



Severn Trent Water Ltd
Draft Drought Plan 2018

Strategic Environmental Assessment Environmental Report

Final Report for Severn Trent Water Ltd

Customer:

Severn Trent Water Ltd

Customer reference:

ED62813

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Non-Technical Summary

Introduction

Under the Water Industry Act 1991 (as amended), water companies in England and Wales are required to produce an updated Drought Plan every five years and submit a draft plan to the Secretary State and/or to Welsh Ministers.

Severn Trent Water's updated Draft Drought Plan provides a comprehensive statement of the actions Severn Trent Water will consider implementing during drought conditions to safeguard essential water supplies to its customers whilst minimising environmental impact over the 5-year period from 2019 to 2024. It is consistent with Severn Trent Water's Water Resources Management Plan 2019 (WRMP19), the objective of which is to set the strategic plan for maintaining reliable and sustainable water supplies over the next 25 years.

Drought Plans encompass a number of drought management measures that will only be implemented if and when required. Each drought is different in terms of its severity, season, location and duration; each combination of these factors may require a different combination of measures to be implemented. To ensure flexibility of response, the Draft Drought Plan includes a range of temporary demand management (demand-side) and temporary supply enhancement (supply-side) measures to help maintain essential water supplies to customers across the Severn Trent Water supply area.

SEA of plans and programmes is a statutory requirement under Directive 2001/42/EC, as transposed into national law by the Environmental Assessment of Plans and Programmes Regulations 2004. The purpose of SEA is to help ensure a high level and strategic protection of the environment by incorporating environmental considerations at an early stage in the development and preparation of plans and policy. In the context of drought planning, SEA assists in the identification of the potential environmental impacts of Severn Trent Water's drought management measures, assesses how any adverse impacts might be mitigated and contributes to decisions on the formulation of the Drought Plan.

The SEA provides information on the relative environmental performance of alternative options, and is intended to make the planning and decision-making process more transparent. The SEA is used to support the timing and implementation of drought management measures within the Drought Plan.

SEA screening confirmed that Severn Trent Water's Draft Drought Plan required an SEA due to uncertainties surrounding the potential impact of some drought management options on sites designated under the Habitats Directive. A SEA Scoping Report was issued in December 2017 for 5 weeks (21st December 2017 to 25th January, 2018), and provided an opportunity for the statutory consultees to provide views on the proposed scope and assessment approach for this SEA Environmental Report.

Assessment Methodology

The assessment has been 'objectives-led'. SEA objectives have been derived from environmental objectives established in law, policy or other plans and programmes, and from a review of the baseline information. The SEA objectives have been categorised under the following topic areas: biodiversity, flora and fauna; population and human health; material assets and resource use; water; soil, geology and land use; air and climate; archaeology and cultural heritage; landscape and visual amenity. The overall findings of the SEA describe the extent to which objectives for each topic are met by each of the drought management measures considered.

The outputs of the assessment are a completed appraisal framework table for different drought management measures, and a colour coded summary matrix for beneficial effects and adverse effects ranging from negligible to major effect significance. This provides a comparative assessment of the residual environmental effects of implementing each drought management measure (i.e. those impacts remaining after the implementation of mitigation measures).

A cumulative, or in-combination, assessment has also been undertaken which has involved examining the potential impacts of each of the drought management measures in combination with each other as well as in combination with the implementation of other relevant plans and programmes.

Findings of the Assessments

Demand-side measures

Five demand-side measures are included in the draft Drought Plan:

- Promoting water efficiency
- Reducing leakage
- Temporary Use Bans (TUBs)
- Non-essential use bans (NEUBs)
- Emergency drought orders/emergency plans

Demand-side measures serve to alleviate pressure on water resources by reducing customer demand for water in a drought, and therefore reducing the need for supply-side options to abstract more water from the environment. These measures generally have beneficial environmental effects but adverse effects of demand-side options have been identified with respect to population and human health, the value of water to society and effects on livelihoods where water use restrictions are involved. These adverse effects increase in significance with those measures that restrict a greater range of water uses.

The SEA of the demand-side measures supports the proposed ordering and sequencing of implementation of these measures relative to the supply-side options set out in the Draft Drought Plan.

Supply-side measures

There are seven supply-side measures that would require a drought permit or drought order to authorise additional water abstraction. No construction works are required to make use of these drought permits/orders.

The following seven sources could be affected by a Severn Trent Water drought permit or drought order application:

- Tittesworth Reservoir and River Churnet
- Eathorpe on River Leam
- Brownsover on River Avon
- Derwent Valley Reservoirs
- Ambergate on River Derwent
- Site G on River Severn
- Wyelands on River Wye

The drought permit/order measures are assessed as having a wide range of potential effects, from moderate adverse effects on biodiversity, flora and fauna for some options to moderate beneficial effects for water resource reliability and resilience. All of these measures involve abstracting more water from existing licensed water sources under temporary revisions to the abstraction licence conditions. The adverse effects arising from the implementation of the drought permits and orders are associated with reduced water levels and flows in watercourses. In many cases this may result in adverse effects on the water quality and ecology of the impacted watercourses. In some instances there are also adverse effects on aquatic recreational activities, water-dependent cultural heritage assets and landscapes characterised by watercourses. Beneficial effects are associated with maintaining public health, livelihoods and wider societal benefits through the provision of water supplies during prolonged periods of drought. The drought permits and orders also ensure resilience to drought which may become more prevalent due to climate change.

The SEA highlights that the majority of the drought permit/order measures considered for inclusion in the draft DP would have no greater than minor adverse effects across the SEA objectives. This includes the drought orders/permits for Brownsover on River Avon, Derwent Reservoirs, Eathorpe on River Leam and Wyelands on the River Wye.

In contrast, more significant adverse effects have been identified for two drought permits/orders associated with the River Derwent and River Churnet. Operation of the Ambergate on River Derwent drought permit/order would reduce water levels and flows in the river such that there would likely be moderate adverse effects on informal recreational activities in vicinity of Belper. The River Derwent is a key feature of the Derwent Valley Mills World Heritage Site, as such, reduced water levels in the river may also have moderate adverse effects on the setting of this designated site.

The Tittesworth Reservoir and River Churnet drought permit/order also performs relatively poorly across the SEA objectives with the most significant adverse effects relating to water and biodiversity, flora and fauna. Operation of the drought permit/order would result in moderate adverse effects on water flows and levels between Tittesworth Reservoir and the Abbey Green borehole discharge point. These reduced freshwater flows would be associated with moderate adverse effects on the brook lamprey fish species and the migration of salmon.

The Site G on River Severn drought permit/order measure performs the best across the SEA objectives with no more than negligible adverse effects and major beneficial effects on population and human health. This is due to the fact that flows in the River Severn would continue to be supported by the River Severn regulation scheme, such that the additional abstraction at Site G under the drought permit/order would be offset by maintenance by the Environment Agency of the 5-day average 850 Ml/d minimum flow requirement at Bewdley. Therefore, effects of the Site G drought permit/order acting alone on freshwater inflows to the Severn estuary would be expected to be negligible, since any effects would be counterbalanced by additional river regulation releases upstream.

The significance of effect on SEA objectives of the supply-side measures varies depending on the scale of the abstraction changes being sought relative to low flow conditions and the sensitivity of the environment in the impacted reaches. The assessment showed that a distinction can be made between the different measures and this has been taken into account in deciding the sequencing of implementation of drought permits/orders. However, such decisions must also reference the cumulative effect of measures implemented in the same river basin.

Cumulative Effects Assessment

Greater environmental effects may arise when some of the drought management measures are operated in combination with other drought management measures or in combination with the programmes or plans of other organisations, particularly other water companies and the Environment Agency.

The demand-side measures are complementary with potential cumulative beneficial effects for the water environment and water-dependent features if implemented together. Cumulative beneficial effects on the water environment with other water company and Environment Agency drought plans may occur if drought conditions were to arise at the same time and water efficiency campaigns are co-ordinated to maximise the water saving benefits. Demand management measures proposed in the Severn Trent Water Draft Water Resources Management Plan 2019 for implementation before 2024 would also be complementary with the Draft Drought Plan.

Cumulative adverse effects are anticipated in relation to effects on population and livelihoods, plus certain recreation, landscape and heritage features as a result of the combined effects of a Temporary Use Ban, Non-Essential Use Ban Drought Order and Emergency Drought Order.

Cumulative effects with supply augmentation measures have been only been identified in relation to carbon and air quality effects between leakage control measures and drought permit/orders involving increased pumping of water. These cumulative effects are considered to be negligible given the small additional carbon and air quality effects associated with increased leakage reduction activities.

No adverse cumulative effects are expected from simultaneous implementation of two or more of the supply-side measures in the Draft Drought Plan or with other English water company Drought Plans or their draft Water Resources Management Plans 2019. However, cumulative effects between the

Severn Trent Water Draft Drought Plan and the Dwr Cymru Welsh Water's Drought Plan were identified. In the event that the Severn Trent Water Wyelands drought permit/order is simultaneously implemented with the Dwr Cymru Welsh Water drought permit/order options on the River Wye, low cumulative adverse effects on hydrology and water quality are anticipated in the lower reaches of the River Wye. Low cumulative adverse effects are also identified for European eel, Atlantic salmon and shad, river mussels, yellow mayfly and macrophytes (notably *Ranunculus*). In terms of the SEA significance of these cumulative effects, due to the international importance of the River Wye and its estuary (designated as an SAC), these effects are assessed as being of moderate significance. However, the low magnitude of these cumulative effects will not result in any likely significant effects on the designated features or conservation objectives of the River Wye SAC.

