat.
	Summary of baseline information used	Groundwater level monitoring at 12 points in area across Chalk, Crag & Drift aquifers, flow monitoring at 5 sites on upper River Deben, plus level data from EA gauging station, rainfall data, groundwater quality monitoring in Crag aquifer.
	Summary of additional monitoring required	Increased frequency of in-drought and post-drought (recovery) flow gauging of upper River Deben.
	Summary of mitigation measures	Potential to undertake river aeration to increase DO if observed to be an issue, otherwise withdraw drought action if significant environmental effects identified.
	Permits / approvals needs for mitigation measures	Permissions required from relevant landowners to access land to implement mitigation measures.
	Impact on other activities, e.g. fisheries, industry	None identified.

Supply Side Drought Action Name		Drought permit to increase restricting daily quantity on Blyth Borehole 6 licence from 0.91 MI/d to 1.2MI/d.
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Infrequent (not likely to occur within several decades)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation.
	Demand Saving or DO of Option (Mld)	Peak: Up to 0.29 MI/d Annual: N/A
	Location	Blyth Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	At least six weeks, if 28 day consultation with Natural England is required, assuming 12 day decision time by Environment Agency and no hearing or objections.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Requires a drought permit. Permission from landowners to access land to implement mitigation measures will be required.
	Risks associated with option	Risk that drought permit is not granted or that process is longer than envisaged. Risk that landowners do not allow permission to access land to implement mitigation measures.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor – available information indicates predominantly indirect impacts and monitoring data indicates limited impact, given there is no overall increase in annual total abstraction.
	Level of confidence (H, M, L)	Low – An AMP7 WINEP investigation, into the sustainability of the group licence which this abstraction is part of, is ongoing and monitoring, although long term and ongoing, does not extend through a drought.
	Summary of likely environmental impacts	Potential to temporarily reduce baseflows to local rivers, which may in turn reduce DO, increase the impact of barriers to fish movement and increase riparian desiccation. Potential temporary increase in drawdown and possible enlargement of borehole cone of depression. Potential that increased abstraction from the chalk could temporarily affect groundwater levels in the overlying sands and gravels and affect spring input into a SSSI.

Supply Side Drought Action Name		Drought permit to increase restricting daily quantity on Blyth Borehole 6 licence from 0.91 MI/d to 1.2MI/d.
	Summary of baseline information used	ESW abstraction data, groundwater levels in abstraction BH and local SSSI, river flow and DO data for Rivers Alde & Fromus, GW quality parameters for Chalk aquifer, rainfall data.
	Summary of additional monitoring required	Increase the frequency of flow monitoring on Rivers Alde & Fromus and DO monitoring on River Fromus during in-drought and post-drought (recovery) periods.
	Summary of mitigation measures	Possible aeration of rivers to increase DO if monitoring indicates significant environmental effect. Possible installation of a temporary weir to raise water levels in Gromford Meadows. Withdrawal of drought action if monitoring shows significant environmental effect.
	Permits / approvals needs for mitigation measures	Permissions required from relevant landowners to access land to implement mitigation measures.
	Impact on other activities, e.g. fisheries, industry	None identified.

Supply Side Drought Action Name		Drought permit to modify compensation flow and / or abstraction from Blyth Borehole 2.
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Infrequent (not likely to occur within several decades)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation.
	Demand Saving or DO of Option (Mld)	Peak: From up to 0.205 Ml/d from cessation of compensation discharge, up to 3.0 Ml/d if increase daily abstraction licence max. Annual: N/A
	Location	Blyth Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	At least six weeks, if 28 day consultation with Natural England is required, assuming 12 day decision time by Environment Agency and no hearing or objections.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	The current abstraction licence makes an allowance for the abstraction of up to 205 cubic metres per day during July to October inclusive for the purposes of making a compensation discharge, when requested by the EA, in addition to the amount allowed to be abstracted for public water supply. Reducing this amount and utilising some or all of the water made available by doing this for public water supply would require a drought permit for change of purpose. A drought action to increase the daily licence for public water supply purposes by an appropriate quantity (e.g. 2.8 Ml/d or 3.0 Ml/d) would also require a drought permit.
	Risks associated with option	Risk that drought permit is not granted or that process is longer than envisaged. Risk that landowners do not allow permission to access land to implement mitigation measures.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor – available monitoring indicates limited impact, given there is no overall increase in annual total abstraction.
	Level of confidence (H, M, L)	Low – An AMP7 WINEP investigation, into the sustainability of this licence and others in the area, is ongoing and monitoring, although long term and ongoing, does not extend through a drought.

Supply Side Drought Action Name		Drought permit to modify compensation flow and / or abstraction from Blyth Borehole 2.
	Summary of likely environmental impacts	Possibility that abstraction from Crag aquifer could lower GW levels & reduce baseflow to rivers and reduce spring and seepage discharges into surface wetlands. Possibility that increased abstraction could cause saline intrusion into aquifer. Possibility that reduced base flow to rivers could lead to lower DO concentrations, fish stress and kills and desiccation of riparian habitat.
	Summary of baseline information used	ESW abstraction data, groundwater levels in abstraction boreholes, local observation boreholes and local SSSIs, river flow data for Hundred River & Leiston Beck, GW quality parameters for Crag aquifer, including chloride concentration, water quality parameters in surface and GW at SSSI sites, water quality parameters in Hundred River & Leiston Beck (incl. temperature & DO), surface water levels in wetland ditches, rainfall data.
	Summary of additional monitoring required	Increase the frequency of DO monitoring on Hundred River & Leiston Beck during in-drought and post-drought (recovery) periods.
	Summary of mitigation measures	Maintain compensation discharges to Hundred River and Leiston Beck. Potential aeration of Hundred River and Thorpeness Meare if environmental impacts observed. Withdraw drought action if monitoring indicates likely environmental impact on ground water, surface water or features of protected sites.
	Permits / approvals needs for mitigation measures	Permissions required from relevant landowners to access land to implement mitigation measures.
	Impact on other activities, e.g. fisheries, industry	None identified.

Supply Side Drought Action Name		Drought permit to increase annual licence and April to October quantities on Lound licence.
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Exceptional (extreme drought scenario)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation.
	Demand Saving or DO of Option (Mld)	Annual Average: Increasing April to October quantity might make an additional 222MI of water available. Increasing the annual licence might make 295 MI available. Peak: N/A
	Location	Northern Central Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	1 to 2 months – time for drought permit/order application and determination, and communication with public. EA determination: Normally within 12 calendar days from date of application When there is a hearing, a decision will normally be made within seven calendar days of the receipt of the hearing report.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Requires a drought permit, but no additional permissions, as ESW owns the lakes and has access to the lake shore.
Summary of environmental assessment (incl. mitigation measures)	Risks associated with option	Risk that drought permit is not granted or that process is longer than envisaged. Risk that landowners do not allow permission to access land to implement mitigation measures.
	Overall environmental impact (minor, moderate, major or uncertain)	Minor to moderate – lake levels drew down to minimum levels during the last drought (1996/7) although the drought action was not required.
	Level of confidence (H, M, L)	Low to medium - drought action was not required during 1996/7 drought so no monitoring during implementation of current drought action. Most data sets, although long term and ongoing, do not extend through last drought (1996/7).

