Drought Plan 2022
Annex 9: Strategic Environmental Assessment Environmental Report

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from Southern Water

Contents

Appendices (published as separate documents)

1 Introduction

1.1 Background and Purpose of Report

This Strategic Environmental Assessment (SEA) Environmental Report has been prepared in support of the development of the Southern Water Services (Southern Water) Draft Drought Plan 2022. Habitats Regulations Assessment (HRA) and a Water Framework Directive (WFD) assessment have also been carried out in parallel.

SEA is a statutory requirement for plans or programmes which could have significant environmental implications and helps to identify where there are potential impacts and how any negative impacts might be mitigated. More information about SEA, and its role in supporting the development of the Drought Plan, is provided in Section 1.2.

Where possible this Environmental Report accompanying the Draft Drought Plan 2022 has sought to build upon the SEA work carried out for the Drought Plan 2019. Prior to this stage, the scoping information presented in the Environmental Report (July 2019) was updated and sent to statutory consultees (the Environment Agency, Historic England and Natural England) for review and comment on 2nd February 2021. The representations received and how they have been taken into account are presented in **Appendix A**.

This Environmental Report presents the review of relevant policies and plans (Section 2) and the baseline environment information (Section 3) that set the context for the assessment that has been carried out in accordance with the assessment methodology (Section 4). The potential effects of alternative drought plan measures are described in Section 5, with assessment of the cumulative, or in-combination, effects between drought plan measures and other activities, programmes and plans set out in Section 6. Section 7 explains how the SEA findings have been used to inform the development of the Draft Drought Plan 2022. Information regarding mitigation and monitoring is provided in Section 8. A quality assurance checklist is provided in Section 9.

1.2 Application of SEA to Drought Planning

1.2.1 Overview of Strategic Environmental Assessment

SEA became a statutory requirement in the UK following the adoption of Directive 2001/42/EC (the SEA Directive) on the assessment of effects of certain plans and programmes on the environment. The Directive was transposed into national legislation by The Environmental Assessment of Plans and Programmes Regulations 2004 (referred to as the SEA Regulations)[1].

The objectives of SEA are set out in Article 1 of the SEA Directive as follows:

> *'to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans with a view to promoting sustainable development'.*

The SEA Directive requires preparation of an Environmental Report in which the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and geographical scope of the plan or programme, are identified, described and evaluated. It should be noted that, as stated in the Office of the Deputy Prime Minister (ODPM) SEA Guidelines[2], "*it is not the purpose of the SEA to decide the alternative to be chosen for the plan or programme. This is the role of the decision-makers who have to make choices on the plan or programme to be adopted. The SEA simply provides information on the relative*

1 The Environmental Assessment of Plans and Programmes Regulations 2004 (Statutory Instrument 2004 No. 1633) apply to any plan or programme which relates solely or in part to England.
2 Office of the Deputy Prime Minister (2005) A Practical Guide to the Strategic Environmental Assessment Directive.

environmental performance of alternatives and can make the decision-making process more transparent." The SEA process has therefore been used to help inform decisions making, including the selection of options, and the timing and implementation of drought plan measures within the plan, as well as the consideration of appropriate monitoring and mitigation of identified environmental and social effects.

The range of environmental and social issues to be included in an SEA is set out in the SEA regulations, and includes biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, and landscape.

As identified above, the Government has produced SEA guidance which sets out the stages of the SEA process[3]. This, together with water industry guidance on undertaking SEA of Drought Plans[4], has been used to inform the assessment methodology for the SEA. We understand that water industry guidance on SEA and HRA of WRMPs and Drought Plans is currently being revised but has not yet been published.

A Drought Plan Guideline was published by the Environment Agency in 2011[5] and included recommendations for the application of SEA to water company drought plans. An update to the guideline was published by the Environment Agency in September 2019[6] with supplementary guidance on Environmental Assessment for Water Company Drought Plans[7] and the Defra Drought Plan (England) Direction issued to water companies in 2016. These guidance documents and regulations have all informed Southern Water's Draft Drought Plan 2022 and the SEA.

1.2.2 Requirement for SEA and HRA of Southern Water's Drought Plan

A full SEA was carried out for the current Drought Plan 2019. Taking a precautionary approach and to take account of updated evidence, including revised HRA and WFD assessments, it was considered appropriate to undertake a full SEA for the Draft Drought Plan 2022.

Undertaking a SEA of the Draft Drought Plan 2022 has aided its development and Southern Water's decision-making on the measures to be included in the plan, their timing and phasing taking account the assessed environmental and social effects (adverse and beneficial). As every drought is different in terms of severity, location, duration and hence impact, the output of the SEA (and parallel HRA and WFD assessments) has helped to guide the selection of options specific to the characteristics of any potential drought. The application of the SEA (and HRA) has helped ensure strategic decisions affecting the environment were made early on in the Drought Planning process.

1.3 Southern Water Supply Area and Drought Planning

1.3.1 Introduction

In the event of a drought, Southern Water will need to implement a range of management measures to ensure the continued provision of essential water supplies to all of its customers. The Southern Water Drought Plan sets out the options that the company will consider implementing in dealing with drought conditions, taking account of statutory legislation and regulatory requirements. The Drought Plan is prepared to comply with Sections 39B and 39C of the Water Industry Act 1991, as amended

3 Ibid.
4 UKWIR (2012) Strategic Environmental Assessment and Habitats Regulation Assessment – Guidance for Water Resources Management Plans & Drought Plans (12/WR/02/A).
5 Environment Agency (2011) Water Company Drought Plan Guideline.
6 Environment Agency (2019) How to write and publish a Drought Plan, September 2019. Available at https://consult.environment-agency.gov.uk/environment-and-business/water-company-drought-plan-guideline-update/
7 Environment Agency (2019) Environmental assessment for water company drought planning -supplementary guidance. Consultation draft (September 2019)

by the Water Act 2003[8] and in accordance with the Drought Plan Regulations 2005[9] and follows guideline issued by the Environment Agency (EA)[10]. Once approved by the Secretary of State and published, the Drought Plan 2022 will replace the existing Southern Water Drought Plan published in 2019.

1.3.2 Southern Water's Supply Area

Southern Water provides water supplies to just over 2.4 million customers across an area of 4,450km^2, extending from East Kent, through parts of Sussex, to Hampshire and the Isle of Wight in the west.

Water supplies are predominantly reliant on the transmission and storage of groundwater from the widespread chalk aquifer that underlies much of the region. This extends throughout parts of Kent, Sussex, Hampshire and the Isle of Wight; and makes up 70% of the total water supply. River abstractions account for 23% of the water supplies, most notably the Eastern Yar and Medina on the Isle of Wight, the Rivers Test and Itchen in Hampshire, the Western Rother and Arun in West Sussex, the River Eastern Rother and River Brede in East Sussex, and the River Teise, River Medway and Great Stour in Kent. Four surface water impounding reservoirs provide the remaining 7% of water supplies: Bewl Water, Darwell, Powdermill and Weir Wood. The total storage capacity of these four reservoirs amounts to 42,390Ml. South East Water is entitled to 25% of the available supplies from the River Medway Scheme, which incorporates Bewl Water Reservoir.

Although the South East is one of the driest regions in the UK, rainfall is still integral to the maintenance of water supplies. During winter, when most of the effective rainfall occurs, groundwater reserves are recharged naturally through infiltration processes. Rain infiltrates through the soil to recharge the natural storage in the underlying groundwater to support river baseflows for the following year. Annual rainfall averages 730mm across the Southern Water region. Rainfall experienced outside of winter is of less value to groundwater recharge as it is mostly lost to evaporation, plant transpiration or runs off directly into rivers from the land.

The Southern Water region is divided into fourteen Water Resource Zones (WRZs) which are geographically separate and amalgamated into three larger, sub-regional areas (see **Figure 1.1**):

[8] https://www.legislation.gov.uk/ukpga/2003/37/contents
[9] https://www.legislation.gov.uk/uksi/2005/1905/regulation/4
[10] Environment Agency, 2020. Water Company Drought Plan Guideline, April 2020.

Western Area – comprising the following seven WRZs:

- Hants Kingsclere (HK)
- Hants Andover (HA)
- Isle of Wight (IW)
- Hants Rural
- Hants Winchester
- Hants Southampton East
- Hants Southampton West

Central Area – comprising the following three WRZs:

- Sussex North (SN)
- Sussex Worthing (SW)
- Sussex Brighton (SB)

Eastern Area – comprising the following four WRZs:

- Kent Medway East
- Kent Medway West
- Kent Thanet (KT)
- Sussex Hastings (SH)

These areas contain a number of separate WRZs, but they are managed as semi-integrated blocks because there is significant bulk water transfer capability between the WRZs. This means that an area-wide perspective is required when drought management measures are being considered.

A number of bulk water supplies are made between Southern Water and several adjacent water companies. Southern Water's supply area is bounded by eight other water companies:

- Thames Water
- Wessex Water
- Cholderton and District Water
- South East Water
- Affinity Water
- SES Water
- Bournemouth Water
- Portsmouth Water

The geographical area under consideration for the SEA covers all of Southern Water's WRZs as well as the river and/or groundwater catchments of those water sources and sources of bulk water supply imports that serve these WRZs but which lie outside their boundaries (see map at **Figure 1-2**).

Figure 1-1 Southern Water's Supply Area

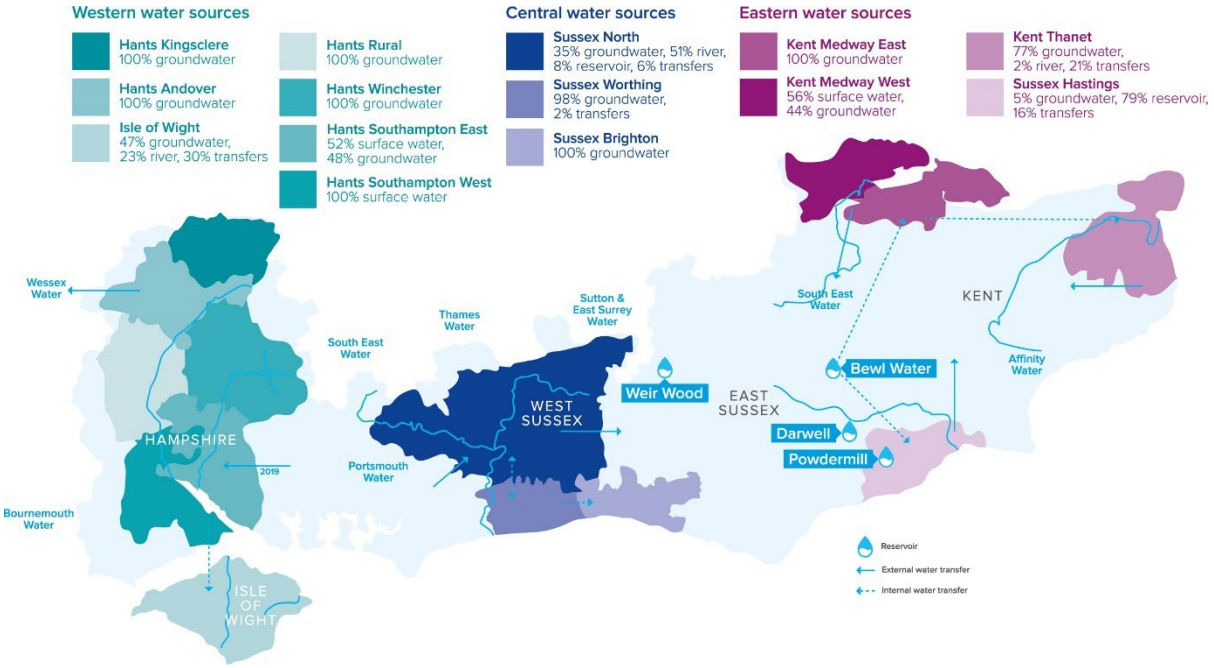
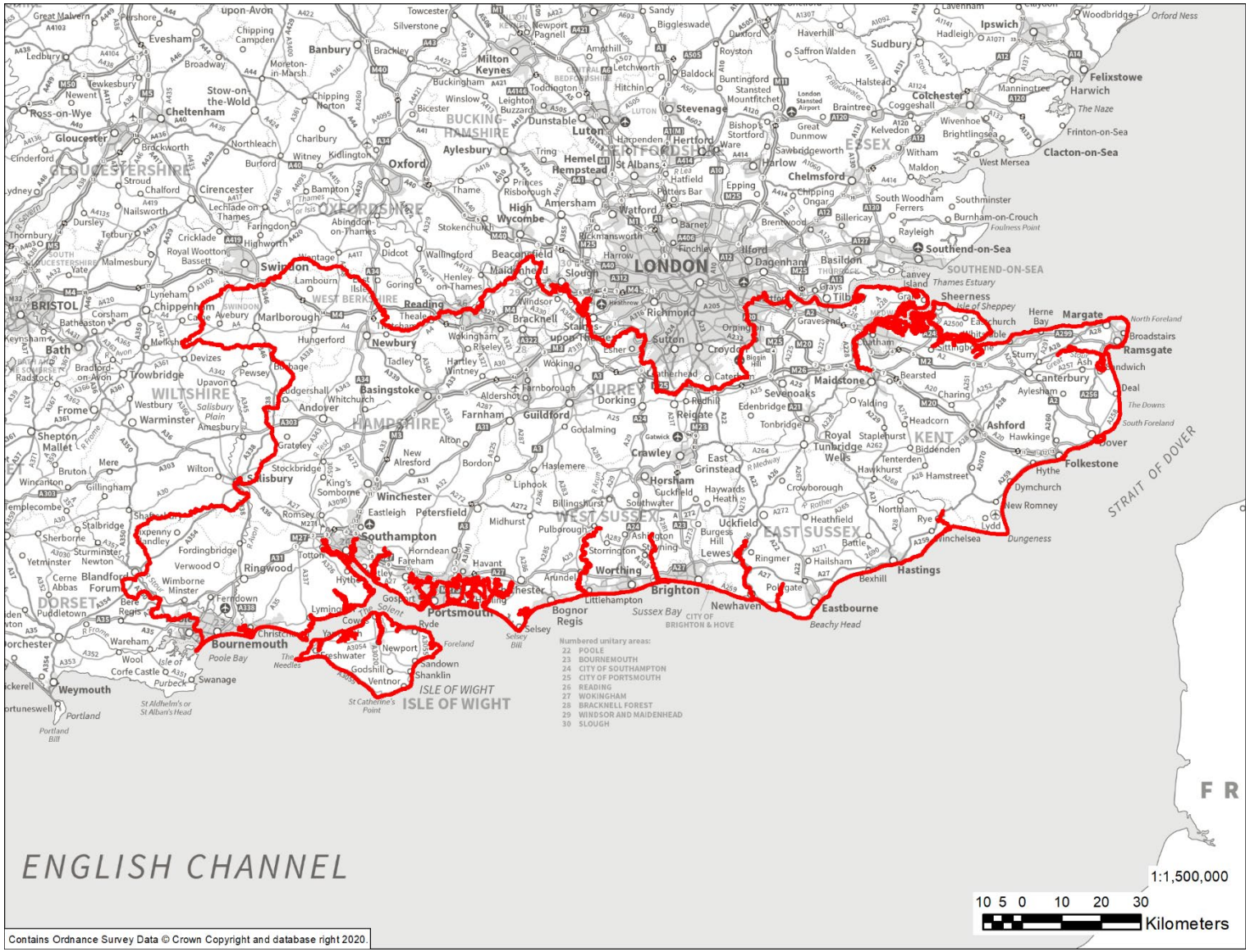


Figure 1-2 SEA Area under Consideration



1.4 Southern Water's Drought Planning Process

1.4.1 Overview and Timetable

The development of a drought plan consists of the following stages:

1. Submitting a draft Drought Plan to the Secretary of State for Environment and Rural Affairs.
2. Publishing the draft Drought Plan for public consultation after approval from the Secretary of State.
3. Public consultation on the draft plan.
4. Publishing a statement of response (SOR) to the representations made during public consultation.
5. Publishing a revised Drought Plan incorporating the SOR.
6. Submitting the revised Drought Plan to the Secretary of State.
7. Publishing the final Drought Plan after approval from the Secretary of State.

Following approval from the Secretary of State, the Draft Drought Plan 2022 and this Environmental Report will be published for consultation with the public and statutory bodies.

Only those drought management measures that are relevant to the period encompassed by the Draft Drought Plan 2022 are considered in the SEA (i.e. the years 2022 to 2027). In this regard, environmental effects of the potential drought plan measures are considered within the context of the company's existing abstraction licence conditions (except where stated) and operating arrangements. Additionally, only those plans, projects and programmes that are likely to be effective during the five-year period of the Drought Plan are considered in the SEA. The closely allied, but separate statutory process, of developing a long-term Water Resources Management Plan (WRMP) is also being undertaken by Southern Water.

1.4.2 Drought Plan Development

Under sections 39B and 39C of the Water Industry Act 1991 (as amended), water companies are required to prepare and maintain statutory drought plans. The Drought Plan sets out the operational steps a water company will take before, during and after a drought to maintain essential water supplies to customers. A Drought Plan is defined in the Water Industry Act 1991 (as amended) as 'a plan for how the water undertaker will continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water, with as little recourse as reasonably possible to Drought Orders or Drought Permits'. The Drought Plan identifies triggers that act as decision points for implementing a range of drought management actions. The nature of the triggers varies for each Water Resource Zone, and the nature of the drought management actions that will be considered also varies depending on the prevailing drought conditions.

1.4.3 Drought Management Measures

There are two broad categories of drought management measures: demand-side measures and supply-side measures, as described below.

Demand-side measures

Demand-side measures are designed to reduce the demand for water during drought and the various potential options that have been considered in developing the Drought Plan are set out in **Table 1.1.**

Table 1-1 Potential demand-side drought management options

Measure	Description of Measure
Media campaigns to influence water use	Wide-scale media activity and advertising to encourage voluntary reduction in water usage
Water efficiency promotion to partner organisations	Engage with partner organisations to ensure co-ordinated approach to interventions
Water efficiency promotion with local authorities	Initiate discussions with local authorities regarding watering regimes for public parks and gardens
Leakage reduction	Increase leakage monitoring and repair activity
Pressure management	Mains pressure reduction
Enhanced media campaign with customers	Enhanced media campaign to publicise restrictions and encourage water savings
Temporary Use Ban	Temporary ban on certain categories of water use under water company powers set out in the Water Industry Act 1991 (WIA 1991) as amended by Flood and Water Management Act 2010
Drought Order to ban non-essential water use	Application to Secretary of State for a Drought Order to prohibit certain prescribed non-essential water uses as set out in the Drought Direction 2011
Emergency Drought Order to ration water supplies by use of rota cuts or standpipes	Application to Secretary of State for an Emergency Drought Order to authorise water supply via temporary rota cuts or standpipes

Supply-side measures

Supply side measures relate to actions that can temporarily increase the amount of water available for supply. Potential supply-side drought measures that have been considered in developing the Drought Plan and which do not require a Drought Permit or Drought Order are listed in **Table 1-2**. Options that require Drought Permits or Drought Orders are summarised in **Table 1-3**.

Table 1-2 Potential supply-side drought management options

Drought Measure	WRZ	Description
Tankering of water	All	Tankering water from adjacent WRZs or other water companies
Rest groundwater sources	Sussex Worthing	Use any spare winter/spring surface water available to supply customers in Worthing and Brighton during the early stages of a drought. This allows groundwater sources in the Worthing area to be rested in key 'storage' sources, which can improve their drought resilience as drought conditions intensify.
Rest groundwater sources	Isle of Wight	Maximise any spare surface water sources available on the Isle of Wight and the cross-Solent supply from Hampshire during the early stages of a drought. This allows groundwater sources in the Isle of Wight to be rested to improve their drought resilience as drought conditions intensify.
Increase bulk imports Reduce bulk water exports	Various	In the event of a severe drought, the Company would investigate the possibility of receiving additional bulk supplies from other water companies and/or reducing existing bulk water exports to other water companies

Drought Measure	WRZ	Description
Rest Weir Wood Reservoir source during early stages of drought	Sussex North	Maximise pumping from the Pulborough source in order to reduce abstraction from Weir Wood Reservoir to conserve reservoir for increased use in the later stages of a drought.

It should be noted that increasing imports from other water companies, reducing supplies to commercial customers and the use of temporary emergency desalination plants were considered as reasonable options previously through the development of the current Drought Plan 2019 and its associated SEA process. However, they have been removed from consideration for the Draft Drought Plan 2022 and are not reasonable alternatives because of potential environmental impacts and the concerns raised by statutory bodies.