Cumulative effects of the Environment Agency's River Severn drought order with the Severn Trent Water River Severn catchment drought permits/orders are assessed as having no greater than minor adverse effects assessment assuming appropriate management of the River Severn Regulation Scheme and the reductions to other abstractions under the Environment Agency's drought order. The HRA screening concluded that there would be no likely significant cumulative effects on the Severn Estuary European Marine Site. A similar conclusion applies to the cumulative effects of all water company drought permits/orders in the River Severn catchment along with the Environment Agency's River Severn Drought Order.

No adverse cumulative effects are expected from the implementation of any supply-side measures with other major projects or land use and spatial plans.

Role of the SEA in developing the Draft Drought Plan

The SEA has helped to inform decision-making on the sequencing and timing of the different drought plan measures. Those measures that have negligible to low adverse effects should be implemented first wherever possible with those measures having more significant adverse effects being implemented later. However, other factors may preclude such sequencing, including the spatial distribution of drought impacts between the different Water Resource Zones, the intensity of the drought, practicability and possible drinking water quality risks. This balancing of overall effects has determined the final sequencing of measures in the draft DP.

Mitigation and Monitoring

Consideration of mitigation measures has been an integral part of the SEA process. The SEA appraisals have been based on residual impacts that are likely to remain after the implementation of reasonable mitigation measures.

During implementation of one or more drought management measures, appropriate monitoring will be undertaken to track any potential environmental effects which will, in turn, trigger deployment of suitable and practicable mitigation measures. Prior to implementation, Severn Trent Water will review the specific requirements for mitigation and monitoring in consultation with the Environment Agency, Natural England, Natural Resources Wales, Ofwat and the Consumer Council for Water, as appropriate.

Next Steps

This SEA Environmental Report is being issued for public consultation alongside the draft Drought Plan. Comments received through this consultation will inform the production of the Final Drought Plan that will be published in due course following approval from the Secretary of State and Welsh Government.

When the drought plan is implemented during an actual drought event, Severn Trent Water will also use the SEA to help support its decisions on implementation of drought management measures. The company will also monitor the effects of any measures that it implements, helping to ensure that the potential effects identified in the SEA are considered in practice and will also inform the next drought plan and associated SEA.

Consultation

The consultation period for this SEA Environmental Report will run concurrently with consultation on Severn Trent Water's draft Drought Plan. Comments should be sent by email to:

Water.resources@defra.gsi.gov.uk with 'Drought Plan SEA Consultation' in the subject box.

Alternatively comments should be sent by post to:

Secretary of State for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London
SW1P 3JR

Please copy all comments made to: futureconsultations@severntrent.co.uk with 'Drought Plan SEA Consultation' in the subject header.

1 Introduction

1.1 Background and Purpose of Report

Severn Trent Water is preparing its Draft Statutory Drought Plan (DP) covering the period 2019 to 2024 and has undertaken a Strategic Environmental Assessment (SEA) to inform the development of its DP. A Habitats Regulations Assessment (HRA) screening and Water Framework Directive (WFD) compliance assessment has also been undertaken which has informed the SEA.

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 the rationale for applying it to the draft DP, is provided in Section 1.2 below.

This Environmental Report is the second output of the SEA process. In December 2017, the SEA Scoping Report was issued for consultation which summarised the baseline environment of the area affected by the DP and the framework that would be used for the assessment of alternative options for inclusion in the plan. Issues raised by consultees on the Scoping Report have been considered in preparing this Environmental Report (see Section 1.7 Consultation).

This SEA Environmental Report presents the current and future baseline environmental information in the absence of the DP (Section 3) and provides details of the methods employed in undertaking the assessment (Section 4). The potential effects of the various DP options are presented in Section 5 along with the effects of the combinations of options included in the draft DP. Information regarding mitigation and monitoring of the effects of implementing the DP is provided in Section 6.

This Environmental Report accompanies the consultation on the draft DP. Section 1.8.3 provides details on how to comment on this Environmental Report as part of the statutory consultation process.

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 on the assessment of effects of certain plans and programmes on the environment (commonly referred to as 'the SEA Directive'). 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, however, that as stated in the national SEA Guidelines² *"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 environmental performance of alternatives, and can make the decision-making process more transparent."* The SEA can, therefore, be used to support the timing and

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.

implementation of actions within the plan, although this needs to be set in the context of applying SEA to drought planning, as described in Section 1.2.2 below.

The range of issues included in an SEA is set out in the Regulations and includes: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage and landscape.

SEA is usually focused mainly on environmental effects. However, it is current best practice within the water industry to examine the broader social effects of drought planning, in addition to the environmental effects. As such, the full range of environmental and social effects which are likely to arise from implementation of the Draft DP are considered.

As identified above, national SEA guidance sets out the key stages of the SEA process. This, together with national water industry guidance for undertaking SEA of Drought Plans³, has been used to inform the methodology for the SEA. These documents remain the recommended best practice guidance for preparation of SEAs of Drought Plans.

The Drought Plan Guideline was published by the Environment Agency in December 2015⁴ and this included additional guidance for the environmental assessment of Drought Plans. This additional guidance was subsequently updated by the Environment Agency in September 2017⁵. The guidance specifies that a water company must ensure that its Drought Plan meets the requirements of the Strategic Environmental Assessment (SEA) Directive. Natural Resources Wales (NRW) issued its Water Company DP Technical Guideline⁶ in August 2017 for water companies wholly or mainly in Wales, which also provides guidance to be followed by companies wholly or mainly in England with drought management actions that affect Wales. This guidance includes a requirement to consider all obligations in relation to the Environment (Wales) Act 2016 and the Well-being of Future Generations (Wales) Act 2015 in developing Drought Plans.

1.2.2 Applying Strategic Environmental Assessment to Drought Planning

Drought Plans encompass a group of measures that will only be implemented if and when required because of the unpredictable occurrence of a drought event, and therefore the actual impact of the plan over its life is subject to very significant uncertainties. There may or may not be a drought during the period of the plan, and each drought is different in terms of severity, season, location, duration and influence of other abstractors within the catchment. Each combination of these factors may require a bespoke reaction in terms of measures to be implemented.

It is impossible to predict in advance which and how many of the measures will be required to respond to each particular drought event. Therefore, SEA of Drought Plans cannot provide a certain prediction of an overall environmental effect of adopting the plan, as its implementation is uncertain. The Environmental Report discusses these where relevant.

Instead of attempting to assess a number of potential scenarios, the SEA of the draft DP includes a cumulative effects assessment in order to assess the effects of different combinations of measures.

The SEA of the draft DP is focussed on the reactive and transient nature of the event when a DP is operational, while maintaining the strategic approach of an SEA. The assessment of individual drought management options (Stage B of the SEA process) concentrates on effects resulting from the implementation of drought management measures rather than the 'natural' impacts of drought which are considered as the environmental baseline conditions.

1.2.3 Requirement for SEA and HRA of Severn Trent Water's DP

Undertaking SEA of the DP helps guide decision making both in the preparation of the DP and during DP implementation. For example, the SEA identifies the potential effects across a broad range of

³ UKWIR (2012) Strategic Environmental Assessment and Habitats Regulation Assessment – Guidance for Water Resources Management Plans & Drought Plans (12/WR/02/A).

⁴ Environment Agency (2015) How to write and publish a drought plan, December 2015. Available at <https://www.gov.uk/government/collections/how-to-write-and-publish-a-drought-plan>.

⁵ Environment Agency (2017) Drought Plan guideline extra information: Environmental Assessment for Water Company Drought Plans (September 2017)

⁶ Natural Resources Wales (2017) Water Company Drought Plan Technical Guideline, August 2017.

environmental topics which are focussed to the situation and which have been established during the scoping phase. As every drought is different in terms of severity, location, duration and hence impact, the output of the SEA for each drought management option has been used to help guide option selection specific to the characteristics of any potential drought event. This has helped to inform the development of the DP.

The SEA Scoping Report which was consulted on in December 2017 contained a description of the SEA screening process. It concluded that an SEA is required, taking into account a precautionary approach and the unknown outcome of the HRA screening at that time.

An HRA screening and WFD compliance assessment has since been undertaken and the outcomes are presented in separate reports. The findings of the HRA screening and WFD assessment have informed the SEA.

1.3 Severn Trent Water Supply Area and Drought Planning

1.3.1 Introduction

In the event of a severe drought, Severn Trent Water will need to carry out a range of management measures to ensure the continued provision of adequate supplies of wholesome water to its customers. The Severn Trent Water Draft DP sets out the measures for dealing with drought conditions, and takes account of legal and regulatory requirements for drought management. Statutory demand management measures available to water companies during drought have been extended through the provisions in the Flood and Water Management Act 2010. Section 36 of this Act amended the Water Industry Act 1991 provisions relating to hosepipe bans and allows companies to temporarily restrict a wider range of customer water use activities under a Temporary Use Ban without requiring a drought order. The Drought Direction 1991 has been replaced by the Drought Direction 2011, which sets out specific water uses that require a drought order in order to impose restrictions during a drought.