Supply Side Drought Action Name		Drought permit to increase annual licence and April to October quantities on Lound licence.
	Summary of likely environmental impacts	Potential for temporary deterioration in lake water levels from increased abstraction, although historically lake drawdown has rejuvenated springs within the system, maintaining a minimum water level through the 1990s droughts. Potential that if spring input to the lakes increases, this could drawdown groundwater levels and reduce the strength of the springs. Potential for reduced DO, increased algae growth and desiccation of marginal habitat.
	Summary of baseline information used	Abstraction data for ESW Lound Lakes abstraction points, surface water level data for Lound lakes & Fritton Lake, surface water quality parameters for Lound Lakes, GW level and various water quality parameters in two observation BHs. EA surface water quality data for Lound Run & Mill Water. Rainfall data. Various terrestrial & aquatic ecological surveys of lakes and meadows.
	Summary of additional monitoring required	Increase frequency of in-drought and post-drought (recovery) monitoring of DO in Lound Lakes.
	Summary of mitigation measures	Consider aeration of ponds / lakes if low DO and fish stress observed to be an issue. Withdrawal of drought action if significant effects observed.
	Permits / approvals needs for mitigation measures	No permits or approvals required, as ESW owns the Lound Lakes and has access to the lake shore.
	Impact on other activities, e.g. fisheries, industry	May have to temporarily close disabled fishing club on Hopton 2 Pond.

Supply Side Drought Action Name		Drought permit to increase restricting annual quantity on Ormesby / Bure licence.
Supply side action information	Likelihood of Action Use Regular / Infrequent / Exceptional	Infrequent (not likely to occur within several decades)
	Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3) and local supply and demand situation, and water resource situation. Additional water required over and above, or in a different geographical part of the network to, that available from the previous action. Maximise use of all other available resources and move water within the Resource Zone to meet demand.
	Demand Saving or DO of Option (Mld)	Annual Average: 1Ml/d (365Ml over a year) Peak: N/A
	Location	Northern Central Water Resource Zone
	Implementation Timetable Preparation time, time of year effective, duration	1 to 2 months – time for drought permit/order application and determination, and communication with public. EA determination: Normally within 12 calendar days from date of application When there is a hearing, a decision will normally be made within seven calendar days of the receipt of the hearing report.
	Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Drought Permit
	Risks associated with option	Risk that drought permit is not granted or that process is longer than envisaged. Risk that landowners do not allow permission to access land to implement mitigation measures.
Summary of environmental assessment (incl. mitigation measures)	Overall environmental impact (minor, moderate, major or uncertain)	Minor – no impact on the Trinity Broads as any additional abstraction would be from the River Bure. The likelihood of this drought action, to marginally increase annual abstraction from the Belaugh intake, reducing nearby fen groundwater levels to an extent whereby conservation objectives are not met is deemed to be unlikely. Monitoring indicates winter tidal surges more likely cause of temporary increases in conductivity / salinity in the Bure than summer low flows.

Supply Side Drought Action Name		Drought permit to increase restricting annual quantity on Ormesby / Bure licence.
	Level of confidence (H, M, L)	Medium – monitoring does not extend through a notable drought such as 1996/7, however, the abstraction has been subject to a Review of Consents investigation which concluded that there is sufficiently low risk associated with FL abstraction that environmental outcomes are likely to be achieved with the minor increase in abstraction associated with drought action.
	Summary of likely environmental impacts	Potential for reduced river levels and flow. Potential to reduce adjacent fen GW levels & soil moisture, which could cause desiccation of flora and stress aquatic fauna. Potential for saline intrusion during periods of low flow, although monitoring indicates only an issue during winter tidal surges. Reduced river levels and flow could reduce DO and increase water temperature causing stress to fish and aquatic fauna.
	Summary of baseline information used	Rainfall data, surface water levels & near surface wetland groundwater levels at various locations, Crag GW levels, abstraction data for ESW abstraction points, surface water quality parameters at various locations (incl. TP, TON), ecological survey data, various datasets used for AMP4 Review of Consents Investigation.
	Summary of additional monitoring required	Additional in drought and post-drought (recovery) monitoring of water level and water quality parameters.
	Summary of mitigation measures	Additional water abstracted from Bure, to protect Trinity Broads. Adherence to Bure low flow conditions on abstraction licence. Withdrawal of drought action if significant effects observed.
	Permits / approvals needs for mitigation measures	None required.
	Impact on other activities, e.g. fisheries, industry	None identified.

APPENDIX 6:

EXCEPTIONAL SHORTAGE OF RAIN (ESOR) ASSESSMENT

The Environment Agency issued its latest draft guidance entitled *Hydrological guidance for the assessment of an Exceptional Shortage of Rain (ESoR)* on 18 March 2021.

The sections in the guidance that relate to drought permit and drought order applications are reproduced below.

Overview

An ESoR needs to be demonstrated as part of any future drought permit or drought order application. In the case of a drought permit or emergency drought order, the Environment Agency or Secretary of State, respectively, must be satisfied that a serious deficiency of supplies of water in any area exists or is threatened due to an exceptional shortage of rain. For a drought order, the Secretary of State must be satisfied that, due to an exceptional shortage of rain, a serious deficiency of supplies exists or is threatened, or such a deficiency in flow or level of any inland waterway to pose a serious threat to any flora or fauna which are dependent on those waters, exists or is threatened.

The EA's guidance states that it is not appropriate to set a prescriptive approach to assessing an ESoR case. Each drought and each situation is unique. This technical guidance provides additional detail on best practice for ESoR assessments and should be read in conjunction with the Environment Agency's supplementary guidance on drought permits and drought orders.

Practicalities

In the case of a water company drought permit application, the water company will undertake the ESoR assessment. A checklist for water companies has been included in this document (see Appendix A) and should be provided to water companies to help with their assessment. The ESoR assessment should include suitable graphical evidence, for example charts, maps and tables, as appropriate, to support the ESoR case.

The Environment Agency expects water companies to follow the methodologies outlined in its supplementary guidance on drought permits and drought orders.

As a minimum, the Environment Agency expect every assessment to include a rainfall ranking and SPI assessment for the full period of analysis available and if appropriate, supported by additional methods agreed by Environment Agency hydrologists.