Table 1-3 Supply side Drought Permit / Order measures

Measure Name	WRZ	Description
Lukely Brook WSW Groundwater source	Isle of Wight	Remove requirement for Minimum Residual Flow condition at the Sheep Dip Weir on the Lukely Brook. Provision of a temporary compensation flow release of 0.4 Ml/d to the Lukely Brook from the Lukely Brook groundwater source via a temporary pipeline.
Caul Bourne WSW Groundwater source	Isle of Wight	Reduce the Minimum Residual Flow in the Caul Bourne from 4l/s (0.3Ml/d) to 2 l/s (0.15Ml/d) Remove the constraint that limits abstraction to 40 Ml (1.3 Ml/d) within a 30-day period when the flow drops beneath 20 l/s (1.7Ml/d)
Eastern Yar Augmentation Scheme Surface water source	Isle of Wight	Reduction to the Minimum Residual Flow conditions: River Medina: reduce from 2.7Ml/d to 1.7Ml/d River Medina near Newport: reduce from 5Ml/d to 4Ml/d This will allow increased abstraction for transfer and augmentation of flows in the River Eastern Yar.
Lower Itchen Sources Groundwater and surface water sources	Hampshire Southampton East	Reduce the Hands-Off Flow condition in the River Itchen from 198Ml/d to 160Ml/d. Reduce the Hands-Off Flow condition relating to the Portsmouth Water's Lower Itchen abstraction licence from 194Ml/d to 150Ml/d.
Candover Augmentation Scheme	Hampshire Southampton East	Operate the Candover Augmentation Scheme source to allow discharge of groundwater to the River Itchen downstream of the Candover Stream. Increase the daily abstraction licence limit from 5Ml/d to 27Ml/d (20Ml/d during May to August) and increase the annual abstraction limit to 3750Ml (20.8Ml/d over 6 months).
Test Surface Water Drought Permit	Hampshire Southampton East and	Reduce the Hands-Off Flow condition in the Lower River Test from 355Ml/d to 265Ml/d.

Measure Name	WRZ	Description
	Hampshire Southampton West	
Test Surface Water Drought Order	Hampshire Southampton East and Hampshire Southampton West	Reduce the Hands-Off Flow condition in the Lower River Test from 355Ml/d to 200Ml/d. This Drought Order would be implemented once the measured flow in the Lower River Test falls below 265Ml/d (the limit authorised under the Drought Permit)
Pulborough (1) Surface water source	Sussex North	Reduce Minimum Residual Flow at Pulborough Weir from 63.65Ml/d to 53.65Ml/d, allowing greater surface water abstraction.
Pulborough (2) Surface water source	Sussex North	Reduce Minimum Residual Flow at Pulborough Weir from 63.65Ml/d to 43.65Ml/d, allowing greater surface water abstraction.
Pulborough (3) Surface water source	Sussex North	Reduce Minimum Residual Flow at Pulborough Weir from 63.65Ml/d to 33.65Ml/d, allowing greater surface water abstraction.
Weir Wood Reservoir Surface water source	Sussex North	Reduce statutory compensation flow from Weir Wood Reservoir to the River Medway from 3.64Ml/d in winter and 5.64Ml/d in Summer, to 2.5 Ml/d.
East Worthing WSW Groundwater source	Sussex Worthing	Increase abstraction licence daily limit from 4.5Ml/d to 7.0 Ml/d between October and December inclusive.
North Arundel WSW Groundwater source	Sussex Worthing	Increase abstraction licence daily limit from 4.5Ml/d to 7.0 Ml/d.
River Medway Scheme Stage 1 Surface water source	Kent Medway West	In a second dry winter following a dry summer, reduce the Minimum Residual Flow in the River Medway From 200Ml/d in November to January to 150Ml/d From 250Ml/d in February to 150Ml/d From 275Ml/d in March and April to 150Ml/d
River Medway Scheme Stage 2 Surface water source	Kent Medway West	In a third dry winter following two successive dry summers, reduce the Minimum Residual Flow in the River Medway From 200Ml/d in November to January to 150Ml/d From 250Ml/d in February to 150Ml/d From 275Ml/d in March and April to 150Ml/d Modify the Bewl Water Reservoir regulation release factor from 1.1 to 1.0 to support abstraction from the River Medway
River Medway Scheme Stage 3	Kent Medway West	In a third dry summer after three dry winters, reduce the Minimum Residual Flow in the River Medway From 350 Ml/d in May to August to 275Ml/d

Measure Name	WRZ	Description
Surface water source		Modify the Bewl Water Reservoir regulation release factor from 1.1 to 1.0 to support abstraction from the River Medway
River Medway Scheme Stage 4 Surface water source	Kent Medway West	Following a third dry summer, reduce the Minimum Residual Flow requirement in the River Medway From 200 Ml/d in November to January, 250 Ml/d in February and 275 Ml/d in March and April, to 100Ml/d in November to April From 350 Ml/d in May to August to Ml/d 200Ml/d From 275 Ml/d in September to October to 150Ml/d Modify the Bewl Water Reservoir regulation release factor from 1.1 to 1.0 to support abstraction from the River Medway.
Darwell Reservoir (1) Surface water source	Sussex Hastings	Reduce the Minimum Residual Flow in the River Rother in the summer from 28.5Ml/d to 10Ml/d to allow additional abstraction from the River Rother to Darwell Reservoir.
Darwell Reservoir (2) Surface water source	Sussex Hastings	Maintain the Minimum Residual Flow in the River Rother in winter of 4.545 Ml/d and increase daily licence from 56.7 to 70 Ml/d to capture more high flow events.

As described in our main drought plan, we have removed the drought permits for Faversham and Sandwich because abstraction licence variations mean these would no longer provide a benefit.

It should be noted that a number of Drought Permit/ Order options previously considered through the development of the current Drought Plan 2019 and its associated SEA process have now been removed as they are no longer reasonable. The options and their reasons for removal are set out below:

- Powdermill Reservoir - Reduce the Minimum Residual Flow in the River Brede from 6.2Ml/d to 2Ml/d to allow additional abstraction from the River Brede to Powdermill reservoir. This was removed from consideration due to the small and, in particular, uncertain benefit derived from flow estimate and hydrological modelling as well as potential downstream environmental impacts identified through the previous HRA work. This was discussed and agreed with the EA.
- Shalcombe WSW - Remove abstraction licence constraint that limits abstraction to 0.35Ml/d when groundwater levels at an observation borehole are equal to or less than 70mAOD. This was removed from consideration as the licence is to be revoked and the benefits is very small (0.65 Ml/d). Further to this, there were issues raised through the HRA process.
- Stourmouth - Revise licence conditions to impose Minimum Residual Flow at 100Ml/d on River Great Stour to allow increased abstraction (maximum 10Ml/d). This has been removed from consideration as it would not be feasible to reinstate the source in the timeframe of a drought developing.
- Test Valley site WSW - Recommission unlicensed site in the Test Valley with abstraction authorised up to 4.36Ml/d. This has been removed from consideration as the licence is revoked due to environmental concerns and there are sufficient alternative options.

1.4.4 Supporting Information

Environmental assessment studies of Southern Water's potential Drought Permit / Order options have been carried out and these have been used to help inform the SEA.

As well as the SEA, a Habitats Regulations Assessment (HRA) was carried out to inform the development of the Drought Plan, providing an understanding the impact of potential drought management measures on designated European Sites and any associated compensatory habitat. Findings from the HRA were used in carrying out the SEA of alternative drought management measures being considered for inclusion in the Drought Plan.

Potential drought management measures, where applicable, have also been assessed in relation to the Water Framework Directive (WFD) objectives, in particular to assess whether potential supply-side drought management measures might lead to a temporary (or permanent) deterioration of the WFD status of designated water bodies. The WFD assessment findings have also informed the SEA.

1.5 Stages of Strategic Environmental Assessment

SEA incorporates the following stages:

- Stage A: Setting the context, identifying objectives, problems and opportunities, and establishing the baseline.
- Stage B: Developing and refining options and assessing effects (impact assessment)
- Stage C: Preparing the Environmental Report (recording results)
- Stage D: Consulting on the Draft Plan and the Environmental Report (seeking consensus)
- Stage E: Monitoring the significant effects of the plan or programme on the environment (verification).

This Environmental Report encompasses Stages B and C of the SEA process, which is being issued for public consultation (Stage D) alongside the Draft Drought Plan.

Table 1-4 is an extract from the ODPM Practical Guide[11] that sets out the main stages of the SEA process and the purpose of each task within the process. Specific guidance on the application of the SEA process to drought plans is provided by UKWIR (2012)[12].

Table 1-4 SEA Stages and Tasks

Stage / Task	Purpose
Stage A: Setting the context and objectives, establishing the baseline and deciding on the scope	
Task A1. Identifying other relevant plans, programmes	To establish how the plan or programme is affected by outside factors to suggest ideas for how any constraints can be addressed, and to help identify SEA objectives.

[11] Office of the Deputy Prime Minister (2005). A Practical Guide to the Strategic Environmental Assessment Directive.
[12] UKWIR (2012) Strategic Environmental Assessment and Habitats Regulation Assessment – Guidance for Water Resources Management Plans & Drought Plans (12/WR/02/A).

Stage / Task	Purpose
and environmental protection objectives	
Task A2. Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.
Task A3. Identifying environmental problems	To help focus the SEA and streamline the subsequent stages, including baseline information analysis, setting of the SEA objectives, prediction of effects and monitoring.
Task A4. Developing SEA Objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed.
Task A5. Consulting on the scope of the SEA	To ensure the SEA covers the likely significant environmental effects of the plan or programme.
Stage B: Developing and refining alternatives and assessing effects	
Task B1. Testing the plan or programme objectives against SEA objectives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives.
Task B2. Developing strategic alternatives	To develop and refine strategic alternatives.
Task B3. Predicting the effects of the plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and its alternatives.
Task B4. Evaluating the effects of the plan or programme, including alternatives	To evaluate the predicted effects of the plan or programme and its alternatives and assist in the refinement of the plan or programme.
Task B5. Mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered.
Task B6. Proposing measures to monitor the environmental effects of plan or programme implementation	To detail the means by which the environmental performance of the plan or programme can be assessed.
Stage C: Preparing the Environmental Report	
Task C1. Preparing the environmental report	To present the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and use by decision-makers.
Stage D: Consulting on the Draft Plan or programme and the Environmental Report	
Task D1. Consulting the public and consultation bodies on the draft plan or programme and the Environmental Report	To give the public and the consultation bodies an opportunity to express their opinions on the findings of the Environmental Report and to use it as a reference point in commenting on the plan or programme. To gather more information through the opinions and concerns of the public
Task D2. Assessing significant changes	To ensure that the environmental implications of any significant changes to the draft plan or programme at this stage are assessed and taken into account.

Stage / Task	Purpose
Task D3. Making decisions and providing information	To provide information on how the Environmental Report and consultees opinions were taken into account in deciding the final form of the plan or programme to be adopted.
Stage E: Monitoring the significant effects of the plan or programme on the environment	
Task E1. Developing aims and methods for monitoring	To track the environmental effects of the plan or programme to show whether they are as predicted; to help identify adverse effects.
Task E2. Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified.

1.6 Structure of the Environmental Report

This SEA Environmental Report presents the findings of Tasks B1 to C1 set out in **Table 1-4,** and provides the public, stakeholders and regulatory bodies with an opportunity to express their opinions on the findings of the assessment. The Environmental Report is structured as follows:

- **Section 1** (this section): describes the requirement for, purpose and process of the SEA, and its context in relation to the Drought Plan.
- **Section 2** - Policy Context: identifies key messages and environmental protection objectives from other relevant plans and programmes.
- **Section 3** - Environmental Baseline Review: draws out the key environmental issues Southern Water intends to consider in the SEA. Identifies the current and future baseline conditions within the area of potential influence of the Drought Plan.
- **Section 4** – Methodology: provides details of the methods employed in undertaking the assessment including the cumulative effects assessment methodology.
- **Section 5** – Assessment of drought plan options: presents the potential impacts of the various drought plan options against the SEA framework.
- **Section 6** – Cumulative Effects Assessment: discusses the potential in-combination impacts of drought options (intra-zone and inter-zone), demand management options and other plans and projects in the region.
- **Section 7** - Describes how the SEA has been used to inform the development of the Drought Plan.
- **Section 8** – Mitigation and Monitoring: discusses measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the Drought Plan and monitoring to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures.
- **Section 9** – Quality Assurance: provides a checklist of requirements from the ODPM guidance.

1.7 Consultation

1.7.1 Consultation on the Scoping Report

Consultation bodies, stakeholders and the public were invited to express their views on the scope of the SEA in accordance with SEA Regulation 12(5). The scoping information was issued on 2 February 2021 to the Environment Agency, Historic England and Natural England. The consultation period ran until 11 March 2021. The responses to comments provided on the updated scoping information and how these have been taken into account in carrying out the SEA are presented in **Appendix A**.

1.7.2 Consultation on the Environmental Report

The Environmental Report of the Draft Drought Plan 2022 was produced taking into consideration the responses received from consultation bodies during the Scoping consultation. It provided assessments of the potential effects (adverse and beneficial) of the drought management options considered for the Draft Drought Plan 2022 and set out how the findings were used to inform the development of the draft plan.

The public, regulatory bodies and stakeholders are invited to express their views on this Environmental Report, as part of the public consultation on Southern Water's Draft Drought Plan 2022.

2 Policy Context

2.1 Introduction

Annex 1 of the SEA Directive (Directive 2001/42/EC) requires the following information to be included within the Environmental Report:

- *"an outline of the…relationship with other plans and programmes"*
- *"the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme"*
- *"the environmental characteristics of areas likely to be significantly affected"*
- *"any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC (the 'Birds Directive') and 92/43/EEC (the 'Habitats Directive')*
- *"the environmental protection objectives, established at international, (European) Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation".*

In accordance with the Directive, a review of relevant plans and programmes is presented in Section 2. A summary of key messages is presented in Table 2-1 (with the full review presented in **Appendix B**).

A summary of the environmental baseline key issues is presented in Section 3 (with the full environmental baseline information presented in **Appendix C**).

2.2 Review of Policies, Plans and Programmes

2.2.1 Policies, Plans and Programmes reviewed

One of the first steps in undertaking SEA is to identify other relevant policies, plans, programmes and environmental protection objectives. The review of these other plans sets out to establish how Southern Water's Drought Plan might be affected by other plans, to identify other environmental and social objectives which the Drought Plan should consider and to help to identify the assessment objectives for the SEA.

Potentially relevant plans and programmes were identified at the international, national, regional and local level. If the plan or programme was assessed as not having a significant effect on the objectives of the Drought Plan and/or the Drought Plan does not have a significant effect on achieving the objectives of the other plan or programme, it was not reviewed in detail.

The full list of international, national, regional and local policies, plans, programmes and strategies reviewed and the key policy objectives, targets and how they relate to SEA topics and SEA objectives are provided in **Appendix B** and listed in Table 2-1.

Table 2-1 Key policy objectives derived from the review of plans, policies and programmes

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
Biodiversity, flora and fauna	Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC Act S41 for England), whilst taking into account future climate change. Promote a catchment-wide approach to water use to ensure better protection of biodiversity. To achieve favourable condition for priority habitats and species in particular designated sites. Avoidance of activities likely to cause irreversible damage to natural heritage. Support well-functioning ecosystems, respect environmental limits and capacities, and maintain/enhance coherent ecological networks, including provision for fish passage and connectivity for migratory/mobile species. Strengthen the connections between people and nature and realise the value of biodiversity. Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital	*International:* United Nations (1992) Convention on Biological Diversity (CBD) European Commission, Birds Directive (2009/147/EC) European Commission The Water Framework Directive (2000/60/EC) European Commission, Directive on Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC) European Commission, Habitats Directive (1992/43/EEC) European Commission, The EU Biodiversity Strategy to 2020 European Commission, Environmental Liability Directive (2004/35/EC) EC Regulation 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel EU Regulation 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species The Marine Strategy Framework Directive (2008) The Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983) The Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979) The Convention on Wetlands of International Importance (Ramsar Convention) (1971) *National:* Conservation of Habitats and Species Regulations 2017 The Countryside and Rights of Way (CROW) Act 2000 Environmental Protection Act 1990 Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104 Wildlife and Countryside Act 1981 (as amended) DCLG (2012) National Policy Planning Framework Defra (2020) The Draft Environmental Bill Defra (2002) Working with the grain of nature: a biodiversity strategy for England Defra (2013) Catchment Based Approach: Improving the quality of our water environment Defra and Joint Nature Conservation Committee (JNCC) (2012) The UK post-2010 Biodiversity Framework Defra (2011) Water for Life - Water White Paper Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
	contributes to the economy and therefore should be protected and, where possible, enhanced. Avoidance of activities likely to cause the spread of Invasive Non-Native Species (INNS). A need to protect the green infrastructure network. A need to consider potential impact of excessive nutrients on European designated sites from all new development and wastewater implications.	Defra (2011) UK National Ecosystem Assessment and Defra, 2014, UK National Ecosystems Assessment Follow on, Synthesis of Key Findings Defra (2015) The Great Britain Invasive Non-native Species Strategy Defra (2008), England Biodiversity Strategy –climate change adaptation principles Environment Agency and RSPB (2004) Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners Environment Agency (undated) Hydroecology: Integration for modern regulation Environment Agency (undated) WFD River Basin Characterisation Project Technical Assessment Method - River abstraction and flow regulation Environment Agency (2008) Sea trout and salmon fisheries. Our strategy for 2002 – 2021 The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 The Eels (England and Wales) Regulations 2009 (as amended) HM Government (2019) A Green Future: Our 25 Year Plan to Improve the Environment Natural Environment and Rural Communities Act 2006 Natural England's standing advice on protected species Salmon and Freshwater Fisheries Act 1975 (as amended) The Countryside and Rights of Way (CROW) Act 2000 Wildlife and Countryside Act 1981 (as amended) Water Resources Act 1991 (as amended) Water Industry Act 1991 (as amended) Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104 The Environment Act 1995 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended) The Marine and Coastal Access Act 2009 *Regional/Local:* Natural England Site Improvement Plans (SIPs) Natural England National Character Area (NCA) Profiles Environment Agency and Defra, (2015) River Basin Management Plan South East River Basin district Environment Agency and Defra, (2015) River Basin Management Plan Thames River Basin district Environment Agency, Catchment Abstraction Management Strategy (various dates for relevant catchments) England Biodiversity Forum (2009) South East Biodiversity Strategy Defra (2010). Eel Management plans for the United Kingdom. South East River Basin District Environment Agency, The Wild Trout Trust, Atlantic Salmon Trust (2011) South Coast Sea Trout Action Plan RSPB Pagham Harbour Local Nature Reserve Management Plan 2013-2018

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
		Surrey Wildlife Trust 5-year Plan 2013-2018
Population and human health	Water resources play an important role in supporting the health and recreational needs of local communities and businesses. To ensure all communities have a clean, safe and attractive environment in which people can take pride. To ensure secure, safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities. Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities. Promotion of healthy communities and protection from risks to health and wellbeing. Promotion of a sustainable economy supported by access to essential utility and infrastructure services.	*International:* United Nations Economic Commission for Europe (1998) Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters The Environment Noise Directive (Directive 2002/49/EC) HM Treasury Infrastructure UK (2014) National Infrastructure European Commission The Water Framework Directive (2000/60/EC) The Natural Environment and Rural Communities (NERC) Act (2006) European Commission, Drinking Water Directive (1998/83/EC) and subsequent amendments European Commission, The 7th Environmental Action Programme (EAP) Environment Action Programme to 2020 'Living well, within the limits of our planet' (1386/2013/EU) European Commission Blueprint to Safeguard Europe's Water Resources *National:* The Countryside and Rights of Way (CROW) Act, 2000 Environmental Protection Act 1990 DCLG (2012) National Planning Policy Framework Defra, Environment Agency, Natural England, Forestry Commission England (2016) Creating a great place for living Defra (2005) Securing the Future; Delivering UK Sustainable Development Strategy Defra (2011) Water for Life -Water White Paper Defra (2011) The Natural Choice: securing the value of nature. The Natural Environment White Paper Defra (2011) Drought Direction 2011 and 2016 Defra, Environment Agency, Natural England, Forestry Commission England (2016) Creating a great place for living Environment Agency (2018) Creating a better place – Our ambition to 2020 HM Treasury (2015) Fixing the Foundations: Creating a More Prosperous Nation HM Treasury Infrastructure UK (2016) National Infrastructure Plan 2016 – 2021 The Natural Environment and Rural Communities (NERC) Act (2006) *Regional/Local:* Southern Water (2011) Strategic Statement 2015-40 and Southern Water (2013) updated Strategic Statement 2015-40 (Parts 1 to 4) Southern Water (2013) Five Year Business Plan 2015-2020 Public Rights of Way Improvement Plans (ROWIPs) Local level green infrastructure plans