1.3.2 Severn Trent Water Supply Area

Severn Trent Water is one of the largest water companies in the country and its purpose is to serve communities and build a lasting water legacy. Severn Trent Water does this by providing high quality drinking water and sewerage services (taking wastewater away) in the Midlands and Wales.

Further details about the water supply system are provided on the company's website (www.stwater.co.uk).

1.3.3 Spatial Scope of the SEA

Some of the options considered for the DP lie outside of the Severn Trent Water supply area. Consequently, the spatial scope of the SEA is larger than the company's water supply area to cover potential locations for drought management measures considered through the drought planning process. The geographical area under consideration for the SEA is shown in **Figure 1.2**.

1.3.4 Habitat Regulations Assessment (HRA) Screening

HRA screening was carried out to inform the development of the DP, providing an understanding of 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.

1.3.5 Water Framework Directive (WFD)

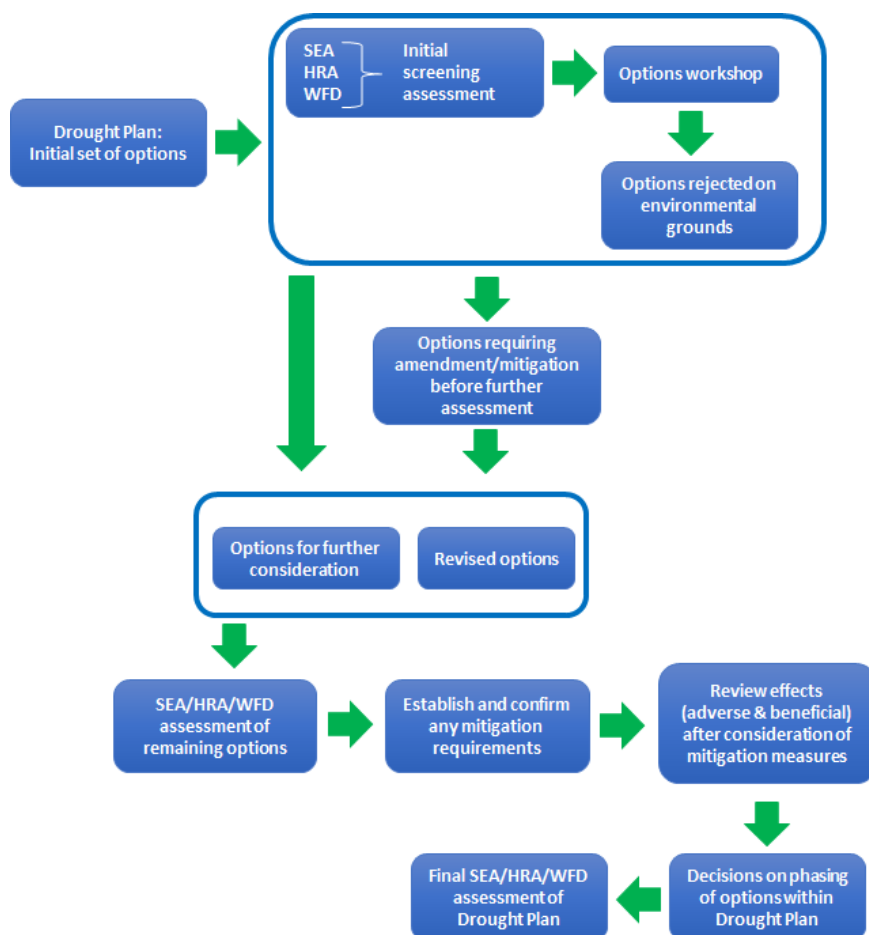
As well as HRA, a WFD compliance assessment was carried out to determine the potential risks that the DP poses to WFD water bodies. The findings of the assessment demonstrate the extent to which the DP is WFD compliant. For drought permit and drought order measures, cross reference is made to the relevant WFD sections contained within Environmental Assessment Reports (EARs). EARs are prepared to determine the potential environmental impacts associated with the implementation of drought permit/orders.

1.3.6 Drought Permit/Order Environmental Assessment Reports

EARs of potential drought permits/orders are currently being updated by Severn Trent Water over the period 2017-2020 with the latest available environmental evidence. As such, the SEA has taken account of the latest best available evidence from these reports as at January 2018 and associated underlying assessments.

The aim of these studies is to produce EARs that have been agreed with the Environment Agency and Natural England (and Natural Resources Wales for permit/order options within Wales) such that in the event of a drought, they are readily available for refreshing based on the prevailing drought situation at that time. The EARs WFD assessments assess the potential hydrological and water quality impacts that would be associated with the implementation of drought permits/orders. The EARs also involve the consideration of all potentially affected habitats and species including, but not limited to, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar features as well as any Site of Special Scientific Interest (SSSI) or species/habitats of principal importance for the conservation of biodiversity in England and Wales (identified in the Natural Environment and Rural Communities (NERC) Act 2006 Section 41 and Section 7 of the Environment (Wales) Act 2016, respectively). The reports include Environmental Monitoring Plan (EMP) recommendations for each drought permit/order.

The HRA screening, WFD compliance assessment and EARs have all informed the SEA. The integration of SEA into the DP development is illustrated in **Figure 1.1**.

Figure 1.1 Integration of SEA into Drought Plan development

1.4 Severn Trent Water's Drought Planning Process

1.4.1 Overview and Timetable

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

The Water Act 2014 amended the publication frequency of Drought Plans and states that revised Drought Plans should be submitted within 4 years and 3 months after the date on which its Drought Plan was published.

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

Only those drought management measures that are relevant to the period encompassed by the Draft DP (2019 to 2024) are considered in the SEA and HRA process. To this end, environmental effects of the draft DP measures are considered within the context of the current abstraction licence operating conditions or, where applicable, confirmed changes to abstraction licences that will take effect during the lifetime of the DP. The same approach has also been taken with respect to the assessment of

cumulative effects of the DP with other plans, projects and programmes, in that only those that are in place during the 5-year lifetime of the DP have been considered in the SEA.

1.4.2 Drought Management Measures

The DP identifies triggers that act as decision-points for implementing drought management measures. The nature of the triggers varies for each water resource zone, and the nature of the drought management measures that will be considered also varies depending on the prevailing drought conditions.

Drought management measures may be applied either company wide, by water resource zone or to target a specific geographic area depending on the nature of the drought event prevailing at the time. The DP contains a range of potential supply-side and demand-side drought management measures, for example implementation of drought permits or drought orders and imposing Temporary Use Bans.

1.4.2.1 Supply-Side Measures

There are 9 emergency abstraction measures identified in the draft DP (**Table 1.1** and shown in **Figure 1.2**). The probability of a drought causing such emergency measures to be implemented is extremely low. The timescales and requirements of a DP drought management measure are different to those of these emergency measures: whilst some of these sources could be deployed at short notice, others have a long lead-in time and would require (temporary) infrastructure, environmental assessments, hydrological studies and water quality assessments.

Due to limited available baseline information for these 9 emergency abstraction measures, it is not possible to determine their predicted environmental effects and therefore they have been excluded from the SEA (and the HRA and WFD assessments). Potential effects of these emergency measures will be incorporated into the assessment at a later date when more information is available.

Table 1.1 Emergency Abstraction Measures

Name	Estimated average yield (Ml/d)
Witcombe Reservoir	1.4
Monkdale Borehole	1.5
Stanley Moor Borehole	0.5
Norton Emergency Borehole	0.7
Beechtree Lane Emergency Borehole	0.9
Blackbrook Reservoir	6.0
Linacre Reservoir Group	6.8
Shardlow/ Witches Oak water/ Birmingham GW	8.9
Esgaireira Reservoir	1.1

There are 7 potential drought permit/order measures included in the draft DP (**Table 1.2**). The approximate locations of these drought permit/order measures are shown in **Figure 1.3**.