Appendix A – Exceptional Shortage of Rain (ESoR) checklist for water companies.

Audience: Environment Agency

Purpose

This document is designed for water companies completing an Exceptional Shortage of Rainfall (ESoR) assessment as part of a drought permit application. You (the water company) must follow the checklist below when completing your ESoR assessment. You may wish to use the sub-headings below to structure your ESoR report. This document is not designed to be used as a template for your report.

Checklist

- Consult with the Environment Agency hydrology technical specialists, Area Drought Coordinator and water company lead (OCS) at as early stage as possible to agree the approach.

1. Introduction

- Provide an overview of the application and the area of interest.
- Provide details of the supply situation and the hydrological context.

2. Rainfall data

- You must use areal rainfall data for the catchment area of interest.
- In most circumstances, you should use the Environment Agency's HadUK / DRT dataset for Hydrological Areas which is provided to water companies on a monthly basis. If the Hydrological Areas are not appropriate then rainfall data can be extracted for a bespoke catchment area from the HadUK/DRT dataset by Environment Agency hydrologists. Fully explain which dataset has been used and why.
- If you have calculated areal rainfall yourself (you are strongly advised to avoid this):
 - You will need to demonstrate that your data is of better quality and / or more hydrologically relevant than the HadUK / DRT dataset.
 - Set out the limitations of the dataset.

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- Your areal rainfall should be calculated in accordance with British Standard BS7843-4:201296. The rain gauges used must be quality controlled, have minimal missing data and be operated in accordance with British Standard.

3. Period of analysis

- Determine the start and end point of the period of analysis before starting the assessment. This is the period of the rainfall deficit which is used to support the ESoR case. You should agree the period of analysis with the relevant Environment Agency hydrologist, the Area Drought Coordinator and water company lead.
- The application should be submitted as soon as possible after the end of the period over which you believe the ESoR has occurred.
- Start of the period of analysis:
 - Provide clear evidence (e.g. charts / graphs) of the point at which the resource situation is no longer normal for the time of year. This should include both the onset of the rainfall deficit and the effects on the water supply situation.
 - Justify how the variables used here are reflective of the water supply situation in the catchment area of interest.
- End of the period of analysis:
 - Provide clear evidence (e.g. charts / graphs / reference to Drought Plan) that the rainfall deficit has triggered the need for a drought permit.
 - Use the latest rainfall data at the point of the application.

4. Geographical extent of analysis

- Provide justification for the catchment area used in the analysis. In most circumstances, this will be one or several of the Environment Agency's Hydrological Areas.
- Provide evidence of how the rainfall deficit is relevant to the catchment area of the public supply source or the wider integrated water resource zone / sub unit of this zone.
- Catchments less than 10 km² or those without a rain gauge located within them should not be used.

5. Technical rainfall analysis methods

- Refer to the Environment Agency's supplementary guidance on drought permits and drought orders. This is available internally on the [Content](#)

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[Cloud](#) and externally it will be shared with water companies on SharePoint or by request from the [Water-Company-Plan](#) mailbox.

- Use the same rainfall dataset (usually HadUK / DRT) for each analysis method (as set out in the sections above) and the same historic period of record (from 1891).
- Use your assessment period of analysis for each method as your main evidence. If you use any shorter periods as supporting evidence (for example, the winter refill period), justify how these are relevant to the water resource situation.
- Detail any limitations and uncertainties associated with the methodology, and the possible impacts on the results.

6. Other meteorological and hydrometric measures

- This analysis should not detract from your evidence that the reason for a serious deficiency is an ESoR.
- Refer to the Environment Agency's supplementary guidance on drought permits and drought orders. This is available internally on the [Content Cloud](#) and externally it will be shared with water companies on SharePoint or by request from the [Water-Company-Plan](#) mailbox. The internal Environment Agency guidance document contains more details on best practice.
- Use your assessment period of analysis for each method as your main evidence. If you use any shorter periods as supporting evidence (for example, the winter refill period), justify how these are relevant to the water resource situation.
- Detail any limitations and uncertainties associated with the methodology, and the possible impacts on the results.

7. Overview / Other

- You should consider the relationship to the threat of a serious deficiency of supply in the catchment area of interest.
- You should consider the relationship to the water company system.
- You may wish to include a forward look based upon a meteorological forecast

8. Summary and conclusions

- Provide a summary of the evidence for an ESoR drawing on your evidence from your technical analysis.

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APPENDIX 7: ENVIRONMENTAL PERMITS AND DROUGHT ORDERS

We will need to apply for a Drought Permit or Drought Order for the Level 3 supply side drought actions in this Drought Plan. This Drought Plan has been developed using the Environment Agency's latest guidance entitled, *Drought permits and drought orders Supplementary guidance from the Environment Agency and Department of Environment, Food and Rural Affairs* (March 2021). The key points of the guidance is reproduced below.

Overview

Drought permits, ordinary drought orders and emergency drought orders are tools to manage water resources during a drought. These tools can help to maintain public water supply and can protect the environment.

The Water Resources Act 1991 (WRA 1991) as amended by the Environment Act 1995 and the Water Act 2003, allows for three legislative ways for dealing with drought situations: drought permits, ordinary drought orders and emergency drought orders.

Drought permits and drought orders are drought management actions that, if granted, can allow more flexibility to manage water resources and the effects of drought on public water supply and the environment.

Both the Environment Agency and water companies can apply for drought orders. When a water company is applying for a drought permit, the Environment Agency must be satisfied that the following conditions have been met before a permit is granted:

- a serious deficiency of supplies of water in any area exists or is threatened; and that
- the reason for the deficiency is an exceptional shortage of rain (See Appendix 6 above).

When a water company is applying for a drought order, the Secretary of State must be satisfied that the following conditions have been met for the drought order to be granted:

- a serious deficiency of supplies of water in any area, exists or is threatened

or

- such a deficiency in the flow or level of water in any inland waterway to pose a serious threat to any flora or fauna which are dependent on those waters, exists or is threatened

and that

- the reason for the deficiency is an exceptional shortage of rain.

If a water company is applying for an emergency drought order, the Secretary of State must be satisfied that the following conditions have been met for the emergency drought order to be granted. Both that:

- by reason of an exceptional shortage of rain, a serious deficiency of supplies of water in any area exists or is threatened

and that

- the deficiency is such as to be likely to impair the economic or social well-being of persons in the area.

The Secretary of State (for drought orders) or the Environment Agency (for drought permits) must be satisfied that these conditions have been met. If these conditions are not met, a permit or order will not be granted.

Even if a serious deficiency of supplies exists, a drought order or a drought permit cannot be granted if the serious deficiency of supplies has not been caused by an exceptional shortage of rain.