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
Material assets and resource use	Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently. Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources. Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, whilst seeking to maintain a healthy water environment. Minimise the production of waste, ensure waste management is in line with the 'waste hierarchy', and eliminate waste sent to landfill. Promote the sustainable management of natural resources.	*International:* United Nations (2002) Commitments arising from the World Summit on Sustainable Development, Johannesburg *National:* DCLG (2012) National Planning Policy Framework Defra and The Environment Agency (2018) Resources and waste strategy for England Government Review of Waste Policy in England 2011 HM Treasury Infrastructure UK (2016) National Infrastructure Plan 2016 - 2021 Defra (2008) Future Water: the Government's water strategy for England Environment Agency (2009) Water Resources Strategy for England and Wales Environment Agency (2010) Water Resources Action Plan for England and Wales Environment Agency (2009) Water Resources Strategy Regional Action Plan for Southern Region Environmental Protection Act 1990 Defra (2015) The government's response to the Natural Capital Committee's third State of Natural Capital report Defra (2008) Future Water: the Government's water strategy for England HM Treasury (2015) Fixing the Foundations: creating a more prosperous nation.
Water	Promote sustainable water resource management, including a reduction in water consumption. Maintain and improve water resource and water quality (surface waters, groundwater and bathing water). Meet protected area targets related to	*International:* European Commission Floods Directive (2007/60/EC) European Commission The Water Framework Directive (2000/60/EC) European Commission Drinking Water Directive (1998/83/EC) (amended 2015) European Commission Environmental Liability Directive (2004/35/EC) Directive 2006/118EC of the European Parliament and of the council of 12 December 2006 on the protection of groundwater against pollution and deterioration European Commission Directive 2006/7/EC of the European Parliament and of the Council of 15 February

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
	water quality and flow in the Water Framework Directive. Expand the scope of water quality protection measures to all waters, surface waters and groundwater. Improve the quality of the water environment and the ecology which it supports, and continue to provide high levels of drinking water quality. Ensure appropriate management of abstractions and protect flow and level variability across the full range of regimes from low to high conditions. Prevent deterioration of waterbody status. Balance the abstraction of water for supply with the other functions and services the water environment performs or provides. Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change. Promote measures to enable and sustain long term improvement in water efficiency. Promote a catchment based approach to the management and work with local stakeholders to	2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC European Commission Urban Waste Water Treatment Directive (91/271/EEC) European Commission Nitrates Directive (91/676/EEC) *National:* Defra (2020) The Draft Environmental Bill Defra (2016) Guiding principles for water resources planning for water companies operating wholly or mainly Defra (2005) Making Space for Water Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report Defra (2012) National Policy Statement for Waste Water Defra (2011) Water for Life - Water White Paper Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper Defra (2011) Drought Direction 2011 and 2016 Defra (2008) Future Water: the Government's water strategy for England Defra and Welsh Government (2014) River Basin Planning Guidance Defra and Environment Agency (2015) How to Write and Publish a Drought Plan Environment Agency (2016) Drought Plan guidance extra information, Environmental Assessment for water Drought Plans Defra (2013) Catchment Based Approach: Improving the quality of our water environment Defra (2002) Directing the Flow – Priorities for Future Water Policy Environment Agency (2010) Water Resources Action Plan for England and Wales Environment Agency (2009) Water Resources Strategy for England and Wales Environment Agency (2013) Managing Water Abstraction Environment Agency (2013) Evidence Climate change approaches in water resources planning – overview of new methods Environment Agency (2018) Creating a better place – Our ambition to 2020 Environment Agency CAMS (various) Environment Agency and other lead authorities Shoreline Management Plans Defra and Environment Agency (2015) River Basin Management Plans (RBMPs) Flood and Water Management Act (2010) HM Government (2019) A Green Future: Our 25 Year Plan to Improve the Environment Regulators' Alliance for Progressing Infrastructure Development (RAPID) (202) Forward Programme 2020 - 2021 The Water Act (2003) The Water Environment (WFD) (England and Wales) Regulations 2003

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
	deliver catchment-based solutions to water quantity and quantity. Manage developments to protect and enhance the coastal zone	Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104 The Water Resources Management Plan Regulations 2007 Water Resources Act 1991 (as amended) Water Industry Act 1991 (as amended) UKTAG on the WFD Guidance Documents (various dates) Water UK (2015) Water resources long term planning framework Water Use (Temporary Bans) Order 2010 Defra (2016) Single Department Plan 2015 - 2020 *Regional/Local:* Environment Agency (2015) Drought response: our framework for England Drought Plans from adjacent water companies Southern water (2013) Drought Plan Environment Agency, Catchment Abstraction Management Strategy (various dates for relevant catchments) Environment Agency (2007) Water for the Future – Managing Water in the South East of England Environment Agency (2009) Water Resources Strategy, Regional Strategy Actions for South East Region Neighbouring water company Water Resource Management Plans (2015-2040). Environment Agency and Defra, (2015) South East River Basin District River Basin Environment Agency and Defra, (2015) River Basin Management Plan Thames River Basin district Environment Agency (2016) South East River Basin District, Flood risk management plan 2015-2021 Environment Agency (2007) Water for the Future - Managing Water in the South East of England. Water Resources in the South East (WRSE) Group (forthcoming) regional water resources strategy
Soil, geology and land use	Protect and enhance the quality and diversity of geology (including geological SSSIs) and soils, including geomorphology and geomorphological processes which can be lost or damaged by insensitive development. Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g.	International: Council of Europe (2003) European Soils Charter European Commission (2006) Thematic Strategy for Soil Protection National: Defra (2009) Safeguarding our Soils – A Strategy for England Defra (2004) The First Soil Action Plan for England DCLG (2012) National Policy Planning Framework Defra (2004) Rural Strategy 2004 Defra (2006) Sustainable Farming and Food Strategy: Forward Look The Countryside and Rights of Way (CROW) Act (2000) Wildlife and Countryside Act 1981 (as amended). *Regional/local:* National Character Area (NCA) profiles

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
	supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development. Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change. Promote mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions. Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.	Environment Agency and Defra, (2015) River Basin Management Plan South East River Basin district Environment Agency and Defra, (2015) River Basin Management Plan Thames River Basin district
Air and climate	Reduce greenhouse gas emissions. Targets include: reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050. Reduce the effects of air pollution on ecosystems. Improve overall air quality.	International: The Cancun Agreement (2011) & Kyoto Agreement (1997) European Commission (2008), The 2008 Ambient Air Quality Directive (2008/50/EC) European Commission (2009) Promotion of the use of energy from renewable sources Directive (2009/28/EC) European Commission (2005) Thematic Strategy on Air Pollution COP21 climate change summit, Paris, 2015 National: DCLG (2012) National Policy Planning Framework Defra (2020) The Draft Environmental Bill Defra (2019) The Clean Air Strategy

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
	Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change. Build in adaption to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly. Need for adaptive measures to respond to likely climate change impacts on water supply and demand.	Defra (2018) The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting Defra (2017) UK Climate Change Risk Assessment Defra (2015) The government's response to the Natural Capital Committee's third State of Natural Capital report Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report Defra (2008), England Biodiversity Strategy –climate change adaptation principles DECC (2007) Energy White Paper: Meeting the Energy Challenge Environment Agency (2020) National Flood and Coastal Erosion Risk Management Strategy for England Environment Agency (2018) Creating a better place – Our ambition to 2020 The Climate Change Act 2008 The Energy Act 2013 UKCIP (2018) UK Climate Projections UKCP18 (2018) Defra (2013) The National Adaptation Programme: Making the country resilient to a changing climate. Defra (2007) The Air Quality Strategy for England, Scotland and Wales Department of energy and climate change (2011) Planning our electric future: a White Paper for secure, affordable and low carbon electricity HM Government (2019) A Green Future: Our 25 Year Plan to Improve the Environment Natural Capital Committee (2020) State of Natural Capital Annual Report 2020 *Regional/Local:* Defra (2015) Climate adaptation reporting second round: Southern Water
Archaeology and cultural heritage	Built development in the vicinity of historic buildings and Scheduled Monuments could have implications for the setting and/or built fabric and cause damage to any archaeological deposits present on the site. Ensure active management of the Region's environmental and cultural assets. Ensure effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets are avoided.	International: The Convention for the protection of the architectural heritage of Europe (Granada Convention) The European Convention on the protection of archaeological heritage (Valletta Convention) National: Ancient Monuments and Archaeological Areas Act 1979 DCLG (2012) National Policy Planning Framework English Heritage (2008), Climate Change and the Historic Environment English Heritage (2010), Heritage at Risk Historic England (2019) Conservation Area Designation, Appraisal and Management: Historic England Advice Note 1 Historic England (2016) Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment Historic England (2015) The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Historic England (2015) Historic Environment Good Practice Advice in Planning Note 3 Department for Culture, Media and Sport (2001) The Historic Environment – A Force for the Future (2001)

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
	Consider effects on important wetland areas with potential for paleo-environmental deposits. Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlements. Conserve and enhance the historic environment, heritage assets and their settings.	Planning (Listed Buildings and Conservation Areas) Act 1990
Landscape and visual amenity	Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside) Abstraction and low river flows could negatively affect landscape and visual amenity. Enhance the value of the countryside by protecting the natural environment for this and future generations. Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders.	*International:* Council of Europe (2006) European Landscape Convention National: Natural England (2016) Conservation 21: Natural England's Conservation Strategy for the 21st Century DCLG (2012) National Policy Planning Framework Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network The Countryside and Rights of Way (CROW) Act (2000) Wildlife and Countryside Act 1981 (as amended) *Regional/Local:* A Strategy for the West Sussex Landscape, West Sussex County Council (2005) Natural England National Character Area (NCA) Profiles North Wessex Downs AONB Management Plan 2009-2014 Isle of Wight AONB Management Plan 2009 – 2014, Isle of Wight AONB Partnership 2009 Chichester Harbour AONB Management Plan Surrey Hills AONB Management Plan 2014-2019 (Surrey Hills Board) Kent Downs AONB Management Plan 2014-2019 High Weald AONB Management Plan 2014-2019 (High Weald Joint Advisory Committee)

SEA Topic	Key Policy Objectives	Plans, Policies and Programmes
		Dorset AONB - A Framework for the Future AONB Management Plan 2014 - 2019 Cranborne Chase AONB Management Plan 2014-2019 South Downs National Park (2013) Partnership Management Plan, Shaping the future of your south downs national park 2014-2019 Partnership Plan for the New Forest National Park (2015) An update of the National Park Management Plan with actions for 2015 -2020

3 Environmental Baseline Review

3.1 Introduction

An essential part of the SEA process is to identify the current baseline environmental conditions and their likely evolution during the life of the plan (in this case, a maximum of five years). The SEA Regulations also require that the evolution of baseline conditions of the plan area (that would take place with or without implementation of the plan) is identified. This is useful when determining impact significance, particularly with regards to baseline conditions that may already be improving or worsening and the rate of such change.

Full environmental baseline data are presented in Appendix C and have been drawn from a variety of sources, including a number of the plans and programmes reviewed as part of the SEA process (as set out above in **Table 2-1**). This environmental baseline review also summarises the likely future trends for the environmental issues being considered (as far as information is available). The key issues arising from the review of baseline conditions are summarised in Section 3.3.

With knowledge of existing conditions and how these may evolve in the absence of the Drought Plan, the potential effects (adverse and beneficial) of the Drought Plan can be identified, mitigated where necessary and subsequently monitored. The SEA considers the effect of alternative drought plan measures against the baseline environmental and social conditions that would exist in drought conditions when the drought plan measures would be implemented.

3.2 Limitations of the data and assumptions made

The area under consideration for the SEA (hereafter referred to as the “area”) is relatively large and covers a number of different geographical and political regions, which makes establishing a baseline at the sub-regional level challenging. There are also challenges around extrapolating information from data collated at differing spatial resolutions. Spatial data have been obtained wherever possible in relation to the SEA topics and the baseline is presented graphically as mapped information where appropriate (see Appendix C). In some instances, reporting cycles mean that available information is dated. The assessments presented in Section 5 and 6 include consideration of the uncertainty and limitations of the available data and comments are provided as to any underpinning assumptions made where data are lacking or dated.

3.3 Key Issues

Biodiversity, Fauna and Flora

The key sustainability issues arising from the baseline assessment for biodiversity are:

- The need to protect or enhance and support the achievement of favourable condition and conservation status of the region’s biodiversity, particularly within designated sites, species and habitats of principal importance.
- The need for development proposals with wastewater implications to consider the impact of excessive nutrients on designated sites.
- The need to avoid activities likely to cause irreversible damage to natural heritage.
- The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors and habitat patches or stepping stones.

- The need to take opportunities to deliver biodiversity net gains where possible.
- The need to control the spread of Invasive Non-Native Species (INNS).
- The need to recognise the importance of building wildlife's resilience to, and allowing wildlife to adapt to, climate change.
- The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services

Population and Human Health

The key sustainability issues arising from the baseline assessment for population and human health are:

- The need to ensure water supplies remain affordable especially for deprived or vulnerable communities, reflecting the importance of water for health and wellbeing.
- The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas.
- The need to ensure public awareness of drought conditions and importance of maintaining resilient, reliable public water supplies without the need for emergency drought measures.
- The need to ensure water quantity and quality is maintained for a range of uses including tourism, recreation, navigation and other use such as agriculture.
- The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to, protecting and enhancing recreation resources, green infrastructure and the natural and historic environment.
- The need to accommodate an increasing population and housing growth through provision of essential services including water supply.
- Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy.
- The need to reduce risk of harm from environmental hazards, such as flooding and drought.

Material Assets and Resource use

The key sustainability issues arising from the baseline assessment for material assets and resource use are:

- The need to minimise the consumption of resources, including water and energy.
- The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill.
- The need to continue to reduce leakage from the water supply system to help reduce demand for water.
- Daily consumption of water is relatively high and consequently there is a continued need to encourage more efficient water use by consumers.

Water

The key issues arising from the baseline assessment for water are:

- The need to further improve the quality of the region's river, estuarine, wetlands and coastal waters taking into account WFD objectives.

- The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives.
- The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface water and groundwaters.
- The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply.
- The need to ensure that people understand the value of water.

Flooding is not viewed as a key issue for the SEA water topic in relation to the Drought Plan because none of the drought management measures are likely to involve the construction of permanent physical infrastructure within areas at risk of flooding or contribute to an increase in flood risk.

Soil, Geology and landscape

The key sustainability issues arising from the baseline assessment for soil, geology and land use are:

- The need to protect and enhance geological features of importance (including geological SSSIs) and maintain and enhance soil function and health.
- The need to manage the land and soil more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources and best and most versatile soils).
- The Drought Plan is unlikely to affect land-use as no permanent development will be required to meet the objectives of the plan.

Air and Climate change

The key sustainability issues arising from the baseline assessment for air and climate are:

- The need to reduce air pollutant and greenhouse emissions and limit air emissions to comply with air quality standards.
- The need to reduce greenhouse gas emissions (industrial processes and transport).
- The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities afforded by climate change.

Archaeology and Cultural Heritage

The key sustainability issues arising from the baseline assessment for archaeology and cultural heritage are:

- The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment.
- The need to protect water-dependent heritage sites during drought conditions.

Landscape and Visual Amenity

The key sustainability issues arising from the baseline assessment for landscape and visual amenity are:

- The need to protect and improve the natural beauty of the area's AONBs, National Parks and other areas of natural beauty.
- The need to protect and improve the character of landscapes and townscapes.

3.4 Inter-relationships

It is noted that there are inter-relationships between SEA topics. These include impacts of changes to water flows and quality on biodiversity, the economy, recreation, tourism, navigation, cultural heritage and landscape. Inter-relationships that result in changes to individual effects are considered by evaluation of synergistic effects throughout the assessment.

4 Methodology

4.1 Introduction

This section outlines the methodology that has been used to undertake the SEA of the drought management options in the Southern Water Draft Drought Plan, taking account of the relevant key parts of the SEA Regulations:

> ***Regulation 12***:
> *(2) The report shall identify, describe and evaluate the likely significant effects on the environment of –*
> *(a) implementing the plan or programme; and*
> *(b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme*
>
> ***Schedule 2***:
> The Environmental Report should include:
> *(6). The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects and secondary, cumulative and synergistic effects.*
> *(8). An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information.*

In line with the EA's Water Resource National Framework document, a regional water resources management plan is being delivered as part of Water Resources South East (WRSE). The group consists of six water companies in the South East (AFW, PWC, SES, SEW, SWS and TWUL) and includes the EA in the project management board. The aim to is to develop a resilient plan that considers the whole of South East England as a single region, unconstrained by water company boundaries, in assessing the options to best meet the water requirements of the domestic and non-domestic consumers in the area. The regional plan is to be finalised in 2023. The WRMPs to be published by individual water companies in 2024 are expected to align with the regional plan.

An environmental assessment methodology has been developed for the regional plan and it is anticipated that the environmental assessments supporting the individual WRMP24s will also be aligned with the proposed regional methodology. The six water companies have submitted all feasible options for drought and water resource planning to WRSE for environmental assessment, which includes SEA, HRA and WFD assessments. This work is currently ongoing and the findings are not available to inform the environmental assessments for the Draft Drought Plan. In line with extant guidance, where possible the links to the proposed regional environmental assessment methodology are set out within this chapter, in particular the links between the SEA objectives are set out in Table 4-1.

4.2 Assessment Methodology and SEA Framework

The environmental and social assessment of the alternative drought plan options adopts an 'objectives-led' approach. Establishing assessment objectives is a recognised way of considering the environmental effects of a plan and comparing the effects of alternatives. The SEA objectives are derived from environmental and social objectives established in law, policy

or other plans and programmes, as well as from the review of baseline information and environmental problems associated with the SEA topics.

An assessment framework of objectives has been developed based on:

- The key policy messages and environmental and social protection objectives identified in the review of policies, and other plans and programmes (see Section 2). This helps to highlight any area where the Drought Plan will support or hinder the achievement of the objectives of policies, other plans and programmes.
- The current state of the environment in the area under consideration, its likely future evolution and the key environmental issues identified (see Section 3).

The SEA objectives are set out in **Table 4-1** and take account of the comments received from statutory bodies through the scoping consultation. The links to the proposed SEA framework for the regional plan is also provided. The following sections describe how these SEA objectives have been used in the assessment of the environmental and social effects of the potential drought plan measures. By assessing each option against these objectives, the effects of the different drought management measures can be objectively compared and the findings used to help determine the measures to be included in the Draft Drought Plan, their timing and phasing of implementation.

As well as the overall SEA objectives, a number of key questions have been developed for each SEA topic. These key questions prompted the assessment and ensured it considered all the relevant aspects. These key questions have been updated from those presented in the scoping consultation to statutory bodies.

The assessment of each option included consideration of the following information:

- Details of each potential drought management measure;
- Likelihood and predicted frequency of deployment of the measure;
- Construction (where applicable) and operational/implementation details;
- Relevant information contained in Environmental Assessment Reports (EARs) relating to Drought Permit or Drought Order options;
- Benefits to the water supply-demand position in a drought (taking uncertainty into account); and
- Key elements of the baseline environment, such as location of designated sites, priority habitats and species, landscape areas or heritage assets, recreational facilities and other environmental features.