Table 1.2 Drought Permit/Order measures

Name	Description	Reliable Supply Benefit in Drought (MI/d)
Derwent Reservoirs	Reduce the aggregate quantity of compensation water releases from Ladybower Reservoir to the River Derwent and the River Noe/Jaggers Clough from 74 MI/d (or 92 MI/d when flow at Derby is <340 MI/d) to 51 MI/d. Reduce compensation water flow releases from Ladybower Reservoir from 54 MI/d to 34 MI/d.	<20
Ambergate on River Derwent	Partial relaxation of the control flows in the River Derwent at St Mary's Bridge (Derby). This will allow the abstraction of up to 320 MI/d at Ambergate when the flow in the River Derwent at Derby is not less than 500 MI/d, rather than the normal flow of 680 MI/d.	10-50
Tittesworth Reservoir and River Churnet	Allow the compensation flow at Tittesworth Reservoir (including Solomon's Hollow) to be reduced from a minimum of 14.8 MI/d to a minimum of 8 MI/d. Authorise abstraction of up to 6.8 MI/d from the Abbey Green borehole to discharge a compensation flow release into the River Churnet 1.8 km downstream of Tittesworth reservoir. Remove the requirement for a total minimum flow discharge of 19.32 MI/d to be released from a combination of Tittesworth Reservoir (including Solomon's Hollow) and Deep Hayes.	<6
Brownsover on River Avon	Reduce the hands-off flow conditions in the River Avon at Stareton from 45 MI/d to 35 MI/d exclusively to allow transfer of additional water from the River Avon at Brownsover into Draycote reservoir.	1-4
Eathorpe on River Leam	Authorise abstraction at Eathorpe on the River Leam to Draycote Reservoir at any time of year when the lower storage condition at Draycote Reservoir would normally prohibit such abstraction. Relax the prescribed flow requirement in the River Leam at Princes Drive Weir in Leamington from 18 MI/d to 12 MI/d.	6.0
Site G on River Severn	Suspend the daily abstraction licence restriction under maximum River Severn Regulation conditions and the constraint limiting abstraction over the first 100 days of River Severn Regulation (Special Conditions 2b and 2c of the Site G abstraction licence). The drought permit is also to suspend the joint abstraction licence constraints at Site G and Shared South Staffordshire Asset under maximum River Severn Regulation, reverting the daily maximum of 303 MI/d (maximum River Severn Regulation) to 431MI/d, and the seasonal abstraction licence limits equivalent to 273 MI/d (abstraction licences No's. 110 and 163) and 303 MI/d (abstraction licences No's.110, 163 and 584) will be temporarily suspended.	<120
Wyelands on River Wye	Authorise the abstraction of up to 45.5 MI/d at Wyelands when the flow in the River Wye at Redbrook is less than 1209 MI/d and the Elan Valley Reservoirs storage is below the Elan Valley Reservoir Storage Licence Rule Curve.	5.7

1.4.2.2 Demand-Side Measures

Potential demand-side measures are identified in **Table 1.3**. The potential volumetric demand saving benefits for these options could not be determined precisely given the uncertainty surrounding their implementation in any particular drought event (e.g. whether the measure would be implemented

company-wide or WRZ specific). Where possible, an estimated percentage change in customer consumption is provided.

Table 1.3 Demand-side measures

Name	Description	Estimated Reduction in Consumption (% change)
Promoting water efficiency	Campaigns promoting water efficiency to domestic customers including information on how to reduce water consumption for toilet flushing, in the bathroom and gardening plus frost protection best practice measures. Educational campaigns via the media, literature, advertising, face-to-face contact, telephone contact and social media.	-
Reducing leakage	Ensure that all water distribution maintenance programmes are up-to-date and undertake additional leakage control activities to deliver demonstrable water savings.	-
Temporary Use Bans (TUBs)	Restrictions on the use of hosepipes for a range of uses, including the washing of vehicles and boats, watering gardens and sports grounds and filling of paddling pools in line with the Temporary Use Ban Regulations.	5
Non-essential use bans (NEUBs)	Drought order to restrict prescribed non-essential water uses.	5
Emergency drought orders/emergency plans	Prohibit or limit the use of water for such purposes as may be appropriate and to supply water by means of stand-pipes or water tanks.	>10

1.4.2.3 Drought Plan Measures Implementation and the Role of SEA

The draft DP sets out the triggers that may require implementation of each of the drought management measures summarised above. These triggers are based on specified monthly water storage volumes in appropriate groupings of reservoirs (Drought 'Control Lines'). Preceding actions are also set out that would occur in advance of the measure being implemented (e.g. applications to the Environment Agency for a drought permit). Not all measures would necessarily be required in any particular drought: this will be dependent on the geographical extent, magnitude, time of year and duration of the drought event.

Most of the measures would only be contemplated once reservoir storage falls close to the relevant Drought Control Line for each reservoir storage group. For example, the Temporary Use Ban would be implemented if projected reservoir storage six weeks ahead is forecast to cross the Drought Control Line; drought orders or permits would be applied for if reservoir storage approaches the Drought Control Line. There is a progressive and sequential approach to implementation of the DP measures, with those measures having the least impact on customers and/or the environment being implemented first, whilst those that have the greatest impact would only be implemented in the event of a very severe drought event.

The SEA assessment of each of these measures and their cumulative effects provides a consistent and relative assessment of the effects of each measure to inform the consideration of the appropriate sequencing of implementation, alongside other factors such as practicability, risks to drinking water quality and security risks. It is noted that some drought management measures may have different environmental effects depending on the season of implementation (for example, a summer drought compared to a winter drought). As drought management measures can theoretically be required and implemented at any time of year, overall effects are assessed on the basis of the worst historic drought in this SEA.

The SEA findings have been used to help inform the sequencing of drought management measures for the draft DP.

Figure 1.2 Emergency Abstraction Option Locations

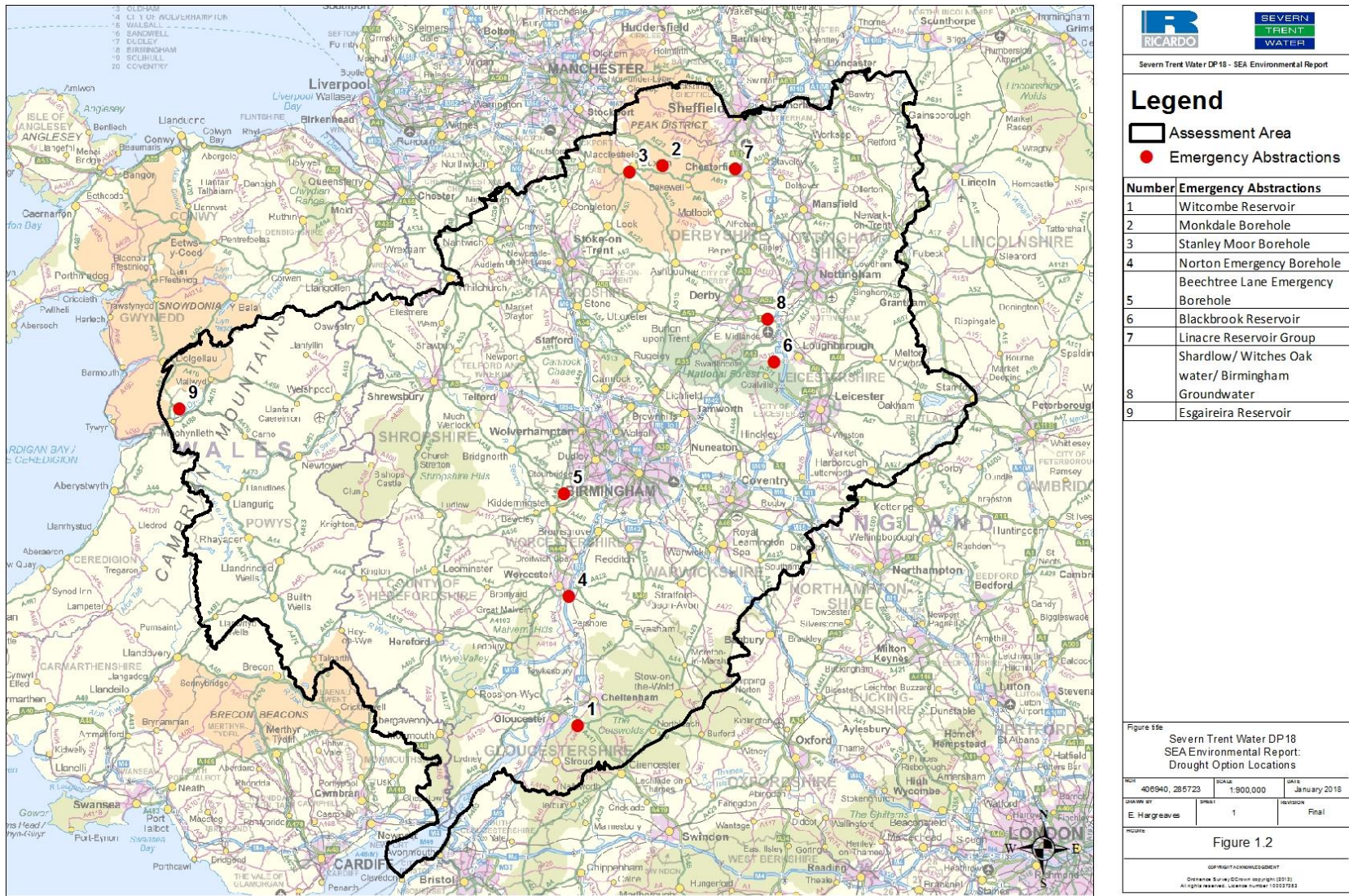
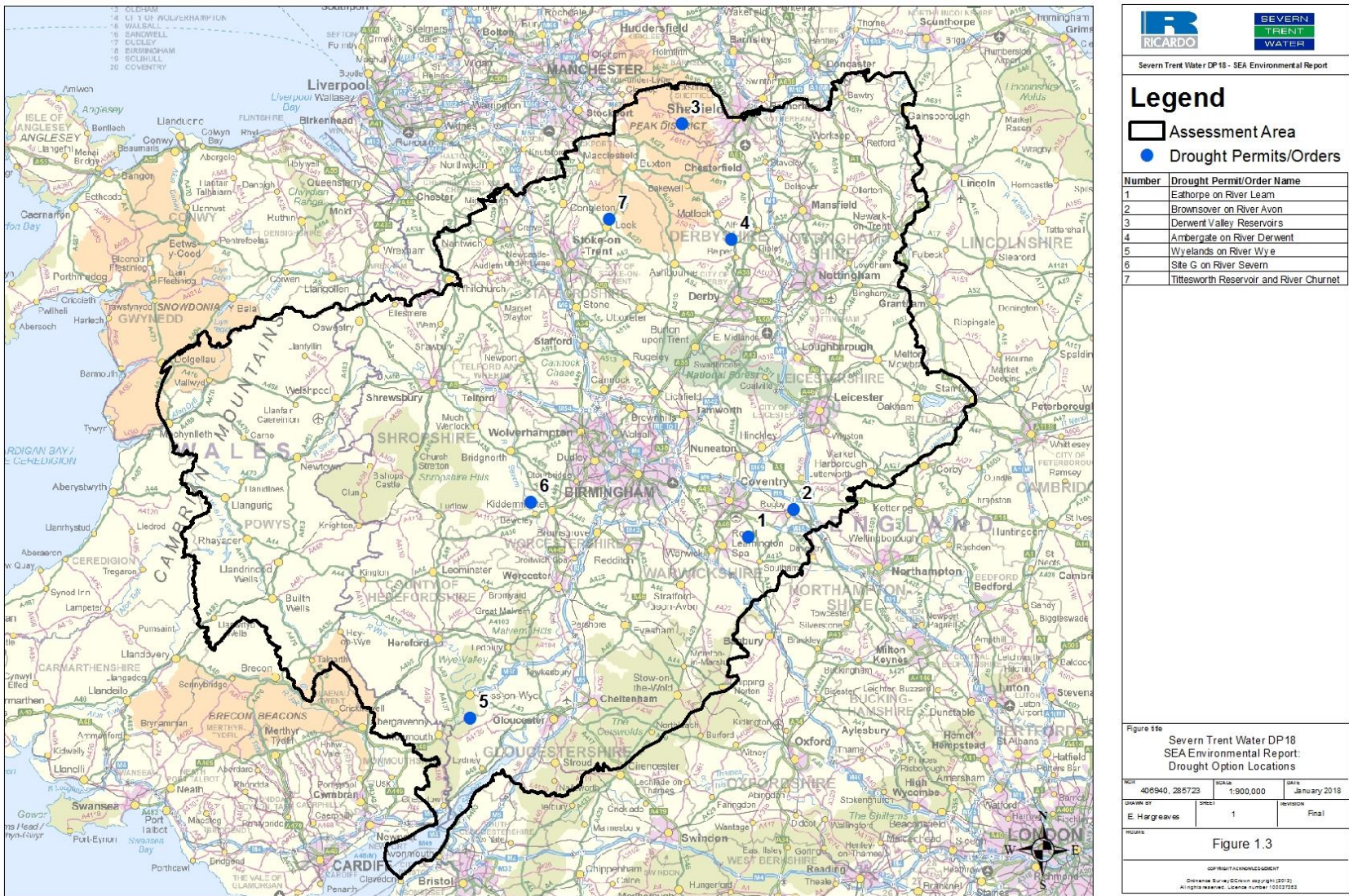