Main differences between drought permits and orders

The circumstances in which an applicant should apply for a drought permit, ordinary or emergency drought order are summarised in the table below.

	Drought Permit	Ordinary Drought Order	Emergency Drought Order
Legislation	WRA 1991 Section 79A	WRA 1991 Section 74	WRA 1991 Section 75
Who can apply?	Water company	Water company Environment Agency	Water company Environment Agency
Who authorises?	Environment Agency	Secretary of State	Secretary of State
Duration	Up to 6 months	Up to 6 months	Up to 3 months
Available Extensions	For a further 6 months	For a further 6 months	For a further 2 months
Minimum time for decision	Once application received, normally within 12 calendar days of the date of publication of the last advertisement. When there is a hearing, a decision will normally be made within 7 calendar days of the receipt of the hearing report.	A decision will normally be made within 28 calendar days from date of application. When there is a hearing, a decision will normally be made within 7 calendar days of the receipt of the hearing report. Please note that this period can be longer (or in exceptional cases shorter)	Same as ordinary drought orders
Legislation	WRA 1991 Section 79A	WRA 1991 Section 74	WRA 1991 Section 75

The available actions allowed by drought permits and drought orders are summarised in the table below.

Drought Permit	Ordinary Drought Order	Emergency Drought Order
<p>For a water company</p> <ul style="list-style-type: none"> To take water from any source specified To modify or suspend conditions on an abstraction or impoundment licence held by the water company 	<p>For a water company</p> <p>Same as for drought permits but also includes:</p> <ul style="list-style-type: none"> To discharge water to specified places To modify or suspend discharges or filtering/treating of water held by water company To modify or suspend restrictions or obligations that apply to the taking, discharging, supply or filtering/treating of water held by others (including Environment Agency) To authorise the Environment Agency to stop or limit the taking or discharging of water from/to specified sources or places To prohibit or limit particular uses of water under Drought Direction 2011 (these provisions do not apply for emergency drought orders) <p>For Environment Agency</p> <ul style="list-style-type: none"> To take water from specified sources To discharge water to specified places To stop or limit the taking of water from specified sources <input type="checkbox"/> To modify or suspend restrictions or obligations to taking, discharging, supply or filtering/ treating of water held by anyone. 	<p>For a water company</p> <p>Same as ordinary drought order but also includes:</p> <ul style="list-style-type: none"> To prohibit or limit uses specified by water company To set up and supply water by means of stand pipes, rota cuts or water tanks in a water company area. <p>For Environment Agency</p> <p>Same as for ordinary drought orders.</p>

Water company drought plans and 'application ready' principles

Water companies are expected to identify all possible drought permits and drought orders and include details of each option in their drought plan as part of the range of drought management actions they plan to use. Drought Plans should include assessment of the environmental impacts of potential drought permits and drought orders and cover the arrangements for environmental monitoring and mitigation that may be required. It is also expected that during a drought, a water company will follow its drought plan.

Water companies should be application ready for more frequent drought permit and order sites that a water company plans on using. This means a water company should be:

- as ready as you can be to submit these permits and orders prior to your application
- have an environmental assessment for each permit and order listed in your drought plan.

Further work will be required at the time of application (for example a full statement of reasons case). However, permits and orders that are application ready are more likely to be processed and implemented swiftly, reducing delays and costs. Even with application ready permits and orders, early engagement with the Environment Agency and possible objectors will be required before submitting any drought permits or orders to avoid delays.

Environmental Reports

The applicant must submit an environmental report with any drought permit or order application which is based upon an environmental assessment, planned monitoring and mitigation.

We have prepared our environmental reports following the Environment Agency's latest supplementary guidance 'Environmental assessment for water company drought planning' (July 2020).

APPENDIX 8: TEMPORARY USE BAN REGIONAL ALIGNMENT

The majority of Water Resources South East (WRSE) and Water Resource East (WRE) water companies, including Essex & Suffolk Water, have agreed the following universal TUB enforcement policy.

The following enforcement policy is a universal document for water companies to use when implementing a TUB.

TEMPORARY USE BAN ENFORCEMENT POLICY

1. Introduction

Essex & Suffolk Water is the statutory water and sewerage undertaker for an area covering approximately [add a broad descriptive geographical description e.g. 5000 square miles across London and the Thames Valley from Kent in the east to Gloucestershire in the west].

A map showing the region for which Essex & Suffolk Water is appointed to act as the statutory water undertaker is shown shaded in blue and attached to this document as Appendix A. This area is referred to within this document as “the Essex & Suffolk Water Region”.

On [date] Essex & Suffolk Water imposed, throughout the Essex & Suffolk Water Region, a prohibition on the use of water for a number of specified categories of use, in accordance with section 76 of the Water Industry Act 1991. This is referred to as the Temporary Use Ban or TUB. The TUB was imposed because of the serious deficiency of water available for distribution and its terms are as follows:

The TUB took effect from midnight on [date] following publication of the notice on the Essex & Suffolk Water website and in the London Evening Standard, The Times and the Daily Mail newspapers on [date]. The terms of the TUB are attached to this document as Appendix B.

Under the terms of section 76(5) of the Water Industry Act 1991, if any person fails to comply with the terms of the TUB that person shall be guilty of an offence and liable on conviction in the Magistrates’ Court to a fine of up to £1000.

This enforcement policy sets out the standards and guidance that will be applied by Essex & Suffolk Water when undertaking its enforcement role within the provisions of the Water Industry Act 1991.

Where infringements and contraventions are found, Essex & Suffolk Water will respond in a manner commensurate with the need to safeguard the availability of water available for distribution. Wherever possible, Essex & Suffolk Water will offer advice to those who may have contravened the prohibition in a bid to remedy

infringements in a timely and cost effective manner. However, in particular cases, offenders may face prosecution.

The purpose of this enforcement policy is to seek to ensure that when enforcement action is required, it is pursued in a consistent, balanced and fair manner.

2. Overall Aim

It is intended that this policy will seek to ensure compliance with the TUB within the Essex & Suffolk Water Region, in an attempt to conserve water, in a fair, open and consistent manner having regard, where appropriate, to the circumstances of each individual case and the extent to which the terms of the TUB have been contravened.

3. Guiding Principles

Whilst undertaking its regulatory and enforcement role in connection with the TUB, Essex & Suffolk Water will have regard to the following Guiding Principles:

- Any decision regarding enforcement action will be impartial and objective, and will not be affected by race, politics, gender, sexual orientation or the religious beliefs of any alleged offender, victim or witness.
- Essex & Suffolk Water will use as its starting position when considering enforcement of the TUB the belief that the vast majority of persons wish to comply with the terms of the TUB and should be assisted in doing so by Essex & Suffolk Water following the Investigational Phase process set out in Appendix C below (“the Investigational Phase”), if reasonably practicable.
- There will be a consistent approach to enforcement whilst recognising individual circumstances.
- Prosecution for an offence under the Water Industry Act 1991 will be considered in all cases, but particularly where a serious, severe, persistent and/or blatant breach of the relevant legislation has taken place or where alternative methods of resolution have failed.