Table 4-1 SEA objectives and assessment approach

SEA Topic	SEA objective	Key questions	Sources of information	Links to proposed SEA objectives for regional plan[13]
Biodiversity, fauna and flora	1.1 To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species and to enhance natural capital including net gain in biodiversity.	• Will it contribute to favourable condition or favourable conservation status of designated sites for nature conservation (SAC, SPA, Ramsar, SSSI, or locally designated sites)? • Will it adversely impact upon the water environment in the Solent region through an excessive presence of nutrients? • Will it have Likely Significant Effects on European sites (with reference to HRA undertaken in parallel)? Or will it cause significant harm to a SSSI, Ancient Woodland, or priority habitat? • Will it protect and enhance aquatic, transitional and terrestrial priority species and habitats? • Will it help to restore the natural ecosystem function? • Will it ensure maintenance or support provision of fish passage with respect to migratory fish functioning habitat connectivity? • Will it contribute to the sustainable management of natural habitats and ecosystems, i.e. within their limits and capacities? • Will it promote wildlife's resilience to and/ or ability to adapt to climate change? • Will it affect WFD compliance e.g. good ecological potential/status? • Will it protect or enhance natural capital and ecosystem services? • Will the option contribute to a net gain or loss in biodiversity, and/ or habitat connectivity?	Drought Plan information EARs: • Significance of effects on environmental features assessment. • WFD status • Hydrological assessment HRA Screening and Appropriate Assessments	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)

[13] WRSE (September 2020) Strategic Environmental Scoping Report

SEA Topic	SEA objective	Key questions	Sources of information	Links to proposed SEA objectives for regional plan[13]
		• Will it create areas of improved biodiversity in urban or deprived areas or easily accessible to those areas?		
	1.2 To avoid introducing or spreading INNS.	• Will it limit, reduce or increase the risk of spread of Non-Native Species (INNS)?	EARs significance of effects on environmental features assessment.	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)
Population and human health	2.1 To protect and enhance health and well-being (including raising awareness of the importance and value of the water environment for health and well-being).	• Will it help to ensure provision of access to a secure resilient and affordable supply of drinking water? • Will it help to protect or improve drinking water quality? • Will it raise awareness of the importance and value of the water environment for health and well-being? • Will it assist in ensuring provision of essential services to support health and well-being?	Drought Plan information	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing
	2.2 To protect and enhance the water environment for other users including sustainable recreation, tourism and navigation, as well as terrestrial recreational resources.	• Will it protect or enhance opportunities for recreation and tourist activities such as public rights of way, including navigation, National Trails and Public Rights of Way)? • Will it help to promote healthy communities and protect from risks to health and wellbeing (for example through nuisance or resulting from traffic or transport changes, disruption to safe and reliable water /sewerage services)? Does it protect and enhance the green infrastructure network? • Will the option minimise disturbance from noise, light, visual, and transport?	Drought Plan information EARs: • Recreation assessment • Navigation assessment	Maintain and enhance tourism and recreation
	2.3 To promote a sustainable	• Will it assist in ensuring provision of essential services and good access to essential services?	Drought Plan information	Avoid negative effects on built assets and infrastructure

SEA Topic	SEA objective	Key questions	Sources of information	Links to proposed SEA objectives for regional plan[13]
	economy with good access to essential services, including a resilient, high quality and affordable supply of water.	• Will the option affect road or rail infrastructure? • Will the option allow for economic development and/ or diversity?		
Material assets and resource use	3.1 To reduce, and make more efficient, the domestic, industrial and commercial consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.	• Will it help to minimise the demand for resources? • Will it use natural rather than built solutions where appropriate? • Will it minimise the use of energy and promote energy efficiency? • Will it make use of existing infrastructure? • Will it help to encourage sustainable design or use of sustainable materials (e.g. supplied from local resources)? • Will it reduce the amount of waste generated and increase the proportion sent to reuse or recycling?	Drought Plan information	Minimise resource use and waste production
	3.2 To promote and secure the efficient and sustainable use of water to ensure resilient water supplies for people and businesses.	• Will it enable efficient water use and ensure maintenance of water supplies? • Will it help to minimise the demand for water?	Drought Plan information	Deliver reliable and resilient water supplies
Water	4.1 To avoid adverse impact on surface and groundwater levels	• Will it lead to a change in river flows, wetted width or river level?	EARs hydrological assessment	Protect and enhance the quality of the water environment and water resources

SEA Topic	SEA objective	Key questions	Sources of information	Links to proposed SEA objectives for regional plan[13]
	and flows and wetland water supply including when this impacts on habitats.	• Will it alter the flow regime or residence time or water level of surface waters including water supply to wetlands? • Will it lead to changes in groundwater levels and recharge? • Will it promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity? • Will it contribute towards improving the awareness of water sustainability and its true value? • Will it promote measures to enable improvements in water efficiency and assist in reducing water abstraction? • Will it lead to a temporary or permanent deterioration to WFD water body status?		
	4.2 To protect and enhance surface and groundwater quality and protect and enhance estuarine waterbodies.	• Will it present a risk to water quality of groundwater, surface water or estuarine waters? • Will it promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quality? • Will it achieve WFD compliance? E.g. good ecological potential/status, prevent deterioration of WFD status between status classes? • Will it prevent water pollution? • Will it affect WFD protected areas?	EARs water quality assessment	Protect and enhance the quality of the water environment and water resources
	4.3 To ensure appropriate and sustainable management of abstractions to maintain water supplies whilst protecting ecosystem	• Will it achieve an appropriate balance of supply with other functions and services (including agriculture and navigation)? • Will it ensure sustainable abstractions, taking account of water resources availability status? • Will it promote achievement of protected area targets on flow or water quality?	Drought Plan Information	Deliver reliable and resilient water supplies

SEA Topic	SEA objective	Key questions	Sources of information	Links to proposed SEA objectives for regional plan[13]
	functions and services that rely on water resources.			
Soil, geology and land use	5.1 To protect and enhance geology, geomorphology and the quality and quantity of soils.	• Will it avoid damage to and protect geologically important sites (e.g. geological SSSIs)? • Will it protect and enhance geomorphology and geomorphological processes? • Will it protect and enhance the quality of soils? • Will it prevent soil erosion? • Will the option remove impacts or improve ecosystem functioning of peat based soils?	Spatial information for geological SSSIs EARs geomorphological assessment	Protect and enhance the functionality, quantity and quality of soils
Air and Climate	6.1 To reduce air pollutant emissions.	• Will it reduce or minimise air pollutant emissions? • Will it increase emissions to air in an areas sensitive to emissions (e.g. in proximity to an Air Quality Management Area (AQMA) or to sensitive habitat or more deprived area)?	Drought Plan information Spatial information for AQMAs	Reduce and minimise air emissions
	6.2 To reduce energy consumption and greenhouse gas emissions.	• Will it reduce or minimise greenhouse gas emissions? • Will it result in an increase in greenhouse gas emissions over and above that that would be produced to supply an equivalent quantity of water in non-drought conditions? • Will it reduce carbon and contribute to carbon reduction targets?	Drought Plan information	Reduce embodied and operational carbon emissions
	6.3 To adapt and improve resilience to the threats of climate change.	• Will it reduce vulnerability or increase resilience to risks associated with climate change effects (e.g. drought)? • Will it create opportunities to benefit from potential effects of climate change? • Will it make use of renewable energy?	Drought Plan information	Reduce vulnerability to climate change risks and hazards

SEA Topic	SEA objective	Key questions	Sources of information	Links to proposed SEA objectives for regional plan[13]
Archaeology and cultural heritage	7.1 To conserve and enhance the historic environment, heritage assets and their settings and protect archaeologically important sites.	• Will it affect designated or non-designated historic assets, sites and features? • Will it affect the setting and/or significance of a historic asset? • Will it affect archaeology (including unknown archaeology)? • Will it affect heritage assets at risk? • Will it historic landscape/ townscape areas? • Will it maintain and enhance the historic environment, including paleo-environmental deposits? • Will the hydrological setting of water-dependent assets be altered, such as important wetland areas with potential for paleo-environmental deposits? • Will it improve access, value, understanding or enjoyment of heritage assets and culturally/historically important assets in the region?	EAR Archaeology assessment and spatial information	Conserve, protect and enhance the historic environment, including archaeology
Landscape and visual amenity	8.1 To protect, enhance the quality of and improve access to designated and undesignated landscapes, townscapes and the countryside.	• Will it have an effect on the character of the landscape, townscape or seascape, including tranquillity and views? • Will it improve access to the countryside? • Will it protect and enhance designated landscapes and features? • Will it create or improve green infrastructure which contributes to access to the landscape? • Where relevant, is the option compatible with the protected landscapes management plan?	EAR Landscape assessment and spatial information	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity

4.3 Proposed Framework for Assessment

4.3.1 Primary Assessment

The appraisal framework set out in **Table 4-2** (below) has been used to assess each of the potential drought plan measures against the SEA objectives. The outcomes of the assessment have been used to inform the development of the Draft Drought Plan 2022, primarily the selection and phasing of measures for inclusion in Southern Water's Drought Plan.

The first and second columns set out the SEA topics and objectives. The third column provides commentary and evaluation of the impact of each alternative measure on the objectives for each topic, with reference to the key questions set out above in **Table 4-1**. The assessment assumes the implementation of standard industry best practice methods in implementing the measures as well as any defined mitigation measures (which are set out in the commentary) such that the significance of effects relates to the residual effects after the application of any mitigation measures in line with the ODPM Practical Guide and UKWIR SEA national guidance. We understand that the UKWIR guidance is currently being revised and will be published in due course.

The eighth column identifies the magnitude of the effect assessed against a scale of negligible to high. The effect magnitude includes consideration of the nature of the impact, likelihood, duration and permanence (fourth, fifth and seventh columns of Table 4-2) in compliance with criteria for determining the likely significance of effects specified in the SEA Regulations Part 2, Regulation 9(2a) and Schedule 1. The value and sensitivity of the receptor(s) is identified in the ninth column on a scale of negligible to high. The scale of the effect, which might relate to either geographical scale or the size of the population affected, is identified in the sixth column on a scale of negligible to large. With respect to duration, short-term effects are defined as those that last for up to six months, medium term effects are those that extend beyond six months to two years whilst long term effects are assessed as those that continue for greater than two years.

The residual adverse and beneficial effects (after application of best practice approaches and any appropriate and explicitly defined mitigation measures) are identified in the tenth and eleventh columns respectively. These are identified separately so as to avoid mixing adverse and beneficial effects, in line with SEA best practice and the proposed methodology for the regional plan, so that these are clearly understood and the transparency of the effects is maintained throughout the Drought Plan decision-making process.

Where qualitative and/or quantitative information was available (e.g. as identified by a Drought Permit/Order Environmental Assessment Report (EAR), or the HRA or WFD assessment process), this has been used to inform the assessment. Objectives or key questions that are not supported by available data or information have been evaluated using spatial analysis, professional judgement and applicable assessment guidelines relating to that topic/objective.

Varying levels of uncertainty are inherent within the assessment process. The level of uncertainty of the option assessment for each SEA objective is included in the appraisal framework. Where there is significant uncertainty which precludes an effects assessment category being assigned for a particular SEA objective, an "uncertain" residual effects assessment label is applied to that specific SEA objective.

Table 4-2 SEA appraisal framework completed for each potential Drought Plan measure

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
Biodiversity, fauna and flora	1.1 To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species and to enhance natural capital including net gain in biodiversity.									
	1.2 To avoid introducing or spreading INNS.									
Population and human health	2.1 To protect and enhance health and well-being (including raising awareness of the importance and value of the water environment for health and well-being).									
	2.2 To protect and enhance the water environment for other users including sustainable recreation, tourism and navigation, as well as terrestrial recreational resources.									

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
	2.3 To promote a sustainable economy with good access to essential services, including a resilient, high quality and affordable supply of water.									
Material assets and resource use	3.1 To reduce, and make more efficient, the domestic, industrial and commercial consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.									
	3.2 To promote and secure the efficient and sustainable use of water to ensure resilient water supplies for people and businesses.									
Water	4.1 To avoid adverse impact on surface and groundwater levels and flows and water supply to wetlands,									

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
	including when this impacts on habitats.									
	4.2 To protect and enhance surface and groundwater quality and protect and enhance estuarine waterbodies.									
	4.3 To ensure appropriate and sustainable management of abstractions to maintain water supplies whilst protecting ecosystem functions and services that rely on water resources.									
Soil, geology and land use	5.1 To protect and enhance geology, geomorphology and the quality and quantity of soils.									
Air and Climate	6.1 To reduce air pollutant emissions. 6.2 To reduce energy consumption and greenhouse gas emissions.									

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
	6.3 To adapt and improve resilience to the threats of climate change.									
Archaeology and cultural heritage	7.1 To conserve and enhance the historic environment, heritage assets and their settings and protect archaeologically important sites.									
Landscape and visual amenity	8.1 To protect, enhance the quality of and improve access to designated and undesignated landscapes, townscapes and the countryside.									

For each SEA objective, a residual effects assessment was determined against a significance of effects matrix (**Figure 4-1**) which takes into account the value/sensitivity of the receptor (e.g. species, air quality, river water quality, landscape value, heritage feature) and the magnitude of the assessed effect. This significance matrix comprises effects on a scale ranging from 'major beneficial' to 'major adverse'. For the box signifying low magnitude and high receptor value/sensitivity, this could result in a greater than 'moderate' effects being assigned dependent on the sensitivity/value of the receptor. This colour coding was used to complete the columns for residual effects in the appraisal framework.

The resulting significance of effects has been used in helping Southern Water to select the measures for inclusion in the Drought Plan and the subsequent timing and phasing of the selected measures. Where major adverse effects are predicted, measures envisaged to prevent, reduce (and as far as possible, offset) these effects on the environment (as a result of implementing the measure) are outlined where relevant/appropriate.

Figure 4-1 Significance of effect matrix

Significance of Effect		Value/sensitivity of receptor		
		High	Medium	Low
Effect magnitude (includes scale of effect)	High	Major Beneficial / Major Adverse	Major Beneficial / Major Adverse	Moderate Beneficial / Moderate Adverse
	Medium	Major Beneficial / Major Adverse	Moderate Beneficial / Moderate Adverse	Minor Beneficial / Minor Adverse
	Low		Minor Beneficial / Minor Adverse	Negligible

= Significance of effect dependent on value/sensitivity of receptor and magnitude

General Significance Definitions

Major - effects represent key factors in the decision-making process. They are generally associated with sites and features of international, national or regional importance. If adverse, such resources/features are generally those which cannot be replaced or relocated.

Moderate - effects are likely to be important considerations at a regional or district scale. If adverse, they are likely to be of potential concern.

Minor - effects are not likely to be decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.

Negligible - effects which are not perceptible, being within normal bounds of variation or the margin of forecasting error.

For the **'high' effect magnitude** (top row), a major effect significance is assigned for both high and medium value receptors to reflect the magnitude of the effect.

For the **'low' effect magnitude and 'high' value receptor** (bottom left box), the significance of effect could be minor, moderate or major dependent on the precise nature of the impact or benefit.

All options (both supply-side options and demand management measures) are assessed to the same level of detail, in line with the SEA legislative requirements, national SEA guidance and the UKWIR SEA guidance. The level of detail is consistent with the strategic nature of SEA.

Summarising the effects assessment

The completed appraisal framework tables for each drought plan measure are presented in **Appendix D**. The completed appraisal framework table for each measure is also accompanied by a summary comprising an overview of the adverse and beneficial. In assessing each alternative measure, the effects (beneficial or adverse) of any interactions between SEA topics are also identified, assessed and reported.

A summary visual evaluation matrix (see example in **Table 4-3**) has been completed for each drought plan option and presented in full in **Appendix D**. The summary of the assessment is presented in Section 5. Each coloured box represents the assessed significance of effect for that SEA objective for the particular drought plan measure (for example, a red box indicates a major adverse significance of effect whilst blue indicates a negligible significance of effect and dark green a major beneficial significance of effect). Adverse and beneficial effects are kept separate in line with SEA best practice.

Table 4-3 Example of a Visual Evaluation Matrix

Drought Plan measure	SEA objective – adverse effects									SEA objective – beneficial effects								
	Objective 1.1	*Objective 1.2*	*Objective 1.3*	*Objective 2.1*	*Objective 2.2*	*Objective 2.3*	*Objective 3.1*	*Objective 3.2*	*Objective 4.1*	*Objective 1.1*	*Objective 1.2*	*Objective 1.3*	*Objective 2.1*	*Objective 2.2*	*Objective 2.3*	*Objective 3.1*	*Objective 3.2*	*Objective 4.1*
[Measure 1]																		
[Measure 2]																		

Secondary, Cumulative and Synergistic Environmental Effects

Schedule 2(6) of the SEA Regulations requires the assessment of "the likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects…." For the purposes of this report, "cumulative effects" is taken to include secondary and synergistic effects.

A cumulative effects assessment has been carried out in order to identify if different measures are mutually exclusive or whether combinations of measures might lead to greater adverse impacts (or beneficial effects). This involved examining the likely significant effects of each of the drought measures individually, in combination with each other (both inter- and intra- water resource zone), and in combination with the implementation of other plans and programmes. A matrix has been used to help consider interactions between the measures. In assessing

these effects, consideration has been given to other factors which may affect the receiving environment during implementation of the measures.

The following cumulative assessments have been undertaken (see Section 6 for the assessment findings):

- An assessment of cumulative effects of drought plan measures that could potentially be implemented at the same time. Mutually exclusive measures (e.g. those that draw upon the same resource or use the same site) are also identified.
- Assessment of cumulative effects of the Draft Drought Plan 2022 with the Southern Water 2019 Water Resource Management Plan (WRMP), other water company drought plans and WRMPs, Environment Agency drought plans (and any other drought plans prepared by other bodies).
- Assessment of potential cumulative effects of the Southern Water Drought Plan with any other identified relevant programmes, plans and projects that may be in place / implemented during the period of the Drought Plan.

Neighbouring water companies will be invited to comment on the Draft Drought Plan 2022 and Southern Water is also continuing its communications with neighbouring companies regarding potential measures in their respective future drought plans and WRMPs to identify any new trans-boundary issues that may arise. Potential effects with other plans are identified, particularly in the context of spatial and temporal proximity.

Drought Plans comprise a basket of measures, the implementation of which are dependent on the particular drought conditions experienced and are subject to temporal, spatial and other factors. The exact timing of implementation of drought management measures will not be known until a drought is experienced. One of the limitations of the cumulative or in-combination assessment of Southern Water's Drought Plan is that whilst an environmental appraisal of each measure has been undertaken, the lack of predictability of which measures will be implemented in any particular drought event means that it is not possible to provide a definitive cumulative assessment of the impacts of the plan for a possible future drought event. Cumulative assessments have therefore been undertaken assuming as a worst case that the implementation of measures could occur simultaneously. Spatial proximity and potential impacts on a common receptor is the primary consideration (e.g. the same designated area, reach of river or the same estuary).

Due to the uncertainty of timing of implementation of drought measures, the findings of the SEA will need to be reviewed during an actual drought and the cumulative assessment updated based on the actual measures proposed for implementation at that time taking account of the findings of the cumulative assessments set out in Section 6.

4.4 Limitations of the Assessment

SEA is a planning level assessment aimed at highlighting potential environmental concerns at a strategic level. Where particular limitations or outstanding issues are known, these are described in the SEA appraisal tables for the relevant drought management option concerned. Further detailed assessment will still be required in an actual drought as part of preparations to implement any specific drought management measure to take account of the prevailing environmental conditions and any new evidence that is available at that time.

5 Assessment of Drought Plan Options

5.1 Assessment of Measures against SEA Objectives

Assessment of the drought management measures has been carried out in accordance with the methodology described in Section 4. Appraisal framework assessment tables have been completed for each drought management measure and are presented in full in **Appendix D**. A summary of the assessment is presented in this section as colour-coded visual evaluation (VE) summary matrices (**Figures 5.1, 5.2 and 5.3**). The colour coding represents a range from major adverse effect in red through to major beneficial effects in dark green as shown in the legend below.

Legend:

Colour		Significance of Effect
	Dark Green	Major Beneficial
	Mid Green	Moderate Beneficial
	Light Green	Minor Beneficial
	Blue	Negligible
	Yellow	Minor Adverse
	Orange	Moderate Adverse
	Red	Major Adverse
	None	Not Applicable

5.2 Demand-Side Measures Assessment Findings

A visual summary of the SEA conclusions for each of the demand side measures considered for Southern Water's Draft Drought Plan 2022 is provided in **Figure 5-1**. The completed appraisal tables for each of the options are provided in **Appendix D**.

Overall, demand-side measures serve to reduce pressure on water resources by reducing customer demand for water and thereby helping to reduce the volumes of water abstracted from the water environment. This, in turn, also contributes to reducing the amount of energy needed for water abstraction, treatment and distribution.

Demand management measures typically provide mostly minor beneficial effects through their contribution to sustainable abstraction, protecting human health and well-being by helping conserve water supplies in drought for customers' essential uses, and helping to reduce drought stress on the water environment. However, some moderate to major adverse effects have also been identified with respect to those demand management measures that temporarily prohibit specific non-essential water uses due to the adverse effects such measures have on those people who rely on those uses of water for their livelihoods. Minor adverse effects on landscape/townscapes, land use, population, air quality (restrictions on using water for dust suppression) and some water dependent recreation and heritage facilities may be associated with Temporary Use Bans and non-essential water use ban Drought Order.

The potential application of an Emergency Drought Order to ration water supplies by using standpipes or rota cuts in emergency conditions is a last resort drought management option and would lead to major adverse effects on the wider population and livelihoods across the Southern Water supply area, in particular in relation to risks to human health.

Figure 5-1 Visual evaluation matrix summary for demand measures

		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Land-scape	
SEA Objective Reference Number		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
Media/ water efficiency campaign	Adverse Effects																	No adverse effects have been identified for this drought management measure.
	Beneficial Effects																	Minor beneficial effects include reducing demand for water and securing essential supplies of water to protect population and human health. Reducing demand for water will have minor beneficial effects by helping to reduce stress on the water environment and contributing to sustainable abstraction. Reducing water demand will also help to improve the resilience of water supplies to drought.
Increased leak detection and repair activity	Adverse Effects																	Minor adverse effects identified are associated with emissions to air (air pollutants and greenhouse gas emissions) as a result of traffic disruption and vehicle movements, as well as temporary nuisance to local communities. All other adverse effects identified are negligible.
	Beneficial Effects																	Minor beneficial effects include reducing demand for water and securing essential supplies of water to protect population and human health. Reducing demand for water will have minor beneficial effects by helping to reduce stress on the water environment and contributing to sustainable abstraction. Reducing water demand will also help to improve the resilience of water supplies to drought.
Temporary Use Ban	Adverse Effects																	A moderate adverse effect has been identified in terms of promoting a sustainable economy due to the effect of the ban on livelihoods for water dependent trades (e.g. landscaping). Minor adverse effects in respect of impact on some recreational facilities, soils management in dry weather, localised townscape effects and effects on certain water settings of heritage features
	Beneficial Effects																	Minor beneficial effects include reducing demand for water and securing essential supplies of water to protect population and human health. Reducing demand for water will have minor beneficial effects by helping to reduce stress on the water environment and contributing to sustainable abstraction. Reducing water demand will also help to improve the resilience of water supplies to drought.
Non-essential use ban Drought Order	Adverse Effects																	A major adverse effect has been identified in terms of promoting a sustainable economy due to the effect of the ban on livelihoods for water dependent trades (e.g. window cleaners, car washing). Moderate

		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Land-scape	
SEA Objective Reference Number		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
																		adverse effects in respect of impact on some recreational facilities and some aspects of tourism. Minor adverse effect on soils management in dry weather, localised townscape effects and effects on certain water settings of heritage features
	Beneficial Effects																	Minor beneficial effects include reducing demand for water and securing essential supplies of water to protect population and human health. Reducing demand for water will have minor beneficial effects by helping to reduce stress on the water environment and contributing to sustainable abstraction. Reducing water demand will also help to improve the resilience of water supplies to drought.
Emergency Drought Order to ration water supplies by rota cuts or standpipes	Adverse Effects																	Significant major adverse effects relating to the impacts on population and human health and safety, livelihoods, plus impacts on water-dependent recreational facilities and the availability of secure, resilient water supplies. Water rationing will cause significant disruption to social and commercial functioning in the areas affected. Potential moderate adverse effects on the setting of certain heritage assets and visual amenities/townscapes. Minor adverse effect on soils management in dry weather.
	Beneficial Effects																	Reducing demand for water will have minor beneficial effects by helping to reduce stress on the water environment and contributing to sustainable abstraction.