Figure 1.3 Drought Permit/Order Option Locations



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 – Scoping Report published for consultation in December 2017.
- 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 consultation on the draft DP.

Table 1.4 is an extract from the SEA Practical Guide that sets out the main stages of the SEA process and the purpose of each task within the process.

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 and environmental protection objectives	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.
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.

Stage / Task	Purpose
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.
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 draft 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 current and future environmental issues to be considered in the SEA.
- Section 4 – Methodology: provides details of the methods employed in undertaking the assessment including the cumulative effects assessment methodology.

- Section 5 – Assessment of the alternative drought management options: presents the assessment of each of the options and the potential cumulative effects with other options and in-combination effects with other plans, programmes and projects in the area affected.
- Section 6 – Mitigation and Monitoring: discusses measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the DP 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 7 – Conclusions: discusses the key findings of the assessment.
- Section 8 – Quality Assurance: provides the SEA Quality Assurance Checklist.

1.7 Consultation

Consultation bodies, stakeholders and the public were invited to express their views on the Scoping Report in accordance with SEA Regulation 12(5). The Scoping Report was issued on 21st December 2017 to the statutory consultees in England and Wales: Environment Agency, Natural Resources Wales, Historic England, Cadw and Natural England. The consultation period ran until 25th January 2018. The responses to comments provided on the Scoping Report and how these have been taken into account in carrying out the SEA are presented in Appendix A.

This Environmental Report has been produced taking into consideration the responses received from the statutory consultation bodies during the Scoping Report consultation. It provides assessments of the potential effects (adverse and beneficial) of the drought management measures considered for the draft DP and sets out how the findings have been used to inform the development of the plan.

The public, regulatory bodies and stakeholders are now invited to express their views on this Environmental Report, and can also use it as a reference point in expressing their wider views on the draft DP that this report accompanies.

The consultation period for this SEA Environmental Report will run concurrently with consultation on Severn Trent Water's draft Drought Plan. Comments should be sent by email to:

Water.resources@defra.gsi.gov.uk with 'Drought Plan SEA Consultation' in the subject box.

Alternatively comments should be sent by post to:

Secretary of State for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London
SW1P 3JR

Please copy all comments made to: futureconsultations@severntrent.co.uk with 'Drought Plan SEA Consultation' in the subject header.

2 Policy context

2.1 Introduction

Annex 1 of the SEA Directive (Directive 2001/42/EC) requires the following specific 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.'*

2.2 Review of Policies, Plans and Programmes

Identifying other relevant plans, policies and programmes, as well as environmental protection and social objectives, is one of the first steps in undertaking SEA, forming part of Stage A of the SEA process. The review presented in the SEA Scoping Report identified how the DP might be influenced by other plans, policies, programmes and described the other objectives which the DP should take into account. This information helped to set the objectives for the SEA process.

Relevant plans, policies and programmes were identified from the wide range that has been produced at an international, national, regional and local level. The emphasis is on 'relevant': plans and programmes that have no likely interaction with the DP (i.e. they are unlikely to influence the plan, or be influenced by it), were excluded from the review. Important relevant plans, policies and programmes and strategic level plans that fall within the area under consideration have been considered, including relevant plans, policies and programmes in Wales as some of the drought management measures may lead to effects within parts of eastern Wales.

The key policy objectives derived from the review of policies, plans and programmes are documented below in **Table 2.1**. **Appendix B** provides details of all the policies, plans and programmes identified from the review.

Table 2.1 Key Policy Objectives derived from the Review of Policies, Plans and Programmes

SEA Topic	Key Policy Objectives
Biodiversity, flora and fauna	<ul style="list-style-type: none"> • Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites, whilst taking into account future climate change and ability to adapt. • Promote a catchment-wide approach to water use to ensure better protection of biodiversity. • To achieve favourable condition for priority habitats and species. • 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. • Ensure maintenance and/or support provision of fish passage for migratory fish. • Protection, conservation and enhancement of natural capital. • Ecosystem services from natural capital 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.
Population and human health	<ul style="list-style-type: none"> • To ensure secure, safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities and all business sectors. • 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. • To provide a clean, healthy environment that benefits both people and the economy. • Water resources play an important role in supporting the health and recreational needs of local communities. • Increase awareness of sustainability, the true value of water and its efficient use. • Promotion of well-being and healthy communities and protection from risks to these. • Promotion of a sustainable economy supported by universal access to essential utility and infrastructure services. • Protection and improvement of drinking water quality.
Material assets and resource use	<ul style="list-style-type: none"> • 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. Government expects water companies to continue reducing overall demand for water. • Contribute to a resource efficient, green and competitive low carbon economy. • Maintain a resilient, reliable public water supply and ensure there is enough water for human uses, as well as providing an improved water environment. • Minimise the production of waste, maximise resource benefits from waste and ensure waste management is in line with the 'waste hierarchy': eliminate waste sent to landfill. • Promote the sustainable management of natural resources.
Water	<ul style="list-style-type: none"> • 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. Government

SEA Topic	Key Policy Objectives
	<p>expects water companies to continue reducing overall demand for water.</p> <ul style="list-style-type: none"> • Contribute to a resource efficient, green and competitive low carbon economy. • Maintain a resilient, reliable public water supply and ensure there is enough water for human uses, as well as providing an improved water environment. • Minimise the production of waste, maximise resource benefits from waste and ensure waste management is in line with the 'waste hierarchy': eliminate waste sent to landfill. • Promote the sustainable management of natural resources. • 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. • Ensure a sustainable balance between the supply and demand for water. • Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value. • Reduce risk of flooding from reservoirs. • Support achievement of River Basin Management Plan objectives.
Soil, geology and land use	<ul style="list-style-type: none"> • Protect and enhance the quality and diversity of geology (including geological Sites of Special Scientific Interest) and soils including geomorphology and geomorphological processes. • Ensure that soils will be protected and managed to optimise the varied ecosystem service functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, carbon sequestration, 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. • Minimise coastal erosion. • Conservation and enhancement of geological SSSIs.
Air and climate	<ul style="list-style-type: none"> • Reduce greenhouse gas emissions. Targets include: reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050. In Wales, target is to achieve an 80% reduction in emissions. • Reduce the effects of air pollution on ecosystems. • Improve overall air quality. • Sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. • 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.