4. Standards

Essex & Suffolk Water will try to meet the highest standards of service whilst undertaking its regulatory and enforcement function in connection with the TUB. The following specific level of service standards will be applied in connection with the TUB:

-

- Matters relating to enforcement of the TUB will be dealt with promptly with written enquiries and complaints receiving a response or acknowledgement within ten working days.
- Employees of Essex & Suffolk Water employed to monitor compliance with the TUB will announce themselves on arrival at any premises and promptly show credentials/identification unless they are already known to the person or persons on such premises.
- Employees of Essex & Suffolk Water employed to monitor compliance with the TUB will provide their name and a Essex & Suffolk Water contact

telephone number to those persons with whom they are in written contact concerning enforcement of the TUB.

- Complaints relating to persons failing to comply with the TUB will be dealt with promptly, though we will always request the name and address of the complainant. Any such identification will be treated in confidence but may need to be disclosed (with prior consent) should formal legal proceedings be taken against the person or persons to which the complaint relates. Anonymous complaints, however, will still be investigated.
- Essex & Suffolk Water will be professional, courteous and helpful in its enforcement of the TUB and wherever possible will seek to work with persons towards compliance using the Investigational Phase.
- In accordance with the Investigational Phase at the onset of considering enforcement action Essex & Suffolk Water will provide the person(s) believed to be contravening the TUB in writing with full details of the manner in which it is alleged the TUB has been breached and the steps that are required to be undertaken and by when to avoid enforcement action being taken.

5. Consistent Enforcement

Consistent enforcement action is desirable, but absolute uniformity would be unfair by failing to recognise individual circumstances that may modify action to be taken where it is permissible. Consistency of approach whilst allowing a degree of discretion will be encouraged by:

- Appropriate training and supervision of those employed by Essex & Suffolk Water to monitor and enforce compliance with the TUB. Amongst other things, they will be made fully conversant with the terms of this Enforcement Policy and its Appendices.
- Ensuring there is compliance with the standards set out in this policy by Essex & Suffolk Water.
- Recognition that it may not be in the interests of justice to prosecute a person found to be breaching the terms of the TUB in those cases where there is only sufficient evidence to prove a minor infringement.
The final decision whether or not to prosecute will be taken by Essex & Suffolk Water's Executive Management Team, who will be aware that each case is unique and must be treated on its own merits.

6. Assessing Appropriate Action (in cases of infringement)

The Investigational Phase that will be undertaken by Essex & Suffolk Water sets out the detailed steps that will be taken by Essex & Suffolk Water **before** enforcement action is taken against a person found to be contravening the TUB. Essex & Suffolk Water will seek to ensure that the process identified in the Investigational Phase attached below as Appendix C as it applies to each individual case will be followed to allow a person sufficient time to demonstrate compliance with the terms of the TUB before enforcement action will be taken.

Prosecution will normally be considered where one or more of the following criteria are satisfied: -

- There is a need to protect the public interest and the interests of the environment, health, safety and such other interests.
- Informal approaches have failed.
- The persons concerned have ignored requests for compliance with the TUB.
- There has been a repeated serious and/or blatant contravention which is a clear overt challenge to the TUB and has potential to undermine customer confidence in the fairness of the restriction.

Essex & Suffolk Water accepts that the decision to institute criminal proceedings against a person or persons who fail to comply with the terms of the TUB is a serious one that should only be taken after full consideration of all the facts.

Essex & Suffolk Water is not bound by, but chooses to accept the provisions of the Code for Crown Prosecutors, January 2013. As such, Essex & Suffolk Water will only institute criminal proceedings when it is satisfied that the two stages of the Full Code Test: (i) the evidential stage; and (ii) the public interest stage, have been met.

The evidential stage is passed when there is sufficient evidence to provide a realistic prospect of conviction against each defendant on each charge. A realistic prospect of conviction means that a bench of magistrates, properly directed in accordance with the law, is more likely than not to convict the defendant of the charge alleged.

The public interest stage is applied by balancing public interest factors for and against prosecution. A prosecution will usually take place unless there are public interest factors tending against prosecution which clearly outweigh those tending in favour. Public interest factors that can affect the decision to prosecute usually depend on the seriousness of the offence or the circumstances of the offender. Some factors may increase the need to prosecute but others may suggest that another course of action would be better.

Both the evidential and public interest stages will be considered fairly and objectively by Essex & Suffolk Water.

[Date]

Appendix A Map of Essex & Suffolk water Region

Insert a map showing the geographical area for which Essex & Suffolk water is appointed as the statutory water (“the Essex & Suffolk Water Region”)

Appendix B: Terms of the Temporary Use Ban

Temporary Use Ban:

Section 76 Water Industry Act 1991

Potable* water supplied throughout the area of [Company name] Utilities Limited must NOT be used for the following purposes:

1. watering a ‘garden’ using a hosepipe;
2. cleaning a private motor-vehicle using a hosepipe;
3. watering plants on domestic or other non-commercial premises using a hosepipe;

4. cleaning a private leisure boat using a hosepipe;
5. filling or maintaining a domestic swimming or paddling pool (except when using handheld containers filled directly from a tap);
6. drawing water, using a hosepipe, for domestic recreational use;
7. filling or maintaining a domestic pond (excluding fishponds) using a hosepipe;
8. filling or maintaining an ornamental fountain;
9. cleaning walls, or windows, of domestic premises using a hosepipe;
10. cleaning paths or patios using a hosepipe;
11. cleaning other artificial outdoor surfaces using a hosepipe.

Definition of a garden

A “garden” includes all of the following: a park; gardens open to the public; a lawn; a grass verge; an area of grass used for sport or recreation; an allotment garden, as defined in section 22 of the Allotments Act 1922; any area of an allotment used for non-commercial purposes; and any other green space.