5.3 Supply-Side Measures Assessment Findings

A visual summary of the SEA conclusions for each of the supply-side measures considered for inclusion in Southern Water's Draft Drought Plan 2022 is provided in **Figure 5-2**. The completed appraisal tables for each of these options are provided in **Appendix D**. The findings of the WFD assessments and the HRA have also informed the SEA assessment. These options relate to those supply-side measures that do not require a Drought Order or Drought Permit and include:

- "resting" certain water sources to conserve water stored in reservoirs or natural groundwater bodies for use at a later stage in a drought; and
- potential use of water tankering to bring small volumes of water to specific locations from areas where there is a surplus availability of water supplies (likely to be from outside of the Southern Water supply area).

"Rest" water sources

The options to "rest" certain water sources by reducing abstraction during the onset of drought conditions to conserve water storage for later use if drought conditions intensify provides minor beneficial effects in respect of resilience to the prolonged effects of drought, as well as minor beneficial effects on the water environment by reducing the impact of abstraction at times of more intense drought conditions by drawing on the stored water rather than impacting on river flow.

Tankering of water

Tankering of water as an emergency measure to maintain water supplies has negligible adverse effects on biodiversity, archaeology and cultural heritage, or landscape and visual amenity. There is the potential for minor adverse effects with respect to local nuisance due to increased traffic on the roads and the resulting local impact on air quality and greenhouse gas emissions. Tanker movements and operations at tanker filling and discharge sites (which could involve 24 hour activity, lighting and use of pump generators) have the potential for minor to moderate temporary adverse effects regarding the wellbeing of local communities.

Tankering of water would result in minor beneficial effects in respect of human health through maintaining water supply during severe drought conditions. However, on the basis of previous droughts, there is likely to be limited resource availability across the Southern Water supply area and neighbouring water companies are likely to be similarly affected and seeking to conserve their own resources, so the scale of beneficial effects is limited.

Figure 5-2 Visual evaluation matrix summary for supply-side measures

		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	
SEA Objective Reference Number		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
Rest Groundwater Sources – Isle of Wight	Adverse Effects																	The option aims to limit the use of key groundwater sources early on in a drought to improve drought resilience later on in a severe or prolonged drought. No or negligible adverse effects are anticipated with implementation of this option, reflecting optimised use of existing water sources.
	Beneficial Effects																	The option would help make existing resources more resilient to the prolonged effects of drought and helping to reduce stress on the water environment by conserving groundwater storage so that increased abstraction later in a drought can be met from storage with lower effects on the water environment.
Rest Groundwater Worthing Sussex	Adverse Effects																	The option aims to limit the use of key groundwater sources early on in a drought to improve drought resilience later on in a severe or prolonged drought. No or negligible adverse effects are anticipated with implementation of this option, reflecting optimised use of existing water sources.
	Beneficial Effects																	The option would help make existing resources more resilient to the prolonged effects of drought and helping to reduce stress on the water environment by conserving groundwater storage so that increased abstraction later in a drought can be met from storage with lower effects on the water environment.
Rest Weir Wood Reservoir	Adverse Effects																	Implementation of this option would result in minor adverse effects relating to a net increase in energy consumption, air pollution and greenhouse gas emissions associated with the increased volume of water that would be pumped from other sources to rest use of the reservoir. The negligible increase in the level of Weir Wood Reservoir could have a negligible adverse impact on migrating waders in the SSSI.
	Beneficial Effects																	The option would help make existing resources more resilient to the prolonged effects of drought and helping to reduce stress on the water environment by conserving reservoir storage so that increased abstraction later in a drought can be met from storage with lower effects on the water environment and reducing the risk of requiring a Drought Order at Weir Wood Reservoir.
Tankering of water	Adverse Effects																	Tankering of water is unlikely to significantly affect the environment in terms of biodiversity, archaeology and cultural heritage, or landscape and visual amenity. However, there is the potential for minor adverse effects with respect to increased traffic on the roads and the resulting emissions to air. This includes nuisance and air quality effects to the local population and minor adverse effects regarding energy consumption and CO2 emissions. The tanker movements, traffic effects, and operations at loading and unloading sites (which could involve 24hour activity, lighting and possibly powered by generators) have the potential for minor to moderate temporary adverse effects regarding the wellbeing of local communities,

		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	
SEA Objective Reference Number		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
	Beneficial Effects																	Tankering of water would result in minor beneficial effects on human health and economic activity through maintaining essential water supplies during severe drought conditions. Tankering also has the potential to make a small contribution to relieving pressure on water resources during times of severe drought. However, on the basis of previous droughts, there is likely to be limited resource availability across the supply area and neighbouring companies are likely to be similarly affected and seeking to conserve their own water resources.

5.4 Drought Permit and Drought Order Options

The key SEA findings of the Drought Permit and Drought Order options are summarised in **Figure 5-3**. The completed appraisal tables for each of these options are provided in **Appendix D**. The findings of the WFD assessment and HRA have been informed the SEA.

Many of the Drought Permit and Drought Order options involve temporary modifications to existing abstraction licence conditions (e.g. to increase the volume of water that can be abstracted or to reduce the river flow conditions at which abstraction would normally need to cease) and therefore they do not involve any construction works. Construction works are associated with a new pipeline to enable implementation of the Candover Augmentation Scheme Drought Order. Very minor construction works are also required to provide a small diameter pipeline to discharge a compensation flow to the Lukely Brook for the Lukely Brook Water Supply Works (WSW) Drought Permit.

All of these options lead to some adverse operational effects on the environment (ranging from negligible to major significance of effect), but equally they contribute minor to major beneficial effects in respect of those SEA objectives relating to population and human health plus maintaining water supply resilience in drought conditions. The adverse effects of the Drought Permit or Drought Order measures vary considerably depending on the scale of the additional abstraction to be authorised and the sensitivity of affected environmental receptors.

In reviewing the SEA findings in **Figure 5-3**, it is important to note that the assessment relates to the specific SEA objectives (see Table 4-2 earlier) and the “significance of effect” findings are based on the methodology and significance of effect criteria set out earlier in Section 4. Whilst the HRA and WFD assessments have informed the assessment, the SEA objectives for the biodiversity, flora and fauna topic and the water topic are more broadly defined than the specific regulatory tests that apply to the HRA and WFD assessments. The approach to the assessment of effects is also different in the SEA compared to the HRA and WFD assessment methodology and therefore conclusions reached in the SEA cannot be directly translated to HRA or WFD compliance. For example, a finding that the significance of an effect is “major adverse” against the SEA biodiversity, flora and fauna objective does not necessarily imply that the option would result in adverse effects on a European site. Similarly, a finding that the significance of an effect is “major adverse” against the water topic SEA objectives does not necessarily imply a temporary deterioration in WFD water body status or that it might hinder achievement of WFD good ecological status.

Figure 5-3 Visual evaluation matrix summary for Drought Order and Drought Permit options

SEA Objective Reference Number		SEA Topic: Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	Commentary
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
Lukely Brook WSW	Adverse Effects																	Implementation of the Drought Permit would result in minor adverse effects on river flows in Lukely Brook assuming the provision of compensation flow of water to the river from the groundwater source to maintain a flow in the river. There would be a moderate adverse effect on the biodiversity of Lukely Brook to be mitigated by the compensation flow. There would be potential effects on the Medina estuary. Additional energy will be required to pump the compensation water flow to the river leading to negligible adverse effects on air quality and carbon emissions. There is also the potential for minor adverse effects on the Clatterford Roman Villa Scheduled Monument and negligible adverse effects on the landscape setting of the river valley and wetland features.
	Beneficial Effects																	Implementation of this Drought Permit would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
Caul Bourne WSW	Adverse Effects																	Implementation of the drought permit would result in a major adverse impact on groundwater levels and flows in the Caul Bourne and freshwater flow inputs to the Newtown Estuary. There would be an associated moderate adverse impact on water quality and ecology in the Caul Bourne. The Appropriate Assessment has identified potential adverse impacts on the designated Solent Maritime SAC, Solent and Southampton Water SPA and Ramsar as a result of the reduction in freshwater input which could lead to a change in wetted area and a change in nutrient loading and flushing, resulting in a potential change to the benthic invertebrate communities and feeding patterns of bird species. Uncertainty in these conclusions will be addressed through a Monitoring and Mitigation Package being developed in consultation with Natural England and Environment Agency. There is the potential for moderate adverse effects on the Caul Bourne Water Mill operation and a minor adverse effect on the Isle of Wight AONB due to lower flows in the Caul Bourne. The increased abstraction associated with this Drought Order would also result in only a negligible net change in energy use overall by Southern Water as demand will be reduced by water use restrictions prior to implementing the Drought Permit.
	Beneficial Effects																	Implementation of this Drought Order would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Order would also deliver minor beneficial effects associated with augmenting water supply resilience including due to climate change effects.
Eastern Yar Augmentation Scheme	Adverse Effects																	Implementation of this Drought Order would lead to a major reduction in flows in the River Medina and freshwater flows to the Medina estuary. The Appropriate Assessment has identified potential adverse impacts on the designated Solent Maritime SAC, Solent and Southampton Water SPA and Ramsar as a result of the reduction in freshwater input which could lead to a change in wetted area and a change in nutrient loading and flushing, resulting in a potential change to the benthic invertebrate communities and feeding patterns of bird species. Uncertainty in these conclusions will be addressed through a Monitoring and Mitigation Package

SEA Objective Reference Number		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
																		being developed in consultation with Natural England and Environment Agency. There is a risk of moderate adverse effects on aquatic ecology in the River Medina and Medina Estuary which may lead to an overall major adverse effect on biodiversity, flora and fauna in drought conditions. Effects on landscape and recreation features are assessed as minor adverse.
	Beneficial Effects																	Implementation of this Drought Order would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Order would also deliver minor beneficial effects associated with augmenting water supply resilience including due to climate change effects.
Candover Augmentation Scheme	Adverse Effects																	The HRA screening assessment concluded that the water-sensitive habitats/species that could be adversely affected by the Drought Order implementation were the chalk stream habitat, Southern damselfly and White-clawed crayfish. Overall, it is considered that, based on available evidence, adverse effects cannot be ruled out on the conservation objectives of certain qualifying features of the River Itchen SAC and therefore on overall site integrity. The HRA Appropriate Assessment concluded that an adverse effect on the site integrity of the River Itchen SAC due to implementation of this option could not be ruled out. This conclusion, and the consequent need to provide compensation measures under the Habitats Directive, is therefore reflected in the assignment of a "major adverse effect" significance for the biodiversity, flora and fauna Objective 1.1.in line with the SEA significance of effects criteria. There would be no likely significant effects on the River Itchen SAC features of Bullhead, Atlantic salmon, Brook Lamprey, and Otter. There may be minor temporary adverse effects during construction of the discharge pipeline. Construction works for the discharge pipeline may also lead to some temporary disruption to local communities as well as recreational activities, including angling and access to public rights of way. The option may result in temporary moderate adverse effects towards visual amenity (including within the setting of the National Park) during construction, but operation of the scheme will result in a minor increase in river levels with negligible adverse effects towards unknown water dependant heritage features.
	Beneficial Effects																	Implementation of this option would result in major beneficial effects on human health and economic activity through maintaining water supplies during drought conditions.

SEA Objective Reference Number		SEA Topic: Biodiversity, Flora and Fauna 1.1	1.2	Population and Human Health 2.1	2.2	2.3	Material Assets and Resource Use 3.1	3.2	Water 4.1	4.2	4.3	Soil, Geology and Land Use 5.1	Air and Climate 6.1	6.2	6.3	Archae-ology and Cultural Heritage 7.1	Landscape 8.1	Commentary
Test Surface Water Drought Permit	Adverse Effects																	The incremental impact of the Drought Permit beyond that of the prevailing drought conditions (i.e. without the Drought Permit in place) is not likely to have a significant effect on designated SSSI features, but a moderate adverse effect has been assessed based on the uncertainties arising from a paucity of ecological evidence. Water quality concerns in the zone of influence of the abstraction during application of the Drought Permit are largely limited to the parameters of temperature and dissolved oxygen, other water quality parameters have been shown to be well within levels of concern for the ecology and therefore not considered likely to lead to a significant impact on the River Test SSSI. The Drought Permit is not considered likely to damage the notified features of the Lower Test Valley SSSI. Given that during a drought, river flows would naturally be low, the additional recreational effects of the Drought Permit are expected to be minimal. The Drought Permit will result in a minor increase in pumping for abstraction and therefore in resource and energy use and associated carbon emissions.
	Beneficial Effects																	Implementation of this option would result in major beneficial effects on human health and economic activity through maintaining water supplies during drought conditions. This option would also deliver major beneficial effects associated with the sustainable management of resources and major beneficial effects associated with resilience to climate change. Importantly, implementation of this option will help minimise the risk of requiring implementation of other Drought Order options which have a greater effect on the water environment.
Test Surface Water Drought Order	Adverse Effects																	The incremental impact of the Drought Order beyond that of the prevailing drought conditions (i.e. without the drought order in place) is not likely to have a significant effect on designated SSSI features, but a moderate adverse effect has been assessed based on the uncertainties arising from a paucity of ecological evidence. Water quality concerns in the zone of influence of the abstraction during application of the Drought Permit are largely limited to the parameters of temperature and dissolved oxygen, other water quality parameters have been shown to be well within levels of concern for the ecology and therefore not considered likely to lead to a significant impact on the River Test SSSI. The drought order is not considered likely to damage the notified features of the Lower Test Valley SSSI. Given that during a drought, river flows would naturally be low, the additional recreational effects of the Drought Order are expected to be minimal. The Drought Order will result in a minor increase in pumping for abstraction and therefore in resource and energy use and associated carbon emissions
	Beneficial Effects																	Implementation of this option would result in major beneficial effects on human health and economic activity through maintaining water supplies during drought conditions. This option would also deliver major beneficial effects associated with the sustainable management of resources and major beneficial effects associated with resilience to climate change. Importantly, implementation of this option will help minimise the risk of requiring implementation of other drought order options which have a greater effect on the water environment.

SEA Objective Reference Number		SEA Topic: Biodiversity, Flora and Fauna 1.1	1.2	Population and Human Health 2.1	2.2	2.3	Material Assets and Resource Use 3.1	3.2	Water 4.1	4.2	4.3	Soil, Geology and Land Use 5.1	Air and Climate 6.1	6.2	6.3	Archae-ology and Cultural Heritage 7.1	Landscape 8.1	Commentary
Lower Itchen Sources (includes assessment of the changes to the Portsmouth Water Lower Itchen abstraction licence under this Drought Order)	Adverse Effects																	The SEA has considered the effects of implementation of this Drought Order which varies the Hands-Off Flow conditions on both the Southern Water and Portsmouth Water lower Itchen abstraction licences. The HRA Appropriate Assessment concluded that an adverse effect on the site integrity of the River Itchen SAC due to implementation of this option could not be ruled out. This conclusion, and the consequent need to provide compensation measures under the Habitats Directive, is therefore reflected in the assignment of a "major adverse effect" significance for the biodiversity, flora and fauna Objective 1.1.in line with the SEA significance of effects criteria. Whilst adverse effects on SAC site integrity cannot be ruled out, detailed ecological assessment concluded that the reduction in river flow due to the drought order would have a very minor effect on river flow velocities and river water depths downstream of the abstraction. During extreme drought, groundwater heads in the chalk aquifer would already be low and any incremental effect of additional abstraction due to the drought order would not affect the hydrological functioning of wetlands, or recovery after the drought. Consequent effects on flora and fauna are assessed as low to negligible: there would be no likely significant effects on the River Itchen SAC features of Bullhead, White-clawed Crayfish, Brook Lamprey, and Otter. Impacts on the Ranunculus plant species and underlying chalk river habitat, the Southern Damselfly and River Itchen salmon would be minor and reversible. Any incremental effects from the additional abstraction are not likely to cause permanent damage to the River Itchen SSSI features. This includes the SSSI wetland communities and assemblages of breeding birds. The Drought Order will result in a minor increase in pumping for abstraction and therefore resource and energy use and associated carbon emissions.
	Beneficial Effects																	Implementation of this Drought Order would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions and helping to avoid the need for an Emergency Drought Order. This Drought Order would also deliver major beneficial effects associated with the augmenting water supply resilience, including to climate change effects.
Pulborough - reduce MRF by 10Ml/d	Adverse Effects																	The implementation of the Drought Permit would result in negligible adverse effects on river flows and levels, water quality and biodiversity, flora and fauna in the River Rother. There is a minor adverse effect in relation to a risk of an increase in the spread of Himalayan balsam (invasive species).
	Beneficial Effects																	Implementation of this Drought Permit would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
Pulborough - reduce MRF by 20Ml/d	Adverse Effects																	Implementation of the Drought Permit would result in minor adverse impacts on water flow and levels and water quality of the impacted reaches, with consequent minor adverse effects on biodiversity, flora and fauna. There is a minor adverse effect in relation to a risk of an increase in the spread of Himalayan balsam (invasive species).

SEA Objective Reference Number		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
	Beneficial Effects																	Implementation of this Drought Permit would result in moderate beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
Pulborough - reduce MRF by 30Ml/d	Adverse Effects																	The implementation of the Drought Permit would result in a major adverse effect on flows in the River Rother in summer and moderate adverse effects in winter. There would be associated moderate adverse impact on water quality and ecology, notably migratory fish and the Least Water Snipe Fly. The reduction in river flows and levels would have a minor adverse effect on visual amenity.
	Beneficial Effects																	Implementation of this Drought Permit would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
Weir Wood Reservoir (Summer)	Adverse Effects																	Implementation of this drought permit would lead to a minor reduction in flows in the River Medway immediately downstream of the reservoir but the effects would decrease with distance downstream due to other catchment and tributary flows. Reduced flows in the upper Medway may lead to the risk of low adverse effects on river geomorphology and water quality. The effect on the physical environment has the potential to result in minor adverse effects on fish and other aquatic ecology in the upper reaches of the River Medway. Changes to river levels are also predicted to result in the risk of minor adverse effects to visual amenity and local water-dependant archaeology and cultural heritage features.
	Beneficial Effects																	Implementation of this drought permit would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This drought order would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects. It would also have minor beneficial effects on water levels in Weir Wood Reservoir for a negligible benefit to flora and fauna at the reservoir.
Weir Wood Reservoir (Winter)	Adverse Effects																	The proposed reduction in the winter compensation flow from Weir Wood Reservoir would have a negligible impact on the River Medway. The minor to negligible effects to the physical environment will pose minor to negligible effects to macroinvertebrate and macrophyte communities in the impacted reaches. The risk to deterioration of the WFD fish status of respective waterbodies is considered to be moderate minor (GB106040018070 'Medway at Weir Wood') and (GB106040018181 'Mid Medway from Hartfield to Eden Confluence'). Changes to river levels are also predicted to result in potential minor adverse effects to the historic environment.

SEA Objective Reference Number		SEA Topic: Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	Commentary
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
	Beneficial Effects																	If implemented, the drought permit would have minor beneficial effects for the supplied population and human health in terms of ensuring supply of water and other customers/businesses. The reduction in compensation releases would result in a marginal increase in Weir Wood reservoir water level/storage, relative to the position without the drought permit. Minor beneficial effects are also expected in regard to improved resilience of water supplies to drought.
North Arundel WSW	Adverse Effects																	Implementation of the drought permit would result in a moderate impact (low confidence) on the chalk aquifer groundwater body. There would be minor adverse effects on all other groundwater levels and dependent surface water bodies including Park Bottom tributary and Swanbourne Lake, as well as a risk of minor adverse and uncertain effects on water features within Arundel Park SSSI. There would be an associated minor adverse effect on water quality and a moderate to minor adverse effect on aquatic ecology in these surface water bodies. There would be a negligible adverse effect on the Arun Banks SSSI. The reduction in river flow and surface water levels would have a minor adverse effect on visual amenity in the local area, notably around Swanbourne Lake and Arundel Park.
	Beneficial Effects																	Implementation of this Drought Order would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Order would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
East Worthing WSW	Adverse Effects																	Implementation of this Drought Permit will result in groundwater drawdown in the Chalk aquifer with minor adverse effects (uncertain) on flows in the Broadwater Brook (Teville Stream). The stream is anticipated to be dry during severe drought conditions prior to implementing the Drought Permit but impacts are likely due to the delay in recovery of flow in the stream at the end of the drought. Minor adverse effects are anticipated to water quality and ecology in the stream.
	Beneficial Effects																	Implementation of this Drought Permit would result in minor beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
River Medway Scheme Stage 1	Adverse Effects																	Implementation of the Drought Permit in winter would result in negligible impacts on river flows in the upper reaches of the river system but minor to moderate adverse effects on river flows in the Lower Medway and Medway Estuary. There would be a minor adverse effect on water quality and minor adverse effects on aquatic ecology. No likely significant effects are anticipated on the Medway Estuary and Marshes SPA, SSSI and Ramsar sites. There is also the potential for a minor adverse effect on the Weald landscape and a number of water-dependent heritage assets. Effects on navigation and recreation are assessed as negligible.