SEA Topic	Key Policy Objectives
	<ul style="list-style-type: none"> Need for adaptive measures to respond to likely climate change impacts on water supply and demand.
Archaeology and cultural heritage	<ul style="list-style-type: none"> Built development in the vicinity of archaeological and cultural heritage assets could have implications for their setting and/or built fabric. 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 archaeological and cultural heritage assets are avoided. 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 setting. Protect, enhance and manage the character and appearance of historic and cultural assets and their settings including maintaining and strengthening local distinctiveness and sense of place.
Landscape and visual amenity	<ul style="list-style-type: none"> Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside). Take account of the different roles and character of different areas, promoting the vitality of main urban areas, protecting the Green Belts around them, recognising the intrinsic character and beauty of the countryside and supporting thriving rural communities within it. 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.

3 Environmental Baseline Review

3.1 Introduction

Annex 1 of the SEA Directive requires the following specific baseline information to be included within the Environmental Report to identify the environmental characteristics of areas likely to be significantly affected by the draft DP 2018:

- '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').'

An essential part of the SEA process is to identify the current baseline environmental conditions and their likely evolution in the absence of the DP over the lifetime of the plan. It is only with knowledge of the baseline conditions that potential impacts of the DP can be identified, monitored, and if necessary mitigated.

Baseline data have been drawn from a variety of sources, including a number of the plans, policies and programmes reviewed and summarised earlier in **Table 2.1**. The environmental baseline is presented in full in **Appendix C** which includes summaries of the likely future trends in the environmental and social issues considered (where information is available to do so).

The assessment of effects has assumed the baseline conditions are those that would prevail during drought conditions with water abstraction taking place under the normal abstraction licence conditions.

3.1.1 Limitations of the data and assumptions made

The area under consideration for this SEA is substantial presenting some challenges around extrapolating information from data collated at differing spatial resolutions. Relevant spatial data have been obtained for each of the SEA topics and presented as mapped information as much as possible to summarise the extensive datasets involved.

In some instances, reporting cycles mean that the available information is dated (as indicated for each dataset) but if information is updated before the Environmental Report is produced, the more recent data will be used in the assessment.

The principal limitations surround the future social and environmental baseline where there is substantial differences in the availability and temporal resolution of robust projections across the various SEA topic areas.

3.2 Key issues

The baseline was set out in the Scoping Report and has been updated based on feedback provided from the Scoping Report consultation. The baseline conditions are detailed further in **Appendix C**. Key issues arising from the review of baseline conditions for each of the SEA topics are summarised in **Table 3.1**. These key issues have been used to support the development of the SEA objectives in Section 4.

Table 3.1 Summary of key issues by SEA topic

SEA topic	Key issues
Biodiversity, flora and fauna	<ul style="list-style-type: none"> • The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation. • The need to avoid activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats. • The need to control the spread of INNS. • 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	<ul style="list-style-type: none"> • The need to ensure water supplies remain affordable especially for deprived or vulnerable communities • 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 security of supply without the need for emergency drought measures. • The need to ensure water quantity and quality is maintained for other users including tourists, recreational users and other users such as farmers. • The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment. • The need to accommodate an increasing population. • 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 well-being and the economy.
Material assets and resource use	<ul style="list-style-type: none"> • 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. • Need to reduce leakage from the water supply system. • Daily consumption of water resources is higher than the national average in the area and there is a need to encourage more efficient use.

SEA topic	Key issues
Water	<ul style="list-style-type: none"> • The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD status targets. • The need to maintain the quantity and quality of groundwater resources taking into account WFD status targets. • 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 waters and groundwaters. • The need to ensure sustainable abstraction. • The need to ensure that people understand the value of water. • The need to reduce and manage flood risk.
Soil, geology and land use	<ul style="list-style-type: none"> • The need to protect geological features of importance and maintain and enhance soil function and health. • The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources). • The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.
Air and climate	<ul style="list-style-type: none"> • The need to reduce air pollutant emissions to comply with EU and national air quality standards. • The need to mitigate against climate change through the reduction in greenhouse gas emissions to contribute to risk reduction over the long term. • The need to adapt to the impacts of climate change for example through, sustainable water resource management and specific aspects of natural ecosystems (e.g. connectivity), as well as accommodating potential opportunities of climate change.
Archaeology and cultural heritage	<ul style="list-style-type: none"> • The need to conserve or enhance archaeological and cultural heritage assets, particularly those which are sensitive to changes in the water environment such as flooding or drought.
Landscape and visual amenity	<ul style="list-style-type: none"> • The need to protect and improve the natural beauty of the region's AONBs and other areas of natural beauty.

4 Assessment Methodology

4.1 Overview

This section outlines the assessment methodology employed for the SEA. The environmental and social assessment of the alternative DP measures was 'objectives-led'. Establishing assessment objectives is a recognised way of considering the environmental effects of a plan and comparing the effects of alternatives. SEA objectives are often derived from environmental and social objectives established in law, policy or other plans and programmes, or from a review of baseline information and environmental problems (based on the SEA topics in Section 3).

An assessment framework of objectives was developed based on:

- The key policy objectives and environmental and social protection objectives identified in the review of policies, and other plans and programmes (see Section 2). It is important that the assessment takes these objectives into account as this will help to highlight any area where the DP will help or hinder the achievement of the objectives of other plans (e.g. at local, national and international level – see review of Plans, Policies and Programmes in Section 2).
- The current state of the environment in the assessment area and the key environmental issues identified, both now and during the 5-year life of the DP (see Section 3).

The SEA objectives are set out in **Table 4.1** alongside the key policy objectives identified from the review of policies, plans and programmes (PPP) and the key issues from the review of baseline information. The following sections describe how these SEA objectives were used in the assessment of the environmental and social effects of potential drought management measures. By assessing each measure against the objectives, it is more apparent where measures might have an adverse or beneficial effect, and where measures could be developed to reduce potential impacts or enhance beneficial effects.

As well as the overall SEA objectives, a number of key questions have been developed for each SEA topic. These key questions were used as prompts for the assessments and ensure it considered all the relevant aspects. The assessment of each potential DP measures required the following information:

- Details of each potential measure;
- Likelihood and predicted frequency of deployment of the measure;
- Construction (where applicable) and operational/implementation details;
- 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, human receptors potentially affected, priority habitats and species, landscape areas and heritage assets.

The proposed SEA objectives were set out in the SEA Scoping Report and finalised in light of comments received during the consultation process.

Table 4.1 SEA Objectives and Assessment Approach

SEA topic	PPP key policy objectives	Baseline key issues	SEA objectives	Indicator questions
Biodiversity, flora and fauna	<ul style="list-style-type: none"> Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC Act Section 41 for England / Section 7 Environment (Wales) Act, 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 contributes to the economy and therefore should be protected and, where possible, enhanced. Avoidance of activities likely to cause the spread of INNS A need to protect the green infrastructure network. 	<ul style="list-style-type: none"> The need to protect or enhance the region's biodiversity, particularly protected sites designated for nature conservation. The need to avoid activities likely to cause irreversible damage to natural heritage. The need to take opportunities to improve connectivity between fragmented habitats. The need to control the spread of INNS. 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. 	<ul style="list-style-type: none"> To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity. To avoid introducing or spreading INNS. 	<ul style="list-style-type: none"> Will it avoid damage to aquatic, transitional and terrestrial species and habitats including fish populations (particularly migratory fish)? Will it enhance aquatic, transitional and terrestrial species and habitats? Will it protect the most important sites for nature conservation? Will it ensure the sustainable management of natural habitats, taking into account climate change adaptability? Will it affect WFD compliance e.g. good ecological potential/status? Will it protect natural capital and ecosystem services? Will it increase the spread of invasive species?
Population and human health	<ul style="list-style-type: none"> Water resources play an important role in supporting the health and recreational needs of local communities. 	<ul style="list-style-type: none"> The need to ensure water supplies remain resilient to drought. 	<ul style="list-style-type: none"> To protect and improve health and well-being and maintain livelihoods through provision of access to a 	<ul style="list-style-type: none"> Will it help to ensure access to a resilient and secure supply of drinking water?