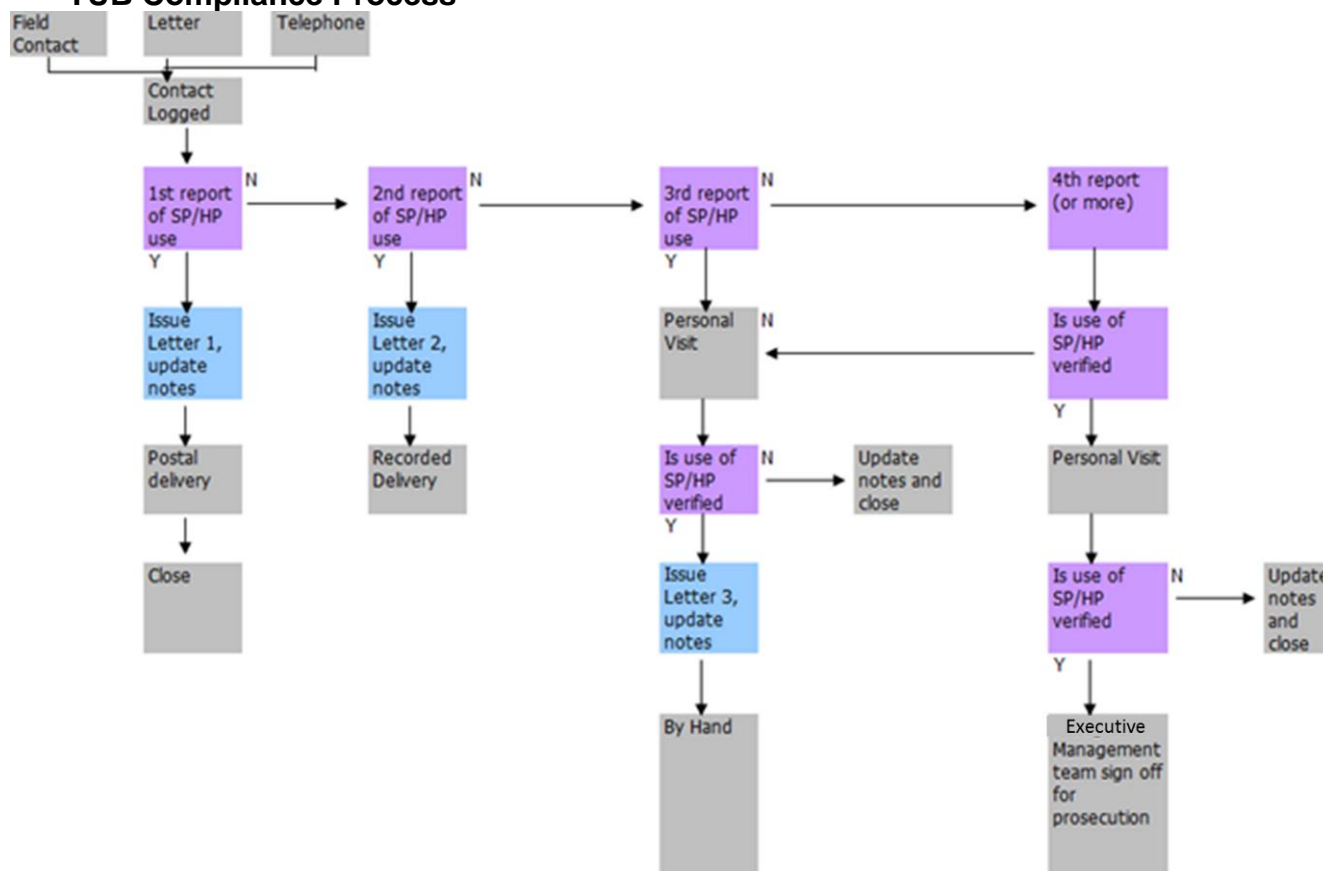
Exemptions

The following will be exempted from the restrictions:

- i) using a hosepipe in a garden or for cleaning walls or windows of domestic premises, paths or patios, a private leisure boat or an artificial outdoor surface, where such use is necessary for health and safety reasons.
- ii) people with severe mobility problems who hold a current Blue Badge as issued by their local authority will not be prohibited from using a hosepipe to water a garden attached to a domestic dwelling, plants on domestic premises, or allotments where the Blue Badge holder is the tenant.
- iii) using a hosepipe to clean a private motor vehicle, walls and windows of domestic premises, or paths, patios and other outdoor surfaces where this is done as a service to customers during a business.
- iv) using a hosepipe to water an area of grass or artificial outdoor surfaces used for sport or recreation, where this is required in connection with a national or international sports event. A list of qualifying events will be published on [Company name]’s website and updated as and when required.
- v) drip or trickle irrigation watering systems, fitted with a pressure reducing valve and a timer, that are not handheld, that place water drip by drip directly onto the soil surface or beneath the soil surface, without any surface run off or dispersion of water through the air using a jet or mist.

Appendix C: TUB Non-compliance Investigational Phase (Flowchart)

TUB Compliance Process



APPENDIX 9: TEMPORARY USE BANS DEFINITIONS

Definition of “using a hosepipe”

For the purposes of a TUB, we have used the definition of “using a hosepipe” as that given in the Water Use (Temporary Bans) Order 2010 as follows:

- a) Drawing relevant water through a hosepipe;
- b) Drawing relevant water through a hosepipe from a container and applying it for the purpose; and
- c) Filling or partly filling a container with relevant water by means of a hosepipe and applying it for the purpose.

A reference to a hosepipe includes anything designed, adapted or used for the same purpose as a hosepipe. “Relevant water” refers to mains water i.e. supplied by the water undertaker; it does not include water supplied before the water restriction was implemented.

The legislation does not state any exemptions to the definition of a hosepipe.

We considered whether micro-irrigation systems should be exempted from a temporary use ban but concluded that they should not be exempted. Whilst we recognise micro-irrigation systems use water more efficiently than a hosepipe or sprinkler, a 1 in 20 year ban is more about conserving water than using water more efficiently. If micro-irrigation was exempted from a hosepipe ban, more systems would be sold during the ban thereby decreasing some of the volume of water conserved from the imposition of the hosepipe ban.

The above definition of a hosepipe applies to all of the 11 categories detailed below:

1. Watering a garden using a hosepipe
2. Cleaning a private motor-vehicle using a hosepipe
3. Watering plants on domestic or other non-commercial premises using a hosepipe
4. Cleaning a private leisure boat using a hosepipe
5. Filling or maintaining a domestic swimming or paddling pool
6. Drawing water, using a hosepipe, for domestic recreational use
7. Filling or maintaining a domestic pond using a hosepipe
8. Filling or maintaining an ornamental fountain
9. Cleaning walls, or windows, of domestic premises using a hosepipe
10. Cleaning paths or patios using a hosepipe
11. Cleaning other artificial outdoor surfaces using a hosepipe

Although all of these uses of hosepipes are banned, it is important to note that during any TUB, gardens may still be watered:

- by hand using a bucket or watering can;
- with grey-water (ex bath/ washbasin water) through a hosepipe; and / or

- using rainwater from a water-butt through a hosepipe (assuming sufficient rainfall).

Further explanation of uses to be banned

Watering a garden using a hosepipe

The definition of “a garden” has been widened and clarified under the Water Use (Temporary Bans) Order 2010. We intend to ban the use of watering using a hosepipe for all categories allowed to be banned, with no exceptions.