SEA Objective Reference Number		SEA Topic																Commentary
		Biodiversity, Flora and Fauna		Population and Human Health			Material Assets and Resource Use		Water			Soil, Geology and Land Use	Air and Climate			Archae-ology and Cultural Heritage	Landscape	
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
	Beneficial Effects																	Implementation of this Drought Permit would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver major beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
River Medway Scheme Stage 2	Adverse Effects																	Implementation of the Drought Permit in winter would result in minor adverse effects on river flows in the upper reaches of the river system but moderate adverse effects on river flows in the Lower Medway and Medway Estuary. There would be a minor adverse effect on water quality and moderate adverse effects on aquatic ecology. No likely significant effects are anticipated on the Medway Estuary and Marshes SPA, SSSI and Ramsar sites. There is also the potential for minor adverse effects on the Weald landscape and a number of water-dependent heritage assets. Effects on navigation and recreation are assessed as minor.
	Beneficial Effects																	Implementation of this Drought Permit would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver major beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
River Medway Scheme Stage 3	Adverse Effects																	Implementation of the Drought Permit in summer would result in minor adverse effects on river flows in the upper reaches of the river system but moderate adverse effects on river flows in the Lower Medway and Medway Estuary. There would be a minor adverse effect on water quality and moderate adverse effects on aquatic ecology. No likely significant effects are anticipated on the Medway Estuary and Marshes SPA, SSSI and Ramsar sites. There is also the potential for minor adverse effects on the Weald landscape and a number of water-dependent heritage assets. Effects on navigation and recreation are assessed as minor.
	Beneficial Effects																	Implementation of this Drought Permit would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Permit would also deliver major beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
River Medway Scheme Stage 4	Adverse Effects																	Implementation of the Drought Order in winter would result in major adverse effects on river flows downstream of Bewl Water Reservoir and through all downstream river reaches to the tidal limit of the river, with moderate adverse effects on freshwater flow to the Medway Estuary. There would be a moderate adverse effect on water quality and major adverse effects on aquatic ecology in the freshwater reaches of the river. Minor adverse effects on aquatic ecology in the Medway Estuary Marine Conservation Zone are anticipated, with no likely significant effects anticipated on the Medway Estuary and Marshes SPA, SSSI and Ramsar sites. There is also the potential for a minor adverse effects on the Weald landscape and a number of water-dependent heritage assets. Effects on navigation and recreation are assessed as moderate. The stage 4 drought order has been amended following discussions with the Environment Agency who advised that it is not acceptable to reduce MRF to zero. Although the MRF conditions are now less

SEA Objective Reference Number		SEA Topic: Biodiversity, Flora and Fauna 1.1	1.2	Population and Human Health 2.1	2.2	2.3	Material Assets and Resource Use 3.1	3.2	Water 4.1	4.2	4.3	Soil, Geology and Land Use 5.1	Air and Climate 6.1	6.2	6.3	Archae-ology and Cultural Heritage 7.1	Landscape 8.1	Commentary
																		severe, the impact assessment in the EAR remains unchanged since the previous version, as further modelling will need to be carried out in order to properly reassess the impacts, and the EAR updated in due course. As a result, there has not been any significant changes made to the assessment of this option through the SEA.
	Beneficial Effects																	Implementation of this Drought Order would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions and helping to avoid the need for an Emergency Drought Order in severe drought. This Drought Order would also deliver major beneficial effects associated with the augmenting water supply resilience including due to climate change effects.
Darwell - reduce MRF (Summer: 18.5Ml/d)	Adverse Effects																	Implementation of this Drought Order would lead to moderate adverse effects on flows in the River Rother decreasing in effect with distance downstream to the Rye Estuary. A reduction in flow will lead to a change in the availability of water that can be pumped across the Walland Marsh ditch system via the Royal Military Canal, and therefore could impact the Dungeness, Romney Marsh and Rye Bay SPA and Ramsar. As a result of the reductions in flow there is also the potential for minor geomorphological changes and moderate adverse effects on water quality in the River Rother and Darwell Reservoir. Reduced river flows are expected to result in minor to moderate adverse effects on aquatic ecology in the freshwater river reaches. Reduced river flows and levels are also predicted to result in potential moderate adverse effects to visual amenity, recreation and navigation.
	Beneficial Effects																	Implementation of this Drought Order would result in moderate beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Order would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects. There would be minor beneficial effects on water levels in Darwell Reservoir.
Darwell - reduce MRF (Winter: Up to 13.2Ml)	Adverse Effects																	Implementation of this drought order would lead to negligible hydrological impacts. No new infrastructure is required, and no significant negative effects are predicted. The HRA concluded no adverse effects on the integrity of European sites and the WFD assessment did not identify any significant issues.
	Beneficial Effects																	Implementation of this Drought Order would result in major beneficial effects on population and human health through maintaining essential water supplies during drought conditions. This Drought Order would also deliver minor beneficial effects associated with the augmenting water supply resilience including due to climate change effects. There would be moderate beneficial effects on water levels in Darwell Reservoir.

As described in our main drought plan, we have removed the drought permits for Faversham and Sandwich because abstraction licence variations mean these would no longer provide a benefit.

6 Cumulative Assessment

6.1 Introduction

The cumulative assessments presented in this section have been carried out in line with the methodology described earlier in Section 4.

6.2 Cumulative Effects of Demand Management Options

Table 6-1 describes the potential cumulative impacts between the demand management measures.

Table 6-1 Cumulative impacts between demand management measures

Cumulative beneficial effects	Cumulative beneficial effects identified for all options in relation to increasing the overall demand savings in a drought to contribute to sustainable abstraction and helping to reduce stress on the water environment and water settings of heritage features.
Cumulative adverse effects	Cumulative adverse effects anticipated in relation to impacts on population and livelihoods, plus certain recreation, landscape and heritage features as a result of the Temporary Use Ban, non-essential use ban Drought Order and Emergency Drought Order
No adverse cumulative effects	No cumulative adverse effects identified in relation to the media/ water efficiency campaigns or increased leak detection and repair activity measures.

Demand management measures to restrict water use are implemented sequentially, with each measure adding a greater number of water uses to be restricted, bringing both cumulative adverse effects and cumulative beneficial effects.

Cumulative effects with supply augmentation measures have only been identified in relation to carbon and air quality effects between leakage control measures and operation of emergency desalination measures. Cumulative effects between leakage control measures and construction activities for some of the supply augmentation options are considered to be negligible given the relative locations of the construction activities with leak repair activities.

6.3 Cumulative Effects of Supply Augmentation Options

Cumulative effects between each supply augmentation option have been identified as presented in **Table 6-1**. The interactions are categorised by the potential for cumulative effects to arise due to construction or operation. The assessment of these potential cumulative effects are summarised in **Table 6-1 and Table 6-2**. The assessments have also been informed by the HRA and WFD assessments, as well as Environmental Assessment Reports for Drought Permit and Drought Order options.

All of the options bring some level of cumulative **beneficial effects** by helping to provide additional water supplies during drought conditions and maintaining essential water supply provision.

Table 6-1 shows the grouping of options that have been assessed as having potential cumulative **adverse effects** (grouped by WFD water bodies) and **Table 6-2** shows the assessment in relation to European designated sites, as set out in the accompanying HRA report. The assessment has concluded that for the majority of combinations of supply augmentation measures, cumulative adverse effects are unlikely, but the assessment identified some risks, for example, where both supply augmentation measures draw on the same river, groundwater body or estuary. These cumulative effects are summarised below:

- The Lukely WSW Drought Permit option may have cumulative, in combination effects with the Eastern Yar Augmentation Scheme Drought Order option that could potentially lead to a slight increase in the overall adverse effects of the Eastern Yar Augmentation Scheme Drought Order on the Medina Estuary.

In this case, the risk of cumulative adverse effects on European sites (Solent Maritime SAC and the Solent and Southampton Water SPA and Ramsar site) were identified and assessed under the HRA process. The risk of cumulative effects between all these Isle of Wight Drought Permits and Drought Orders on these three internationally important conservation sites has also been assessed under the HRA process. The HRA Appropriate Assessment concluded there would be no adverse cumulative effects on these European sites as a result of these Drought Permits and orders being implemented concurrently.

- The Candover Augmentation Scheme and the Lower Itchen sources Drought Order measures in combination with one another could increase the magnitude of potential adverse effects on the chalk stream habitat and Southern damselfly designated features of the River Itchen SAC. The HRA concluded there may be adverse effects on the integrity of the SAC. Further details are provided in the HRA Report (Annex 8).

Figure 6-1 Cumulative impacts matrix: supply augmentation options

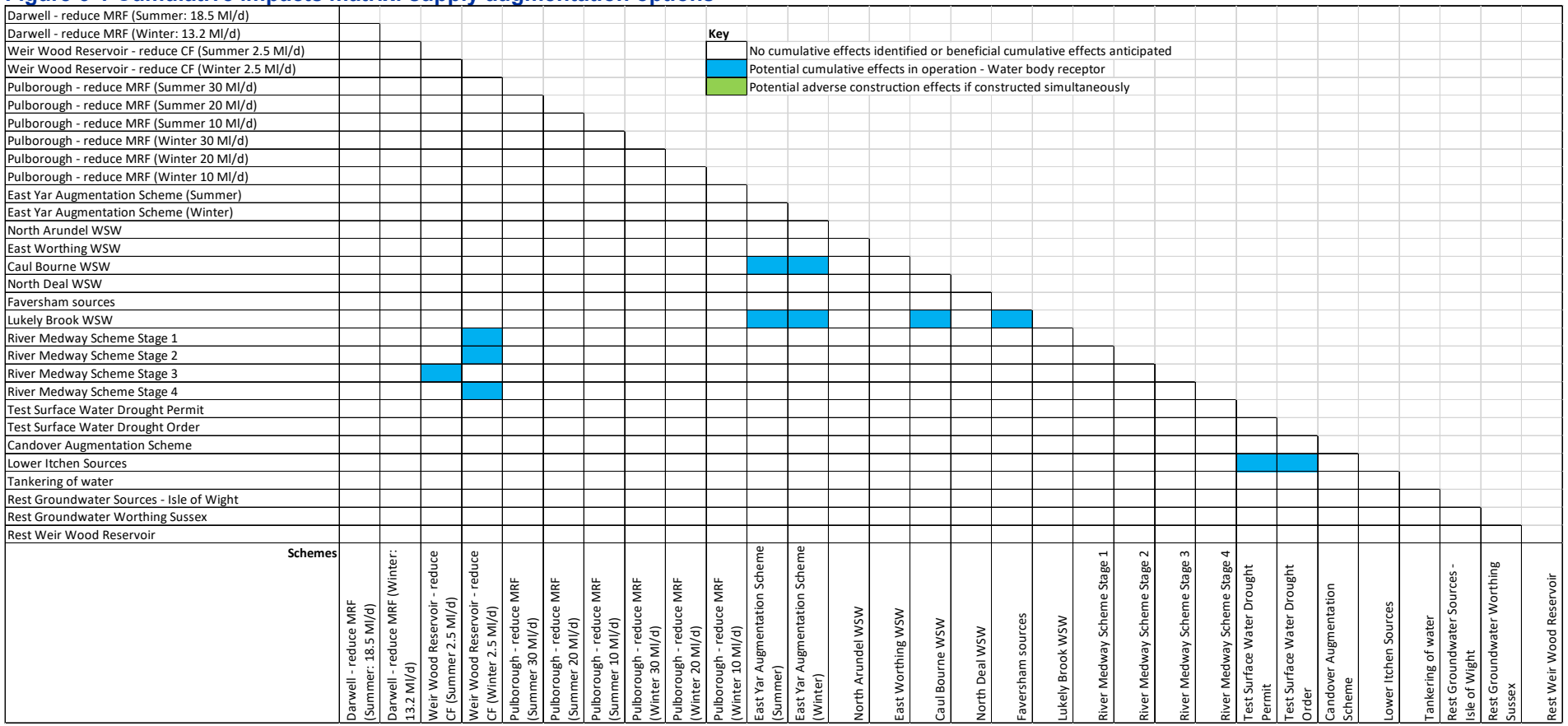


Table 6-1 Cumulative effects assessment of supply augmentation measures (grouped by WFD water body)

Water Body	Drought management measures	Hydrological/ Hydrogeological Cumulative Effects Summary	Cumulative Environmental Effects Summary
Medina Transitional Water Body (GB520710101600)	Lukely Brook WSW / Eastern Yar Augmentation Scheme	These Drought Permit/Order measures may have a cumulative impact on the Medina estuary (transitional water) by reducing freshwater flows from Lukely Brook (Lukely Brook option) and the River Medina (Eastern Yar option). Impacts of the Lukely Brook option are much smaller compared to the Eastern Yar option because of the dominance of the River Medina flows to the estuary. As a result, the cumulative hydrological effect of both options being implemented concurrently is only marginally greater than the Eastern Yar option on its own.	Risks to ecology could increase slightly to the Medina estuary from concurrent implementation of both options in relation to adverse effects on macrophytes, macroalgae, phytoplankton, macroinvertebrates and freshwater fish due to the marginal further decrease in freshwater flow to the estuary.
IoW Central Downs Chalk (GB40701G503200)	Caul Bourne WSW / Lukely Brook WSW	The Caul Bourne and Lukely Brook Drought Permit / Order options may have a cumulative impact on the Isle of Wight Chalk groundwater body due to the additional abstraction of groundwater. Further to this, the surface water catchment of Lukely Brook is adjacent to that of Caul Bourne. It is noted that there is a risk of cumulative drawdown impacts in the groundwater radius of influence, but this is expected to be limited. Where the radius of influence overlaps between the Drought Permits, the cumulative impact will be more significant. Cumulative hydrogeological impact assessed as moderate.	Both Lukely Brook and Caul Bourne are at medium risk of temporary deterioration due to the potential impact on dependent water bodies and groundwater dependent terrestrial ecosystems. There is an increased (but uncertain) risk of a greater magnitude of impact with these Drought Orders/Permits implemented concurrently, but the magnitude is uncertain due to the absence of a groundwater model to assess cumulative effects.

Water Body	Drought management measures	Hydrological/ Hydrogeological Cumulative Effects Summary	Cumulative Environmental Effects Summary
Medway at Maidstone (GB106040018440) Medway Transitional (GB530604002300)	Weir Wood Reservoir (winter) / River Medway Scheme (winter Stage 1)	The Weir Wood Reservoir (winter) Drought Order and River Medway Scheme (Stage 1 - winter) Drought Permit would have a cumulative impact on the Medway at the confluence of the Teise/Beult near Maidstone (Medway near Maidstone) and downstream to the Medway estuary (transitional water body). However, due to the flow amelioration in the intervening River Medway catchment between Weir Wood reservoir and near Maidstone, the additional cumulative hydrological impact is expected to be negligible.	Due to the negligible additional cumulative hydrological impacts, impacts to the aquatic ecology in the River Medway would not increase as a result of these Drought Orders/permits being implemented in combination.
	Weir Wood Reservoir (winter) / River Medway Scheme (winter Stage 2)	The Weir Wood Reservoir (winter) Drought Order and River Medway Scheme (Stage 2 - winter) Drought Permit would have a cumulative impact on the Medway at the confluence of the Teise/Beult near Maidstone (Medway at Maidstone) and downstream to the Medway estuary (transitional water body). However, due to the flow amelioration in the intervening River Medway catchment between Weir Wood reservoir and near Maidstone, the additional cumulative hydrological impact is expected to be negligible.	Due to the negligible additional cumulative hydrological impacts, impacts to the aquatic ecology in the River Medway would not increase as a result of these Drought Orders/permits being implemented in combination.
	Weir Wood (summer) / River Medway Scheme (summer Stage 3)	The Weir Wood Reservoir (summer) Drought Order and River Medway Scheme (Stage 3 - summer) Drought Permit would have a cumulative impact on the Medway at the confluence of the Teise/Beult near Maidstone (Medway at Maidstone) and downstream to the Medway estuary (transitional water body). However, due to the flow amelioration in the intervening River Medway catchment	Due to the negligible additional cumulative hydrological impacts, impacts to the aquatic ecology would not increase as a result of these Drought Orders/permits being implemented in combination.

Water Body	Drought management measures	Hydrological/ Hydrogeological Cumulative Effects Summary	Cumulative Environmental Effects Summary
		between Weir Wood reservoir and near Maidstone, the cumulative impact is expected to be negligible.	
	Weir Wood (winter) / River Medway Scheme (winter Stage 4)	The Weir Wood Reservoir (winter) Drought Order and River Medway Scheme (Stage 4 - winter) Drought Order would have a cumulative impact on the Medway at the confluence of the Teise/Beult in the vicinity of Maidstone (Medway at Maidstone) and downstream to the Medway estuary (transitional water body). However, due to the flow amelioration in the intervening River Medway catchment between Weir Wood reservoir and near Maidstone, the additional cumulative impact is expected to be negligible.	Due to the negligible additional cumulative hydrological impacts, impacts to the aquatic ecology would not increase as a result of these Drought Orders being implemented in combination.