SEA topic	PPP key policy objectives	Baseline key issues	SEA objectives	Indicator questions
	<ul style="list-style-type: none"> To ensure all communities have a clean, safe and attractive environment in which people can take pride. To ensure secure, safe, reliable, sustainable and affordable supplies of water are provided. 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 universal access to essential utility and infrastructure services. 	<ul style="list-style-type: none"> The need to maintain public health across the region, particularly in urban areas and deprived areas. The need to ensure public awareness of drought conditions and importance of maintaining security of supply without the need for emergency drought measures. The need to ensure water quantity and quality is maintained as far as possible for other users including tourists, recreational users and other users such as farmers. The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities local residents and tourists, including opportunities for access to recreation resources and the natural and historic environment. The need to accommodate an increasing population. 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 well-being and the economy. 	<p>resilient, high quality, sustainable supply of water in drought</p> <ul style="list-style-type: none"> To protect the water environment for other users as far as possible including recreation, tourism and navigation. 	<ul style="list-style-type: none"> Will it help to promote healthy communities and maintain health and wellbeing? Will it assist in maintaining essential services and infrastructure to support health and well-being? Will it avoid negative effects on human health or quality of life, e.g. through noise, air quality or transport impacts? Will it protect recreation, tourist activities and navigation?
Material assets and resource use	<ul style="list-style-type: none"> Promote sustainable management of natural resources, sustainable production and consumption whilst seeking to reduce the 	<ul style="list-style-type: none"> The need to minimise the consumption of resources, including water and energy 	<ul style="list-style-type: none"> To reduce, and make more efficient, the domestic, industrial and commercial consumption of 	<ul style="list-style-type: none"> Will it minimise the demand for water and/or increase efficiency in water use?

SEA topic	PPP key policy objectives	Baseline key issues	SEA objectives	Indicator questions
	<p>amount of waste generated by using materials, energy and water more efficiently.</p> <ul style="list-style-type: none"> 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, as well as providing an improved 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. 	<ul style="list-style-type: none"> 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. Need to reduce leakage from the water supply system. Daily consumption of water resources is higher than the national average in the area and there is a need to encourage more efficient use. 	<p>resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.</p>	<ul style="list-style-type: none"> Will it minimise the use of energy and promote energy efficiency? Will it minimise waste, and increase the proportion sent to reuse or recycling? 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)?
Water	<ul style="list-style-type: none"> Maintain and improve water quality (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. Expand the scope of water protection to all waters, surface waters and groundwater. Ensure appropriate management of abstraction and protect flow and level variability across the full range of regimes from low to high conditions. Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions. Balance the abstraction of water for supply with the other functions and services the water environment performs or provides. Encourage more efficient use of water and promote awareness of water sustainability. 	<ul style="list-style-type: none"> The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD status targets. The need to maintain the quantity and quality of groundwater resources taking into account WFD status targets. 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 waters and groundwaters. The need to ensure sustainable abstraction. The need to ensure that people understand the value of water. 	<ul style="list-style-type: none"> To maintain or improve the quality of rivers, lakes, groundwater, estuarine and coastal waterbodies. To avoid adverse impact on surface and groundwater levels and flows, and ensure sustainable management of abstractions. 	<ul style="list-style-type: none"> Will it minimise risks of adverse effects on water quality? Will it affect WFD compliance e.g. Good Environmental Status? Will it affect bathing water compliance? Will it avoid contamination of groundwater? Will it help to minimise risks associated with unsustainable abstraction of ground and surface waters? Will it affect River Basin Management Plan measures? Will it alter the flow or level regime or residence time of surface waters or groundwaters? Will it enable a sustainable use of water resources that balances

SEA topic	PPP key policy objectives	Baseline key issues	SEA objectives	Indicator questions
	<ul style="list-style-type: none"> 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 a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity and quality. Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions. Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value. Reduce risk of flooding from reservoirs. 	<ul style="list-style-type: none"> The need to reduce and manage flood risk. 		<p>demand for water with environmental protection?</p> <ul style="list-style-type: none"> Will it encourage efficient water use? Will it contribute towards improving the awareness of water sustainability and its true value?
Soil, geology and land use	<ul style="list-style-type: none"> 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. 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. 	<ul style="list-style-type: none"> The need to protect geological features of importance and maintain and enhance soil function and health. The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources). The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region. 	<ul style="list-style-type: none"> To protect and enhance geology, geomorphology, and the quality and quantity of soils. 	<ul style="list-style-type: none"> Will it avoid damage to and protect geologically important sites? Will it avoid damaging the quality of agricultural land? Will it protect, maintain and enhance soil function and health?

SEA topic	PPP key policy objectives	Baseline key issues	SEA objectives	Indicator questions
	<ul style="list-style-type: none"> 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. 			
Air and climate	<ul style="list-style-type: none"> 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. 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. Sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change. 	<ul style="list-style-type: none"> The need to reduce air pollutant emissions to comply with EU and national air quality standards. The need to mitigate against climate change through the reduction in greenhouse gas emissions to contribute to risk reduction over the long term. The need to adapt to the impacts of climate change, for example through sustainable water resource management, specific aspects of natural ecosystems (e.g. connectivity), as well as accommodating potential opportunities of climate change. 	<ul style="list-style-type: none"> To maintain and improve air quality. To minimise greenhouse gas emissions. To adapt and improve resilience to the threats of climate change. 	<ul style="list-style-type: none"> Will it reduce or minimise air pollutant 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 increase emissions to air in areas sensitive to emissions (e.g. in proximity to an Air Quality Management Areas (AQMA) or sensitive habitat)? Will it reduce or minimise transport or energy requirements, and associated air and greenhouse gas emissions? Will it reduce vulnerability to risks associated with climate change effects (e.g. reduce the adverse effects of droughts and floods)? Will it improve resilience/adaptability to likely effects of climate change, e.g. by increasing resilience of water supplies?
Archaeology and cultural heritage	<ul style="list-style-type: none"> Built development in the vicinity of archaeological and cultural heritage assets could have implications for their setting and/or built fabric. Ensure active management of the Region's environmental and cultural assets. 	<ul style="list-style-type: none"> The need to conserve or enhance archaeological and heritage assets, particularly those which are sensitive to changes in the water environment such as flooding or drought. 	<ul style="list-style-type: none"> To conserve and enhance the historic environment, heritage assets and their settings, and protect archaeologically important sites. 	<ul style="list-style-type: none"> Will it avoid damage to and protect the historic environment, archaeological and cultural heritage assets and their setting, places and spaces that enhance local distinctiveness?

SEA topic	PPP key policy objectives	Baseline key issues	SEA objectives	Indicator questions
	<ul style="list-style-type: none"> • Ensure effects resulting from changes to water level (surface or sub-surface) on all water dependent historical and cultural assets are avoided. 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 heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations. 			<ul style="list-style-type: none"> • Will there will be a reduced risk of harm/loss to archaeological and cultural heritage assets as a result of changes to the water environment? • Will abstraction alter the hydrological setting of water-dependent assets? • Will it improve access, value, understanding or enjoyment of heritage assets and culturally/historically important assets in the region?
Landscape and visual amenity	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • The need to protect and improve the natural beauty of the region's AONBs and other areas of natural beauty. 	<ul style="list-style-type: none"> • To protect and enhance designated and undesignated landscape, townscape and the countryside. 	<ul style="list-style-type: none"> • Will it avoid adverse impacts and enhance designated landscapes? • Will it help to protect and improve non-designated areas of natural beauty and distinctiveness (e.g. woodlands) and avoid the loss of landscape features and local distinctiveness?

4.2 Proposed Framework for Effects Assessment

4.2.1 Primary Assessment

An appraisal framework was used to assess the effects of each of the potential drought management measures against each of the SEA objectives. The approach was set out in the SEA Scoping Report and finalised following comments received during the consultation on the Scoping Report. The appraisal framework table is provided in **Table 4.2**.

The first and second columns of **Table 4.2** set out the SEA topics and objectives. The fourth column was populated during the assessment with a commentary and evaluation of the effects of each alternative measure on the SEA objectives for each topic and with reference to the indicator questions set out in column three. The assessment assumed the implementation of standard best practice in implementing the measures and any defined mitigation measures so that the significance of effects relates to the residual effects after mitigation in line with the SEA Practical Guide and water industry national SEA guidance for Drought Plans. The mitigation measures for any identified adverse effects were identified within the appraisal framework.

The ninth column identified the magnitude of the effect on a scale of low, medium and high and included consideration of the impact scale, certainty, duration and permanence in compliance with criteria for determining the likely significance of effects specified in the SEA Directive Article 3(5) and Annex II, and the SEA Regulations Part 2, Regulation 9(2a) and Schedule 1. The value and sensitivity of the receptor(s) were identified in the tenth column on a scale of low, medium and high.

The residual adverse and beneficial effects (after application of best practice approaches and any appropriate and explicit mitigation measures) were identified in the eleventh and twelfth columns respectively. These were identified separately so as to avoid mixing adverse and beneficial effects, in line with SEA best practice, so that these can clearly be understood and transparency of effects is maintained throughout the DP decision-making process.

With respect to duration of effects, short-term effects are defined as those that last for up to six months, medium term effects are those that extend for six months to two years whilst long-term effects are assessed as those that continue for greater than two years.