The areas where watering a garden using a hosepipe will be banned under Phase 1 are:

- a) a domestic garden
- b) a park
- c) gardens open to the public
- d) a lawn
- e) a grass verge
- f) an area of grass used for sport or recreation
- g) an allotment garden
- h) any area of an allotment used for non-commercial purposes
- i) any other green space

Exemptions: Under legislation a “garden” does not include the following, meaning hosepipe use is allowed to continue in these areas under a Phase 1 temporary use ban.

- a) agricultural land
- b) other land used in the course of a business for the purposes of growing, for sale or commercial use, any crops, fruit, vegetables or other plants.
- c) land used for the purpose of a National Plant Collection.
- d) a temporary garden or flower display
- e) plants (including plant organs, seeds, crops and trees) which are in an outdoor pot or in the ground, under cover. NB for domestic purposes watering of these by a hosepipe is still banned under our Phase 1 but it comes under a different category in the legislation.

(Legislation excludes the banning of “watering a garden using a hosepipe” when the use is for “health or safety reasons”. However, use of this exclusion is likely to be rare and the company would scrutinize the genuineness of such a claim).

Cleaning a private motor-vehicle using a hosepipe

Washing of any private motor vehicle, using a hosepipe is banned. This includes commercial car wash businesses that use hosepipes or pressure washers to wash customer’s cars. Private cars can still be washed by householders and commercial businesses by hand using water from a bucket.

Exemptions: Legislation excludes:

- a) a public service vehicle, as defined in section 1 of the Public Passenger Vehicles Act 1981; and
- b) a goods vehicle as defined in section 192 of the Road Traffic Act 1988.

NB. Taxis and minicabs are public service vehicles and are therefore excluded from the ban.

Commercial carwashes, that do not use a hosepipe or similar apparatus, are also exempt from this ban.

Watering plants on domestic or other non-commercial premises using a hosepipe

This category covers the banning of watering by a hosepipe of plants which are in an outdoor pot or in the ground, under cover (predominantly plants growing in a greenhouse border).

“Domestic or other non-commercial premises” means

- a) Any land, building or other structure used or enjoyed in connection with the use of any of the following which is used principally as a dwelling:
 - A building or part of a building
 - A caravan
 - A boat
 - Any land or premises which is not used principally for the purpose of a business

Exemptions: Legislation defines some exemptions: -

- Plants in outdoor pots and in the ground, undercover in public authority premises
- Plants in outdoor pots and in the ground, undercover in commercial premises
- Plants grown or kept for sale or commercial use
- Plants that are part of a National Collection or temporary garden or flower display.

Whilst Local Authorities are not restricted in their watering of plants, using a hosepipe, in outdoor pots or in the ground, under cover by the Phase 1 ban, we would expect them to also cease watering this category when a ban is imposed. This is likely to be seen to be fairer by the public and helps to fulfil a Local Authority’s duty under the Water Act 2003 to conserve water.

Cleaning a private leisure boat using a hosepipe

Using a hosepipe to clean a private leisure boat is banned. A private leisure boat is defined as “a vessel or other thing, other than a seaplane, which is designed, constructed or adapted to move through, in, on or over water”. Boats in private ownership only are included, whether trailer launched or not. The ban includes all small watercraft also e.g. canoes, kayaks, jet skis etc.

Exemptions: Legislation exempts the following:

- Vessels used in the course of a business
- Vessels made available or accessible to the public
- Cleaning of any area of a private leisure boat which, except for doors and windows, is enclosed by a roof and walls
- Using a hosepipe to clean a private leisure boat for health or safety reasons.

Filling or maintaining a domestic swimming or paddling pool

A domestic swimming or paddling pool is defined as swimming or paddling pool, other than a pool that is being used for the purpose of a business, which is:

- a) in a building or part of a building used principally as a dwelling; or
- b) on any land or in any building that is used or enjoyed in connection with (a).

Exemptions: Legislation excludes filling or maintaining a pool:

- a) where necessary in the course of its construction
- b) using a hand-held container filled with water drawn directly from a tap
- c) that is designed, constructed or adapted for use in the course of a programme of medical treatment
- d) used for the purpose of decontaminating animals from infections or disease
- e) used in the course of a programme of veterinary treatment
- f) in which fish or other aquatic animals are being reared or kept in captivity.

Drawing water, using a hosepipe, for domestic recreational use

This category covers the banning of the use of a hosepipe to operate water slides or other domestic recreational equipment. This is interpreted to mean both slides designed to be used with water and any temporary or ad hoc water slides or sprinklers. Recreational use covers the use by adults or children.

Exemptions: There are no legislative exemptions.

Filling or maintaining a domestic pond using a hosepipe

This restriction is fairly limited in the number of ponds likely to be affected. A wider ban on filling ponds comes in under the Phase 2 restrictions and requires the company obtaining a Drought Order under the Drought Direction 2011. A “domestic pond” is defined as a pond, including a swimming pond, on land that is used in connection with a building, or part of a building, used principally as a dwelling; and is not being used for the purpose of a business. A pond can be natural or man-made and can be internal or external and includes ornamental ponds.

Exemptions: Legislation excludes filling or maintaining a pond in which fish or other aquatic animals are being reared or kept in captivity.

Filling or maintaining an ornamental fountain

This category covers any water fountain or water cascade that serves a purpose that is primarily decorative. This includes sculptures that have a water component. Filling by any means is banned including permanent plumbing.

This ban applies equally to fountains, cascades and sculptures using water that are privately owned or publicly owned. It also applies to features that use recycled water.

Exemptions; Legislation exempts the filling or maintaining of an ornamental fountain which is on or near a fishpond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy.

Cleaning walls, or windows, of domestic premises using a hosepipe

This category refers to the cleaning of walls or windows on domestic premises using a hosepipe. The restriction also applies to businesses cleaning domestic walls or windows using such apparatus as water-fed poles.

A domestic premise is defined as:

- a. A building used principally as a dwelling or dwellings
- b. A garage, shed, outbuilding or other building or structure used or enjoyed in connection with a building used principally as a dwelling; or
- c. A wall or other means of enclosure within the curtilage of a building used principally as a dwelling.

Exemptions: Legislation exempts cleaning activities for health and safety reasons. However, these are likely to be rare with health or safety reasons likely to be restricted to:

- Removing or minimising any risk to human or animal health or safety; and
- Preventing or controlling the spread of causative agents of disease.

Cleaning paths or patios using a hosepipe

This ban on use applies regardless of who is carrying out the cleaning and regardless of whether they are on domestic or commercial premises. The ban applies whatever the paths or patios are made of.