Table 6-2 Cumulative effects assessment of supply augmentation measures (by European designated site)

European Site	Drought Management Measures	Cumulative effects assessment	Likely Cumulative Effects?	HRA Conclusions
Medway Estuary and Marshes SPA and Ramsar	River Medway Scheme / Weir Wood Reservoir	Flow impacts on the River Medway downstream of Weir Wood reservoir are sufficiently ameliorated by intervening catchment flows prior to the confluence of the River Medway with the River (Greater) Teise near Maidstone, such that cumulative, in-combination impacts with the River Medway Scheme would be no greater than negligible downstream, with no impact on the Medway estuary. No likely cumulative significant effects anticipated on the SPA and Ramsar site.	No	No Likely Significant Effects
Peter's Pit SAC		Supplementary advice to the Conservation Objectives states that the maintenance of water within the ponds on the sites is controlled by groundwater levels. As the impacts resulting from the River Medway Scheme and Weir Wood Reservoir options will be confined to the River Medway only, no likely cumulative significant effects are anticipated on the SAC.	No	No Likely Significant Effects
Thames Estuary and Marshes SPA and Ramsar		No likely cumulative significant effects due to the distance from the confluence near Maidstone where cumulative effects assessed as negligible and no cumulative effects are considered likely in Medway estuary upstream of Thames estuary.	No	No Likely Significant Effects
Arun Valley SAC, SPA and Ramsar	North Arundel WSW/ Pulborough Drought Permits and orders	The North Arundel WSW groundwater zone of influence has negligible impacts on the Lower River Arun, downstream of the Arun Valley SAC, SPA and Ramsar. No impacts were identified as a result of the Pulborough Drought Order on the designated sites given the limited connectivity between the habitats and the river due to the presence of the flood banks. No likely cumulative significant effects are anticipated.	No	No Likely Significant Effects
Briddlesford Copse SAC	Lukely Brook WSW/ Eastern Yar	Both Drought Permit/Order options affect the River Medina watercourse which is located within the known buffer zone used by Bechstein's bats to feed (as identified through the Environment	No	No Likely Significant Effects

European Site	Drought Management Measures	Cumulative effects assessment	Likely Cumulative Effects?	HRA Conclusions
	Augmentation Scheme	Agency's Review of Consents work) – these bats are a designated feature of the SAC. However, there are no water dependent habitats used by the bat species in direct hydrological connectivity with the River Medina. Therefore, changes to levels and flows resulting from the combined operation of the Lukely Brook and Eastern Yar Drought Permits/Orders are unlikely to affect the bat species. As such no likely cumulative significant effects are anticipated.		
Isle of Wight Downs SAC		The SAC is outside the groundwater drawdown zone for the Lukely Brook WSW Drought Permit option and is not reliant on water supply from the River Medina or River Yar. Therefore no likely cumulative significant effects are anticipated.	No	No Likely Significant Effects
Solent Maritime SAC		The combined reduction in freshwater flow to the Medina Estuary from the combined use of the Lukely Brook and Eastern Yar Drought Orders and permits is only 1% greater in winter and no change in summer when compared to the impact of the Eastern Yar Drought Order in isolation, so no likely cumulative significant effects on the SAC habitats due to the hydrological change.	No	No Likely Significant Effects
Solent and Southampton Water SPA and Ramsar		The combined reduction in freshwater flow to the Medina Estuary from the combined use of the Lukely Brook WSW and Eastern Yar Augmentation Scheme Drought Orders and permits is only 1% greater in winter and no change in summer when compared to the impact of the Eastern Yar Augmentation Scheme Drought Order in isolation, so no likely cumulative significant effects on the SAC habitats due to the hydrological change. Changes to macroinvertebrate assemblages on the mudflat and sandflat habitats have been identified for both options separately, and therefore the additional reduction in freshwater inputs could further exacerbate the changes in community structure and composition leading to potentially greater impacts on the following	No	No Likely Significant Effects

European Site	Drought Management Measures	Cumulative effects assessment	Likely Cumulative Effects?	HRA Conclusions
		species; Mediterranean gull (feeding), dark-bellied brent goose (feeding), black-tailed godwit (feeding), ringed plover (feeding), shelduck (feeding), redshank (feeding), grey plover (feeding), wigeon (feeding), pintail (feeding) and dunlin (feeding), little egret (feeding), water rail (feeding). The combined impact of the two options is not considered to be materially greater to lead to likely cumulative adverse effects on the designated sites.		
Isle of Wight Downs SAC	Eastern Yar Augmentation Scheme, Lukely Brook WSW, Caul Bourne WSW	The European dry heaths are situated on the superficial deposits overlying the chalk aquifer. The hydrogeology assessment for Caul Bourne WSW has concluded that there is a low connectivity between the deposits and the aquifer, with the direction of the groundwater flow in the aquifer being to the north away from the SAC. The assessment for Lukely Brook has identified that the SAC is outside the groundwater drawdown zone of influence, and the site has no hydrological connectivity or reliance on water flows in the River Medina in respect of the Eastern Yar Augmentation Scheme Drought Order. Therefore, no likely cumulative significant effects are anticipated from the concurrent implementation of these four Drought Order/permit options.	No	No Likely Significant Effects
Solent Maritime SAC		The three options affect two different estuaries within the overall SAC; Eastern Yar and Lukely Brook impact the Medina Estuary, whilst Caul Bourne WSW impacts Newtown Estuary. Given the potential impact of the Eastern Yar and Caul Bourne WSW options individually on flows to the estuaries, cumulative adverse effects may arise when these options are implemented concurrently.	Yes	Appropriate Assessment concluded no adverse effects on the European site

European Site	Drought Management Measures	Cumulative effects assessment	Likely Cumulative Effects?	HRA Conclusions
Solent and Southampton Water SPA and Ramsar		Cumulative effects between Eastern Yar and Caul Bourne WSW options could occur in relation to flows and consequent effects on bird habitat and food sources in the Newtown and Medina estuaries.	Yes	Appropriate Assessment concluded no adverse effects on the European sites
Solent Maritime SAC	Lower Itchen Sources, Eastern Yar Augmentation Scheme, Caul Bourne WSW	The four options affect three different estuaries: Eastern Yar and Lukely Brook impact the Medina Estuary; Caul Bourne WSW impact the Newtown Estuary; Lower Itchen Sources impacts the lower reaches of the River Itchen. The River Itchen itself does not support any areas of the Solent Maritime SAC, the closest area being Southampton Water but the Drought Order has no adverse effects on this water body. As such, no likely cumulative significant effects on the SAC from all five options are anticipated.	No	No Likely Significant Effects
Solent and Southampton Water SPA and Ramsar		The four options affect three different estuaries: Eastern Yar and Lukely Brook impact the Medina Estuary; Caul Bourne WSW impact the Newtown Estuary; Lower Itchen Sources impacts the lower reaches of the River Itchen. There is only a small area of mudflats in the River Itchen estuary compared to the larger and more prominent areas within the Solent that are used by species associated with mudflat habitat. The Lower Itchen sources Drought Order has no adverse effects on the mudflat habitat and so no likely significant effects are anticipated on invertebrate food sources or designated bird species. Consequently, there are no likely cumulative significant effects between the Lower Itchen sources Drought Order and the Isle of Wight Drought Permit/Order options.	No	No Likely Significant Effects

European Site	Drought Management Measures	Cumulative effects assessment	Likely Cumulative Effects?	HRA Conclusions
River Itchen SAC	Test Surface Water/ Lower Itchen sources	HRA screening concluded that likely significant effects could not be ruled out in respect of the cumulative effects of the Test Surface Water Drought Order with the Lower Itchen sources Drought Order	Yes	Appropriate Assessment concluded that adverse effects on the European site could not be ruled out

6.4 Assessment of effects on Marine Conservation Zones

The Marine and Coastal Access Act 2009 allows for the creation of Marine Conservation Zones (MCZs). MCZs protect a range of nationally important marine wildlife, habitats, geology and geomorphology, and can be designated anywhere in territorial and offshore waters. Taking the findings of the assessment of options and consideration of cumulative effects above, it is considered that none of the options are likely to have a significant effect on any of the interest features of any MCZs. The SEA process for the Drought Plan 2019 carried out a detailed desktop assessment in relation to four schemes for potential impacts on the Medway Estuary MCZ, Bembridge MCZ and Kingsmere MCZ. Three of these schemes proposing emergency desalination plants have now been removed from consideration following discussions with statutory bodies. The final scheme, River Medway Scheme Drought Order (Stage 4), has been amended following discussions with the Environment Agency to maintain the MRF at a more appropriate level. As a result, it is concluded that none of the options will have a significant effect on any MCZs either alone or cumulatively.

6.5 Cumulative Effects with Existing Relevant Plans, Programme and Projects

6.5.1 Other Water Company Drought Plans

Assessment of the potential cumulative impacts with drought management measures listed in neighbouring water companies' current drought plans has been undertaken. It should be noted that all water company Drought Plans are subject to review on timescales that may not be aligned with the timescale of Southern Water's Drought Plan update. The information used to carry out these assessments is the most up-to-date information available at the time of writing, but the assessments should be reviewed at the time of implementing any Drought Plan measures to ensure that no changes to the neighbouring water company drought options have been made in the intervening period, and that the assessment in this Environmental Report remains valid.

Potential cumulative effects with some of the supply augmentation measures in the South East Water, SES Water and Portsmouth Water Drought Plans have been identified as set out in **Table 6-3.** No other potential for cumulative effects has been identified with drought plan supply augmentation measures of other neighbouring water companies.

Concurrent implementation of Temporary Use Bans and/or Drought Orders to ban non-essential water use by neighbouring water companies has the potential to increase the risk of adverse effects on population, recreation and landscape/townscapes. Concurrent implementation of an Emergency Drought Order by other neighbouring water companies would possibly place additional adverse effects on population and human health.

The conclusions of the cumulative effects assessment with other water company supply augmentation options in their published drought plans are set out below.

Portsmouth Water Final Drought Plan 2019

The plan includes the potential need for a Drought Permit for its Chichester groundwater source which may have combined impacts with Southern Water's North Arundel Drought Order. Further dialogue with Portsmouth Water is required to confirm the assessment in **Table 6-3**.

South East Water Final Drought Plan 2018-2023

The plan includes the River Ouse Drought Permit option and the Halling Drought Permit. No cumulative effects were identified in relation to the River Ouse option. **Table 6-3** sets out the cumulative assessment for the Halling Drought Permit option with the River Medway scheme Drought Permits/Order options.

SES Water Drought Plan 2019

The plan includes a potential need for a Drought Permit for the Bough Beech Reservoir based on modifications to the River Eden abstraction licence. **Table 6-3** sets out the cumulative assessment for the Bough Beech reservoir / River Eden Drought Permit option with the River Medway Scheme Drought Permits/Order options and the Weir Wood reservoir Drought Order option.

Table 6-3 Cumulative effects assessment of drought measures between Southern Water's Drought Plan measures and other water company drought plan measures

Water Body	Drought management measures	Hydrological/ Hydrogeological Cumulative Effects Summary	Cumulative Environmental Effects Summary
Mid Medway from Eden Confluence near Maidstone (GB106040018182)	Weir Wood Reservoir (summer) Drought Order/ SES Water Bough Beech Reservoir/River Eden Drought Order	The SES Water Drought Order for Bough Beech Reservoir/River Eden is expected to have a negligible hydrological impact (if implemented in May only) and up to a moderate hydrological impact if implemented from June onwards. The hydrological impact of the Weir Wood summer Drought Order on the Mid Medway river reach from the Eden confluence is assessed as negligible. Consequently, cumulative hydrological impacts between Weir Wood Reservoir (summer) Drought Order and the Bough Beech/River Eden Drought Permit on the Mid Medway from Eden Confluence to near Maidstone (GB106040018182) will be no greater than that relating to the Bough Beech/River Eden Drought Order if implemented in isolation.	No additional cumulative effects during summer on hydrology and ecology in and no change to the risk of WFD deterioration in relation to macrophytes, macroinvertebrates and fish. No additional cumulative risk to WFD deterioration for the Mid Medway from Eden Confluence to Yalding (GB106040018182) water body.
Medway at Maidstone (GB106040018440) Medway Transitional (GB530604002300)	Weir Wood Reservoir (summer) Drought Order / River Medway Scheme (summer Stage 3) Drought Permit/ SES Water Bough Beech/River Eden Drought Order	Concurrent implementation of the Weir Wood Reservoir Drought Order (summer), the River Medway Scheme Drought Permit (summer) SES Water's Bough Beech/River Eden Drought Order would only occur during the summer period (May onwards). Impacts of the Weir Wood Reservoir summer Drought Order are negligible on lower reaches of the River Medway and the Medway estuary. Given the dominant effect of the River Medway Scheme Drought Permit on flows in the River Medway compared to the other two options, the cumulative hydrological impact is assessed as no greater than the moderate hydrological	Risk to WFD deterioration could potentially alter from low to medium risk for the Medway at Maidstone water body (GB106040018440) for macrophytes, macroalgae and phytoplankton, macroinvertebrates and fish. Cumulative risks to the Medway transitional water body (GB530604002300) considered unlikely to increase from the low risk assigned to the River Medway Scheme drought permit.

Water Body	Drought management measures	Hydrological/ Hydrogeological Cumulative Effects Summary	Cumulative Environmental Effects Summary
		impact assessed for the River Medway Scheme implemented on its own.	
Chichester chalk groundwater body (GB40701G505200) and Arun Transitional water body (GB540704105000)	North Arundel Drought Order/ Portsmouth Water Chichester groundwater source Drought Permit	The Portsmouth Water Drought Permit for Chichester groundwater source may increase abstraction by 8.5Ml/d (from the licensed volume of 2.5Ml/d). Cumulative hydrogeological effects may be major as a consequence but further information is required from Portsmouth Water to provide a more accurate assessment. There may be increased groundwater level drawdown leading to reduced water levels in Swanbourne Lake, although this lake may be dry prior to any Drought Permits being implemented due to natural drought conditions, although recovery of water levels in the lake may take longer due to the Drought Permits being implemented concurrently.	Cumulative effects are uncertain but provisionally assessed as leading to a moderate risk (low confidence) of WFD deterioration on the Chichester Chalk groundwater body (GB40701G505200), taking account of the size of this groundwater body. Cumulative effects on the Arun Transitional water body (GB540704105000) are provisionally assessed as leading to a low risk of WFD deterioration (low confidence).
Medway Transitional (GB530604002300)	River Medway Scheme Drought Permits or Order/ South East Water Halling Drought Permit	The South East Water source is located adjacent to the Medway Estuary (transitional water) and has a hydraulic connection to the Grey Pit, which overflows into the Medway Marshes. However, this overflow is known to cease in summer. The hydrological impact of this Drought Permit on the Medway estuary is assessed as negligible and therefore there is no change to overall hydrological impact of the River Medway Scheme Drought Permits/Order.	No additional cumulative risks to the water environment of the Medway estuary have been identified.

There are no other cumulative effects identified with other drought plan supply augmentation measures in other neighbouring water company drought plans:

- Bournemouth Water component of the South West Water 2017 draft Drought Plan
- Thames Water Drought Plan 2017
- Wessex Water Final Drought Plan 2018
- Cholderton and District Water company Drought Plan 2012

6.5.2 Regional and Water Resource Management Plans

Regional Plan

A regional water resources management plan is being delivered as part of Water Resources South East (WRSE). The group consists of six water companies in the South East (AFW, PWC, SES, SEW, SWS and TWUL) and includes the EA in the project management board. The aim to is to develop a resilient plan that considers the whole of South East England as a single region, unconstrained by water company boundaries, in assessing the options to best meet the water requirements of the domestic and non-domestic consumers in the area. The regional plan is to be finalised in 2023. The WRMPs to be published by individual water companies in 2024 are expected to align with the regional plan.

All of the options considered through the Draft Drought Plan 2022 for implementation during a drought have been included in the list of constrained options that has been provided to the WRSE for consideration in the development of a 'best value' plan for the region. These options will be considered through the SEA, HRA and WFD assessment for the regional plan, including the consideration of cumulative effects.

Southern Water WRMP19

Southern Water published its final Water Resource Management Plan for 2020-70 in December 2019.

The scope for in-combination effects of the WMRP 2020-70 with the drought management measures included in the Draft Drought Plan 2022 is limited as in most cases the drought management measures will come into operation once the operation of the WRMP schemes has ceased due to abstraction licence conditions. The Environmental Report (Dec 2019) that accompanied the final WRMP19 considered the potential interactions between the WRMP schemes and the previous Drought Plan 2019. A number of the potential interactions identified in the Environmental Report (Dec 2019) with the WRMP19 Medway water reuse and Sandown WwTW schemes are no longer applicable as a result of the removal of the three temporary desalination plant options from consideration in this Draft Drought Plan 2022 due to environmental concerns and feedback from statutory bodies.

There is still the potential for cumulative beneficial effects between the WRMP river restoration options for River Test and River Itchen with the Test Surface Water Drought Permit/Order and the Lower Itchen sources Drought Order by helping improve the environmental resilience of these rivers to abstraction at times of low river flows.

No other significant cumulative effects have been identified. As referred to above, it should be noted that the potential for cumulative effects will be explored further through the SEA process for the Regional Plan as well as the SEAs prepared for individual WRMPs to be published in 2024.

Other Water Company Water Resource Management Plans (WRMPs)

All of the neighbouring water companies to Southern Water have published final 2019 WRMPs which have been examined along with outputs of a Water Resources South East Group (WRSE) environmental assessment project. The WRSE group includes six south east water companies (Affinity Water, Portsmouth Water, South East Water, Southern Water, SES Water and Thames Water). The purpose of the project was to input to the development of long term best value plans for securing water supplies in the south east. Since 2016 the WRSE has been working to improve the approach to undertaking cumulative effects assessment for WRMP options developed by neighbouring water companies in the South East of England.

A piece of work aimed to identify the potential for cumulative effects between the six WRSE water companies, to support their WRMP19 and related SEAs in a regional context. It provided a unique opportunity for communication between the six water companies and sharing of respective Draft WRMP19 geographical information.

Information sharing facilitated through WRSE together with the information contained in the published WRMP19 strategies highlighted the following WRMP19 schemes that required in-combination assessment:

a) joint Southern Water / South East Water Medway water reuse scheme: the potential for in-combination cumulative effects of this scheme are the same as those already identified above under the Southern Water draft WRMP19 assessment.

b) three groundwater options included in the Affinity Water WRMP19 feasible list would involve increased abstraction from the East Kent Chalk - Stour WFD groundwater body together with the Southern Water Sandwich Drought Permit option. However, as described in our main drought plan, we have removed the Sandwich drought permit because abstraction licence variations mean it would no longer provide a benefit.

For other water companies outside of the WRSE group, but neighbouring Southern Water (Bournemouth Water (part of South West Water)), Cholderton and District Water and Wessex Water), the review of published WRMP19 strategies have indicated no potential in-combination likely significant effects on any European sites with the Draft Drought Plan.

Bournemouth Water's 2019 WRMP scheme to provide a bulk supply to Southern Water's Western operational area has already been discussed above and has no likely in-combination effects with drought plan measures.

As such, no cumulative effects are anticipated in relation to the WRMPs of these other three water companies.

As previously stated, a regional water resources management plan is being delivered as part of Water Resources South East (WRSE). All of the options considered through Southern Water's Drought Plan 2022 and other water companies' Drought Plans and WRMPs have been included in the list of constrained options that have been provided to WRSE for consideration in the development of a 'best value' plan for the region. These options are currently being considered, including cumulative/ in-combination effects, through the SEA, HRA and WFD assessments for the regional plan and in further detail through individual WRMPs. If available, the outputs of this work will inform revised Final Environmental Report published alongside Southern Water's final Drought Plan 2022.

6.5.3 Other Plans and Projects

Environment Agency National Drought Plan

Assessment of the potential for cumulative impacts of supply side and Drought Permit/Order options with drought options listed in the Environment Agency national Drought Plan[14] has been undertaken. The information used to carry out these assessments is considered to be the most up to date information available at the time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to the Environment Agency Drought Plan have been made in the intervening period, and that the assessment, therefore, remains valid.

Part of the Environment Agency's role is to reduce the impact of drought on the natural environment by taking specific actions. They can apply for environmental Drought Orders if the environment is suffering serious damage because of abstraction during a drought. The plan confirms that the Environment Agency would work with stakeholders, including water companies, to identify where and when it would be necessary to take actions to protect the environment and its potential effects on any essential public supplies or infrastructure. The Environment Agency can restrict spray irrigation during periods of drought which would have a cumulative beneficial effect alongside Southern Water's demand management measures. No cumulative adverse effects have been identified with Southern Water's supply augmentation options.

River Basin Management Plans (RBMP) (Thames River Basin District and South East River Basin District Plans)

Assessment of the potential for cumulative effects with these River Basin Management Plans (RBMPs) has been undertaken. The information used to carry out these assessments is considered to be the most up to date information available at the time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to the River Basin Management Plans have been made in the intervening period, and that the assessment, therefore, remains valid.

The 2015 Thames and South East RBMPs describes the planned steps to implement the measures required to achieve the environmental objectives of the Water Framework Directive (WFD). They provide the framework for protecting and enhancing the water environment. The SEAs[15,16] of the RBMPs determined that the plan was likely to have significant positive effects on the environment, particularly in respect of biodiversity, water, population and human health and that any local negative effects would expect to be mitigated during implementation. Therefore, there will be **no cumulative impacts** between the Thames or South East RBMPs and the Southern Water's Drought Plan measures. A review and update of the current RBMPs is underway and it is anticipated that consultation on the draft RBMPs will occur in 2021.

Cumulative effects with identified relevant strategic level projects

There are a number of infrastructure priorities identified in regional and local planning documents in addition to national programmes. These include the improvement of existing infrastructure by extension, redevelopment or increasing existing capacity. With regard to other projects that may result in a cumulative effect with the Draft Drought Plan 2022, those considered to be **relevant at the strategic level** comprise large scale high profile infrastructure schemes and particularly those that may affect water flows or groundwater levels in the same catchments as those affected by the Drought Plan. These projects comprise:

14 Environment Agency (2017). Drought response: our framework for England. June 2017.
15 Environment Agency (2016) The River basin management plan for the Thames River Basin District Strategic Environmental Assessment: Statement of Particulars Updated December 2015. https://www.gov.uk/government/collections/river-basin-management-plans-2015
16 Environment Agency (2016) The River basin management plan for the South East River Basin District Strategic Environmental Assessment: Statement of Particulars Updated December 2015. https://www.gov.uk/government/collections/river-basin-management-plans-2015

- Lower Tidal Arun flood risk management scheme – The scheme was formally approved in March 2014 by the Environment Agency and is outlined to manage flood risk in the Arun Valley, from Pallingham Weir to Littlehampton. The scheme consists of a range of measures and recommends maintaining and enhancing many existing flood defences and providing some new ones in strategic locations. The new defences however do rely on funding, so it is anticipated that construction will be staggered. In the more rural areas, it is recommended to work with natural processes and increase landowner involvement in decisions.[17]. Interactions are only likely to occur with the Pulborough surface water source and North Arundel WSW Drought Permits/Orders and neither involve any new infrastructure, so no cumulative effects are likely to arise during construction related activities required for the flood risk management scheme. The programme for the flood risk management scheme is not clear at this stage; however, it is considered unlikely that any significant cumulative effects would arise through interactions with either of these two Drought Permits/ Orders.
- River Medway Flood Storage Areas Project – The Leigh Barrier is an existing flood storage area to protect properties and 300 businesses in the town of Tonbridge in Kent (River Medway)[18]. The Leigh Barrier is due to be upgraded to increase its storage capacity by a further 30%. Currently, the indicative funding programme shows construction between 2019 and 2022; however, it is unlikely that any significant cumulative effects would arise through interactions with the options proposed through the Draft Drought Plan 2022.

Other current National Infrastructure projects listed for the South East[19] are considered too distant from the Drought Plan management measures and the respective zones of hydrological influence to result in any cumulative effects.

Cumulative effects with Shoreline Management Plans

Shoreline Management Plans provide a policy context for shoreline / coastal zone management and development. The following Shoreline Management Plans are available within the public domain and were considered for in-combination impacts:

- SMP 9 The Medway Estuary and Swale
- SMP10 Isle of Grain to South Foreland.
- SMP 11 Beachy Head to South Foreland
- SMP 12 Beachy Head to Selsey Bill (South Downs)
- SMP 13 Hurst Spit to Selsey Bill (North Solent)
- SMP 14 Isle of Wight
- SMP 15 Durlston Head to Hurst Spit (Poole & Christchurch Bays)

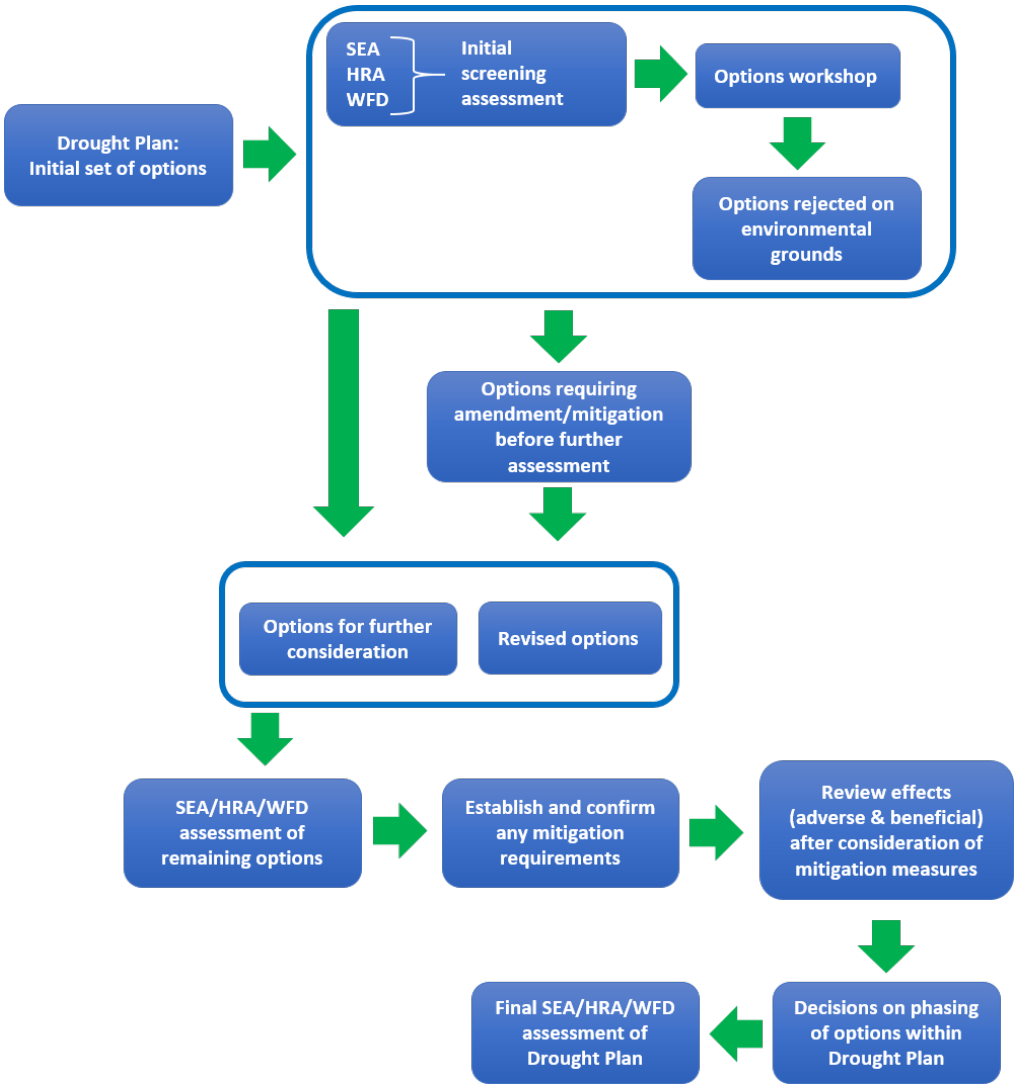
The assessments for any potential in-combination impacts between these plans and the measures contained Southern Water's Draft Drought Plan 2022 were considered with regards to spatial proximity and/or hydrological and/or hydrographical connectivity. No in-combination likely significant effects were identified in respect of the policies set out in the plans. Measures put forward in the Isle of Wight Shoreline Management Plan included the proposed creation of a 30.9Ha compensatory habitat of coastal grazing marsh for the Solent and Southampton Water Ramsar site. Such a measure could be considered to have a minor beneficial in-combination effect. The potential for in-combination effects would need to be reviewed again for an application-specific HRA against the latest version of the relevant Shoreline Management Plan if any options with the potential to affect the coastal zone were needed in a future drought event, in dialogue with the Environment Agency, local planning authority and/or other relevant statutory bodies and stakeholders.

17https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307894/Lower_Tidal_River_Arun_final_strategy_report.pdf
[18] https://www.gov.uk/government/publications/leigh-flood-storage-area/leigh-flood-storage-area
[19] https://infrastructure.planninginspectorate.gov.uk/projects/south-east/

7 Role of the SEA in developing the draft Drought Plan

The SEA, along with the findings of the HRA and WFD assessment, have been used to help inform the development of the Draft Drought Plan 2022, and enable the consideration of reasonable alternative options for inclusion in the plan and/or alternative phasing of implementing the different options. The process followed is summarised in **Figure 7-1.**

Figure 7.1 Option assessment process with SEA, HRA and WFD considerations



In summary, the application of these processes, together with the development of Environmental Assessment Reports (EARs) for Drought Permits and Orders, has:

- Informed dialogue with the Environment Agency and Natural England as to the options to be included in the Drought Plan and their sequencing in relation to the Draft Drought Plan to reflect their environmental or social effects (see the Draft Drought Plan for the sequencing of Drought Permit and Drought Order implementation).

- Identified a small number of options that have been excluded from the Draft Drought Plan where this is feasible (taking account of our supply duties) due to environmental concerns, including three emergency temporary desalination plants, the Test Valley Drought Order and Powdermill Drought Order.
- Identified a number of HRA risks which has either led to:
    a) the option being modified and/or additional mitigation measures being included to address these risks to ensure no adverse effects on any designated European sites (for example, the provision of mitigation measures for the Caul Bourne Eastern Yar augmentation scheme Drought Orders on the Isle of Wight and Darwell Drought Order as described in Annex 8 – HRA Report).
    b) the option being retained in the Draft Drought Plan with consideration of Imperative Reasons of Over-riding Public Interest (IROPI) after demonstrating there are no other feasible alternative options available in severe drought: Candover Augmentation Scheme and the Lower Itchen sources Drought Orders only.
- Identified risks in relation to temporary deterioration to WFD status for some of the water supply augmentation options and consideration of mitigation measures (for example, for the Bewl Water reservoir / River Medway Scheme Stage 4 Drought Permit). The River Medway Scheme Stage 4 Drought Permit has been modified to maintain a more appropriate MRF following discussions with the EA. Although the MRF conditions are now less severe, the impact assessment in the EAR remains unchanged as further modelling will need to be carried out in order to properly reassess the impacts, and the EAR updated in due course.
- Identified various environmental impacts through the SEA process for some of the supply-side options (including Drought Permit / Order options), mainly on the water environment and associated aquatic habitats, flora and fauna.
- Identified where additional environmental baseline monitoring, studies or data are required to better understand the potential environmental risks relating to implementation of various drought plan measures, both to support future drought management planning and during an actual drought event (see Annex 7 of the Draft Drought Plan).
- Identified potential mitigation measures to address identified environmental effects of various Draft Drought Plan measures to reduce the risks of the effects arising during a drought (see Annex 7 of the Drought Plan).
- Identified no impacts of the demand-side measures sufficient to exclude any options on environmental grounds, but noting that two options are likely to have major adverse effects on human health and safety, economic activity and livelihoods:
    a) those water use restrictions to be implemented under the Phase 2 Temporary Use Ban powers and Phases 1 and 2 of the Non-Essential Use Ban Drought Order that impact on small businesses that are entirely dependent on using water; and
    b) an Emergency Drought Order to ration essential supplies by use of standpipes or rota cuts.

Consequently, the more onerous water use restrictions are only planned to be introduced when the Severe Drought stages are reached, whilst the Emergency Drought Order is only included as a ‘last resort’ option in a civil emergency (i.e. in conditions that are worse than a 1 in 500 year drought), as set out in Annex 4. Conversely, the Phase 1 Temporary Use Ban would normally be implemented before the implementation of Drought Permits/Orders, although this may not be the case for a winter Drought Permit/Order given the negligible demand savings that would be achieved.

In particular, the phasing of some of the Drought Permits and Orders was modified during the development of the plan due to the findings from the environmental assessments:

- The reduced MRF summer drought permit option for Darwell was amended to be set against the Severe Drought stage trigger for Sussex Hastings WRZ. The Darwell winter and summer drought permit options would be phased such that the option with the greatest environmental impact is phased last.

- For the Pulborough surface water Drought Permit/Order options, the MRF reductions on the River Rother have been phased according to environmental impact, with the 10Ml/d MRF reduction option set against the Drought stage trigger and the other two options set against the Severe Drought stage trigger.
- The Drought Permit for Powdermill reservoir to reduce the MRF for the River Brede abstraction has been removed from consideration because of uncertainty around the benefit, the potential environmental impact and the availability of alternative options in the Sussex Hastings water resource zone (Darwell drought permits).
- Bewl Water reservoir / River Medway Scheme Drought Permits / Order have been separated into different stages linked to different drought severity triggers to reflect the differences in environmental impact. A first stage of the Drought Permit with the least adverse environmental effects has been set against the Drought stage trigger. The remaining three stages of this option were amended so that they are triggered in the Severe Drought stage and phased such that the stage with the greatest environmental effects is only considered in the most severe droughts. Stage 4 has been amended following discussions with the Environment Agency to maintain the MRF at a more appropriate level.
- The East Worthing Drought Permit trigger was amended to the Drought stage rather than Severe Drought stage so as to help minimise the need for the North Arundel Drought Order (Severe Drought stage trigger) in Sussex Worthing WRZ which has greater environmental effects.
- The Lower Itchen sources Drought Order and Candover Augmentation Scheme Drought Order are only to be used in a severe drought and only after all other options for providing additional water supplies to the Hampshire Southampton East WRZ have been implemented.
- The Emergency Drought Order to supply water by rota cuts or standpipes has been shown to have major adverse effects on population and human health and is only considered for use in very extreme drought conditions under civil emergency measures.

Overall, the main principle in phasing the drought plan measures is to minimise the environmental and social effects as identified by the SEA, HRA and WFD assessments and Environmental Assessment Reports for each Drought Permit/Order option. The precise phasing during a drought will take into account the prevailing environmental conditions informed by the in-drought monitoring activities set out in Annex 7 of the Drought Plan. These principles are reflected in Annex 2 to the Section 20 Operating Agreement between the Environment Agency and Southern Water signed on 29 March 2018 in relation to the implementation of the Test surface water Drought Permit and Drought Order, Candover Augmentation Scheme Drought Order and Lower Itchen sources Drought Order. Aquatic environmental monitoring of prevailing drought conditions in the River Test and River Itchen will be used to help inform the final sequencing of Drought Order implementation in any future drought event, as well taking account of Southern Water's supply duties.

The Section 20 Agreement also sets out the required sequencing of water use restrictions relative to the drought permit and drought orders and their environmental effects. Level 1 and Level 2 (Temporary Use Ban Phase 1) water use restrictions are required to be in place before implementation of the Test surface water Drought Permit. A Drought Order application must be made to the Secretary of State to authorise partial Non-Essential Use Ban (NEUB) restrictions (Level 3, Phase 1 NEUB restrictions) before implementing any of the supply side Drought Orders. Level 3, Phase 2 restrictions (for Temporary Use Bans and NEUB) are to be implemented when river flows in the River Itchen fall below 200Ml/d (subject to the drought order authorising the NEUB restrictions having been granted).

We have therefore taken the environmental assessments into account in selecting the drought plan options in order to seek to minimise the likelihood of significant adverse environmental effects. However, the Drought Plan must also ensure that essential water supplies can be

maintained to customers in line with our statutory supply duties. Wherever feasible, we have either excluded measures that may have significant adverse environmental effects or have phased these measures so that they would only be implemented in a severe drought. However, the Drought Plan has included two Drought Orders where it is not possible to rule out adverse effects on the River Itchen SAC: the Candover Augmentation Scheme and Lower Itchen sources Drought Orders. These are necessary measures to include in the Drought Plan due to recent agreed changes to the abstraction licence conditions for the River Test and River Itchen water sources, which reduce the reliable volume of supply available in drought. Specific environmental mitigation and compensation packages have been agreed for each of these Drought Orders. Southern Water's WRMP19 includes a strategy to reduce the need for these Drought Orders in the medium term by developing new water resources in parallel with continuing the actions to reduce leakage and customer water consumption.

Mitigation measures are also set out for other drought plan measures to reduce the residual effects on the environment where adverse effects have been identified.

8 Mitigation and Monitoring

8.1 Overview

Key stages of the SEA process include Task B5: Mitigating adverse effects and Task B6: Proposing measures to monitor the environmental effects of implementing a plan or programme, as well as Stage E: Monitoring the significant effects of the plan or programme on the environment. The sections below describe how these tasks have been or will be addressed, as applicable, and how Southern Water intends to ensure that monitoring of potential effects is carried out and the appropriate mitigation measures are implemented for any adverse effects identified.

Southern Water has a responsibility to monitor, assess and, where possible, mitigate the environmental impacts of the supply-side actions we take during a drought. EA guidance governing the Drought Plan requires us to produce an EMP that demonstrates compliance with the requirements for environmental monitoring and mitigation set in the guidance.

The Draft Drought Plan 2022 includes specific monitoring and mitigation packages and implementation timetables for the Test Surface Water Drought Permit and Drought Order, Candover Augmentation Scheme Drought Order and Lower Itchen sources Drought Order which have been developed and agreed with the Environment Agency and Natural England as part of the Hampshire Abstraction Licences Public Inquiry process. The agreed monitoring and mitigation packages are incorporated into the Section 20 Agreement and have been included in Annex 7 of the Draft Drought Plan. The Section 20 Agreement forms an integral component of the statutory Drought Plan, with cross-referencing to the Drought Plan throughout the Agreement. All relevant provisions have informed the Draft Drought Plan and they have been assessed in an integrated manner within this SEA Environmental Report, and accompanying HRA and WFD Assessment Reports (Annex 8 and 10, respectively).

8.2 Mitigation Measures

Mitigation may be defined as a measure to limit the effect of an identified significant impact or, where possible, to avoid the adverse impact altogether.

Consideration of mitigation measures has been an integral part of the SEA process and has informed development of the Draft Drought Plan. The SEA appraisals set out in Sections 5 and 6 above have been based on the assessment of residual impacts, i.e. those impacts likely to remain after the implementation of identified mitigation measures. Certain assumptions have been made regarding mitigation in carrying out the assessments, notably:

- Where suitable specific mitigation measures have been identified (e.g. as informed through the Environmental Assessment Reports for Drought Order/permit options and other assessments of drought management measures), these have been taken into account, such that the resultant residual impact has been determined in this SEA;
- In line with recommendations made in the UKWIR SEA Guidance[20], the SEA appraisals have assumed the implementation of reasonable mitigation measures, such as the use of good construction practice (where this is relevant) and operation of water sources in line with regulatory requirements.

20 UKWIR (2012) Strategic Environmental Assessment and Habitats Regulations Assessment of Drought Plans (UKWIR Project WR/02/A).

During implementation of a specific drought management measure, appropriate monitoring will be undertaken to track any potential environmental and/or social effects which will, in turn, trigger deployment of suitable and practicable mitigation measures as may be available.

For supply-side management measures, the likely mitigation measures are summarised in the Draft Drought Plan at Annex 7: Environmental Monitoring Plan. In some cases, for example derogation to water abstraction rights, the Water Resources Act 1991 (as amended) provides for compensation where mitigation of adverse effects cannot be achieved. For the Candover Augmentation Scheme Drought Order, Lower Itchen sources Drought Order and Test Surface Water Drought Permit and Order, specific mitigation packages have been developed and agreed with the Environment Agency and Natural England for delivery in advance of drought permit / order implementation to improve the drought resilience of the River Test and River Itchen, reflecting the environmental sensitivity of these important chalk rivers. Further details are provided in Annex 7 of the Drought Plan. Compensation measures, as defined under the Habitats Directive, have also been developed for the Lower Itchen sources and Candover Augmentation Scheme Drought Orders, as set out in Annex 8 of the Drought Plan.

In relation to the potential impacts of demand-side measures, more detail is provided in the Drought Plan. Demand interventions have incorporated details from the Water UK and UK Water Industry Research (UKWIR) Code of Practice for water companies and stakeholders on the use of water restrictions[21]. The code of practice sets out the statutory and universal exemptions offered by all companies to Temporary Use Bans and Drought Orders. This UKWIR code of practice was updated in 2023[22]. It should be noted that Southern Water's customers are not legally entitled to compensation in respect of loss or damage sustained as a result of the implementation of Temporary Use Bans or a Non-Essential Use Ban Drought Order.

8.3 Monitoring Requirements

Monitoring is required to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures.

The Draft Drought Plan 2022 includes a basket of measures that will only be implemented if and when required depending on the occurrence of a drought event over the 5-year life of the plan; consequently, the actual impact of the plan is subject to some uncertainties. Monitoring of the impact from implementation of any of the measures included in the plan will be focused on those measures where moderate or greater environmental or social effects have been identified in this SEA and associated HRA, WFD and environmental assessment reports (as applicable).

For supply-side measures, an Environmental Monitoring Plan (EMP) has been produced to accompany the Draft Drought Plan (Annex 7: Environmental Monitoring Plan), setting out the monitoring requirements for each measure during the onset of drought, during implementation of drought plan measures and post-drought. This includes appropriately targeted monitoring of ecological, physical environment, heritage, recreational, navigation and landscape features. The EMP also sets out various baseline monitoring requirements to improve the environmental evidence for future assessment and to compare any drought plan impacts against. This additional baseline evidence will, in turn, help inform the SEA of the next Drought Plan.

For the Candover Augmentation Scheme Drought Order, Lower Itchen sources Drought Order and Test Surface Water Drought Permit and Order, the specific baseline monitoring measures developed

[21] Water UK/UKWIR (2014) Managing Through Drought: Code of Practice and Guidance for Water Companies on Water Use Restrictions - 2013 (UKWIR Project14/WR/33/6)
[22] Update to the Drought Code of Practice 2013 (ukwir.org)

and agreed with the Environment Agency and Natural England will aid further understanding of the potential effects of these drought plan measures on the sensitive environments of the River Test and River Itchen. This will help target the mitigation measures referenced earlier and reduce the uncertainties surrounding the assessment of environmental effects of the Drought Permit and Drought Order options for these two important chalk rivers. Further details are provided in Annex 7 of the Drought Plan.

Monitoring for the Test Surface Water Drought Permit and Drought Order will help reduce the uncertainty about possible risks of WFD status deterioration risks from implementing these measures. Should the monitoring indicate that WFD status deterioration may arise, Article 4(6) of the Directive details the circumstances in which temporary deteriorations do not amount to breaches of the requirements of the Directive. Within the Section 20 Agreement, the Environment Agency agreed that:

(a) Article 4(6) of the Water Framework Directive can be used in principle to enable the grant of a Test Surface Water Drought Permit authorising abstraction; and

(b) Low flows on the River Test of between 355Ml/d and 265Ml/d are capable of constituting exceptional circumstances for the purposes of Article 4(6) of the Water Framework Directive.

Drought Orders are determined by the Secretary of State, and while not wanting to fetter the Environment Agency's discretion, it is presumed by Southern Water that on the basis of this principle having been agreed with the Environment Agency for a Drought Permit application, the Environment Agency would support (or at least not oppose) this principle being presented by Southern Water in any Test Drought Order application to the Secretary of State; and that low flows on the River Test of between 265Ml/d and 200Ml/d may equally be capable of constituting exceptional circumstances for the purposes of Article 4(6) of the Water Framework Directive.

It is acknowledged that acceptance of this principle in a Test Surface Water Drought Order application would be at the discretion of the Secretary of State. Southern Water would seek to secure the support of the Environment Agency prior to submission of a Test Drought Order as part of its pre-application consultations.

In relation to demand management measures, it is recommended that monitoring of customer impacts is carried out during and after the implementation of any demand management measures to assess their effectiveness and confirm the effects predicted in this Environmental Report. This is likely to take the form of structured surveys with a statistically valid sample of household and/or non-household customers, as applicable. UK Water Industry Research (UKWIR) guidance[23] is available on assessing the effectiveness and impact of water use restrictions on customers.

[23] UKWIR (2014) Understanding the Impacts of Drought Restrictions (UKWIR Report 14/WR/01/13)

9 Quality Assurance

ODPM Guidance on SEA contains a Quality Assurance checklist to help ensure that the requirements of the SEA Directive are met. The checklist is reproduced in **Appendix E**, demonstrating how this Environmental Report meets the requirements.