Exemptions: Legislation only exempts cleaning using a hosepipe for health or safety reasons. Again, these exemptions are likely to be rare and similar to the exemptions for H & S given in (9).

Cleaning other artificial outdoor surfaces using a hosepipe

This category bans the use of a hosepipe for outdoor cleaning of artificial surfaces regardless of who is doing the cleaning and regardless of whether the premises are domestic or commercial. Artificial outdoor surfaces are defined as:

- a) Any area outdoors which is paved or laid with hard or artificial material;
- b) Timber decking;
- c) A quay (including a jetty, pontoon, wharf or slipway).
- d) A trailer designed, constructed or adapted to launch boats or other vessels or craft into water, other than a private motor vehicle
- e) The roof of any domestic premises.

Exemptions: Legislation only exempts cleaning using a hosepipe for health or safety reasons. Again, these exemptions are likely to be rare and similar to the exemptions for H & S given in (9).

APPENDIX 10: NON-ESSENTIAL USE BAN DEFINITIONS

Commercial Premises

- For the purpose of a Drought Order, commercial premises are defined as:-
- “any land, building, other structure or premise not being domestic or other non-commercial premises within the meaning of the Temporary Water Use Ban”.

Watering outdoor plants on commercial premises using a hosepipe

- This banning of activity covers:
 - Plants which are in a pot or other container that is outdoors or undercover
 - Plants which are in the ground under cover.
- Exemptions: Legislation exempts the watering of plants using a hosepipe that are: -
 - Grown or kept for sale or commercial use; or
 - Part of a National Collection or temporary garden or flower display.

Filling or maintaining a non-domestic swimming or paddling pool

- For the purpose of the Drought Order, the Drought Direction 2011 defines non-domestic swimming or paddling pools as “a swimming or paddling pool as defined and covered by the Water Industry Act S76(2)(e). The intention is that filling of domestic pools will already have been banned under the Temporary Water Use Ban.
- **Exemptions:** Legislation exempts the following from filling or maintaining pools:
 - a. That is open to the public
 - b. Where necessary in the course of its construction
 - c. That is designed, constructed or adapted for use in the course of a programme of medical treatment
 - d. That is used for the purpose of decontaminating animals from infections or disease
 - e. Used in the course of a programme of veterinary treatment
 - f. In which fish or other aquatic animals are being reared or kept in captivity
 - g. That is for use by pupils of a school for school swimming lessons
- For the purpose of exemptions “Open to the public” is defined as:
- A pool is **not** open to the public if it may only be used if the user is a paying member of an affiliated club or organisation i.e. these are not exempt.

Filling or maintaining a pond

- This extends the areas of pond filling or maintaining being banned beyond those already covered by the Temporary Water Use Ban. Non-domestic ponds are now also covered by the ban on the use of hosepipes and both domestic and non-domestic ponds are banned from having water added by a fixed pipe. Ponds include manmade and natural ponds of any size.

- **Exemptions:** Legislation exempts the filling of any ponds, domestic or non-domestic, by hosepipe or fixed pipe, which contains fish or other aquatic animals that are being reared or kept in captivity. It also excludes the filling of any ponds using a hand-held container which is filled with water directly drawn from a tap.

Operating a mechanical vehicle-washer

- This is fully defined as “operating a mechanical vehicle-washer, whether automatic or not”.
- **Exemptions:** There are no exemptions in legislation. While we are not considering any outright exemptions, we would intend to delay implementing this ban, for as long as we consider sensible, for mechanical washers that recycle water and use less than 23 litres of water per vehicle wash.

Cleaning any vehicle, boat, aircraft or railway rolling stock using a hosepipe

- A boat is interpreted, in this case, as a vessel or other thing that:
 - Is designed, constructed or adapted to move through, in, on or over water; and
 - Is not a private leisure boat within the meaning applied under the Temporary Water Use Ban.
- A vehicle is defined as any of the following which is not a private motor vehicle within the meaning of the Temporary Water Use Ban:
 - A vehicle, designed, constructed or adapted for use on roads; or
 - A trailer or other thing designed, constructed or adapted for attachment to a vehicle falling within a) above.
 - Railway rolling stock is interpreted to include passenger train cars, freight train cars, locomotives and tube trains.
 - Aircraft are interpreted to include privately and commercially owned airplanes, helicopters, gliders and hot air balloons.
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety reasons.

Cleaning non-domestic premises using a hosepipe

- The activity to be banned is defined as:
 - Any exterior part of a non-domestic building other than a window
 - A non-domestic wall
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Cleaning a window of a non-domestic building using a hosepipe

- This restriction is equivalent in all ways to that covered under the Temporary Water Use Ban for domestic properties. The ban extends to the use of water fed poles where mains water is the source used to create the de-ionised water.
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Cleaning industrial plant using a hosepipe

- In this restriction “plant” is defined to mean “*The equipment, including machinery, tools, instruments and fixtures necessary for an industrial operation*”
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Suppressing dust using a hosepipe

- The Drought Direction 2011 defines “using a hosepipe” as:
 - Drawing relevant water through a hosepipe from a container and applying it for the purpose; and
 - Filling or partly filling a container with relevant water by means of a hosepipe and applying it for the purpose.
- This also includes anything designed, adapted or used for the same purpose as a hosepipe.
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Operating a cistern in any building that is unoccupied and closed

A cistern is defined as meaning an automatically operated flushing cistern which services a WC pan or urinal.

Occupation of a building by security staff is interpreted to comprise a building that is “unoccupied”.

APPENDIX 11:

RELEVANT LEGISLATION AND GUIDANCE

In producing this draft Drought Plan, reference was made to the following guidance and legislation:

- Water Company Drought Plan Guideline 2020, Environment Agency
- The Drought Plan (England) Direction 2020
- Drought Plan Guideline Extra Information: Environmental Assessment for Water Company Drought Plans, May 2016, Environment Agency
- Drought Plan Guideline Extra Information: Supplementary Information, April 2016, Environment Agency
- Drought Plan Guideline Extra Information: Drought Permit and Order Application Ready, November 2016, Environment Agency
- Water Company Drought Plan Guideline 2011, Environment Agency
- Water Industry Act 1991
- Water Act 2003 where s.63 inserts new sections 39B & 39C into the Water Industry Act 1991 and s.62 inserts new sections 37B-D into Water Industry Act 1991
- Drought Plan Direction 2005
- Drought Plan Regulations 2005
- Drought Direction 1991
- Flood and Water Management Act 2010 where s.36 amends the Water Industry Act 1991 by substituting a new s.76
- Water Use (Temporary Bans) Order 2010
- Environmental Assessment of Plans and Programmes Regulations 2004
- Conservation of Habitats and Species Regulations 2010
- Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act 2000, Section 28G.