Table 4.2 SEA Appraisal Framework Table (example for the Biodiversity, flora and fauna topic, Objective 1.1)

SEA topics and objectives			Assessment of option								
SEA Topic	SEA objective	Indicator questions	Potential residual effect on sensitive receptors commentary	Scale of effect	Certainty of effect	Duration of effect	Permanence of effect	Magnitude of effect	Value/ sensitivity of receptor	Residual adverse effect significance	Residual beneficial effect significance
Biodiversity, flora and fauna	1.1 To protect and enhance biodiversity, ecological functions, capacity, and habitat connectivity within STW's supply and source area.	<p>Will it avoid damage to aquatic, transitional and terrestrial species and habitats including fish populations (particularly migratory fish)?</p> <p>Will it enhance aquatic, transitional and terrestrial species and habitats?</p> <p>Will it protect the most important sites for nature conservation?</p> <p>Will it ensure the sustainable management of natural habitats, taking into account climate change adaptability?</p> <p>Will it affect WFD compliance e.g. good ecological potential/status?</p> <p>Will it protect natural capital and ecosystem services?</p>									

The SEA appraisal framework was used to capture the assessment for each drought management measure (one table completed per measure).

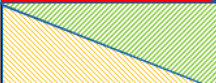
Varying levels of uncertainty are inherent within the assessment process. The assessment minimised uncertainty through the application of expert judgement. The level of uncertainty of the assessment for each SEA objective was reported in the appraisal framework. Where there is significant uncertainty which precludes an effects assessment category being assigned for a specific SEA objective, an “uncertain” residual effects assessment label was applied.

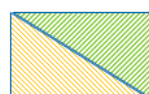
Both supply-side and demand-side measures were considered through the SEA. The assessment therefore provides information on the relative environmental performance of reasonable alternative options to help inform the development of the draft DP.

The assessments were carried out using the effects assessment matrix shown in **Figure 4.1**, taking account of the scale, duration and permanence of the effect. The definitions for the effect significance are explained beneath **Figure 4.1**. The colour coding shown in **Figure 4.1** was used to complete the columns for residual effects in the SEA appraisal framework.

The effects assessment took account of any proposed mitigation measures that have been incorporated into the option, i.e. it is the residual effects after the application of mitigation measures that were assessed.

Figure 4.1 Effects Assessment 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	 Major Beneficial Major Adverse	Minor Beneficial Minor Adverse	Negligible



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

Effect 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 adverse effect 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.

The assessments made use of a suite of environmental and social datasets that are available across the geographical footprint of all the measures under consideration. The HRA screening, WFD assessments and EARs also informed the assessments.

4.2.1.1 Summarising the effects assessment

The completed appraisal framework table for each drought management measure is presented in full in **Appendix D**. A summary of the assessment is presented in Section 5.2 of this report as a colour-coded visual evaluation (VE) matrix. An example VE matrix is shown in **Table 4.3**: for each drought management measure and each SEA topic listed in the left-hand column, the VE matrix summarises the likely significance of effects (as discussed in full in the completed appraisal framework tables).

Table 4.3 Example of a Visual Evaluation Matrix

Drought Management Measure	SEA objective – adverse effects								SEA objective – beneficial effects							
	Objective 1.1	Objective 1.2	Objective 2.1	Objective 2.2	Objective 3.1	Objective 4.1	Objective 4.2	Objective 4.3	Objective 1.1	Objective 1.2	Objective 2.1	Objective 2.2	Objective 3.1	Objective 4.1	Objective 4.2	Objective 4.3
Option 1	Blue	Red	Blue	Yellow	Yellow	Red	Red	Red	Blue	Green	Blue	Blue	Green	Green	Green	Green
Option 2	Yellow	Blue	Yellow	Red	Yellow	Yellow	Yellow	Red	Green	Blue	Green	Blue	Blue	Blue	Green	Green

In assessing each drought management measure, the effects (beneficial or adverse) of any interactions between SEA topics were identified, assessed and reported.

4.2.2 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...” These can be defined as follows:

- Secondary or indirect effects are effects that are not a direct result of the plan, (e.g. an abstraction that changes local groundwater levels and thus affects the ecology of a nearby wetland).
- Cumulative effects arise, for instance, where several nearby groundwater sources each have insignificant effects but together have a measurable effect on river flows; or where several individual effects (e.g. traffic disruption) have a combined effect.
- Synergistic effects interact to produce a total effect greater than the sum of the individual effects. Synergistic effects often happen as habitats, resources or human communities get close to capacity. For instance, a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the areas too small to support the species at all.

The term 'cumulative effects' is being adopted as the collective term to include secondary, cumulative and synergistic effects (as suggested by the Practical Guide). The SEA of the draft DP includes cumulative effects assessments as described in the following sections.

A potential cumulative effects matrix (see example at **Figure 4.2**) was used to help consider interactions between demand management measures. In assessing these effects, consideration was given to other factors which may affect the environment in the short, medium and long term.

Figure 4.2 Example Cumulative Effects Assessment Matrix

Option 2				
Option 3				
Option 4				
Option 5				
	Option 1	Option 2	Option 3	Option 4

Key	
	Potential adverse effects if operated simultaneously
	Potential beneficial effects if operated simultaneously
	No cumulative effects

4.2.2.1 Drought Plan Cumulative Effects Assessment

To meet the requirements of the SEA Directive, the cumulative effects between the draft DP and other relevant plans, programmes or projects, including Severn Trent Water's draft Water Resource Management Plan (WRMP) 2019 and neighbouring water companies' WRMPs and Drought Plans.

The following cumulative assessments have been carried out:

- An assessment of cumulative effects of drought management measure that could potentially be implemented at the same time.
- Assessment of cumulative effects of the draft DP with the Severn Trent Water draft WRMP 2019, other water company Drought Plans and draft 2019 WRMPs, Environment Agency Drought Plans and other relevant water management plans (e.g. River Basin Management Plans).
- Assessment of potential cumulative effects of the draft DP with any other identified relevant programmes, plans and strategic projects that may be in place / implemented during the lifetime of the DP (for example, relevant Local plans and major infrastructure projects such as HS2).

One of the limitations of the cumulative assessment is that whilst an environmental appraisal of each drought management measure can be undertaken, the lack of predictability as to which measures will be implemented in any particular drought event means that it may be impossible to provide a definitive cumulative assessment for all possible future drought events. Cumulative assessments were therefore undertaken assuming, as a worst case, that the implementation of the drought management measures could occur simultaneously. Spatial proximity and therefore potential effects on a common receptor was the primary consideration in the cumulative effects assessment (e.g. the same designated site or same reach of river or the same estuary).

Due to the uncertainty of timing of implementation of drought management measures, the findings of the SEA will need to be reviewed during an actual drought event and a further cumulative assessment made of the measures proposed for implementation at that time.









5 Assessment of Drought Management Measures

5.1 Assessment Against SEA Objectives

The 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 measure and are provided in **Appendix D**. The findings of the WFD assessments and the HRA screening have also been incorporated into the SEA assessment.

A summary of the assessment is presented in this section as colour-coded visual evaluation summary matrices (**Figures 5.1 and 5.2**). The colour coding represents a range from significant adverse effects in red through to significant beneficial effects in dark green as shown in the legend below. Commentaries on the most significant residual effects for each drought management measure are also provided in the summary matrices.

Legend:

Colour	Significance of Effect
	Dark Green
	Mid Green
	Light Green
	Blue
	Yellow
	Orange
	Red
	None

5.1.1 Assessment Findings for Demand-Side Measures

Figure 5.1 provides the summary assessment conclusions for each of the demand-side measures in the draft DP. Overall, demand-side measures serve to reduce pressure on water resources in drought conditions by reducing consumer demand for water, and thereby reducing the volume of water required to be abstracted from sources. However, as these demand management measures move from voluntary actions by customers to mandatory water use restrictions, there is a greater mix of beneficial and adverse effects as the scope of the water use restrictions is widened. The progression from the Temporary Use Ban to a drought order to ban non-essential water use leads to a step-change in the balance between beneficial and adverse impacts, both on the socio-economy of the STW region (greater range of water-dependent businesses affected) and on the urban environment (no filling of ponds, restrictions on cleaning building and vehicles, dust suppression activity prohibited). Further details are provided in **Appendix D**.

The trigger levels and order of implementation of the demand-side measures in the draft DP reflect the increasing significance of effect of each measure and in comparison to the effects of the supply-side measures. A balanced approach between impacts on the water consumer and impacts on the environment needs to be considered in determining the appropriate sequencing of implementation of the full suite of drought management measures.

5.1.2 Assessment Findings for Supply-Side Measures

The summary of the SEA findings for each of the supply-side measures is provided in **Figure 5.2**. The assessment highlights that those measures with a lower significance of effect should be considered for earlier implementation and those measures with a greater significance of effects should be considered for implemented later if drought impacts intensify. Further details are provided in **Appendix D**.

Figure 5.1 Visual evaluation matrix summary for demand-side measures

Drought Management Measures	SEA Topics and Objectives														Commentary
	Biodiversity, flora & fauna		Population & human health		Material assets & resource use	Water			Soil, geology & land use	Air & climate			Archaeology & cultural heritage	Landscape	
	1.1	1.2	2.1	2.2	3.1	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
Reducing leakage															This drought management measure would have minor adverse effects on human health and the setting of some cultural heritage assets due to construction and street work activities. Construction and street work activities would also have minor adverse effects associated with resource use, air quality and GHG emissions. There would be minor beneficial effects on public health and the economy through the water savings achieved from leakage reduction during periods of drought. There would also be minor beneficial effects on resource use and climate change resilience.
Promoting water efficiency															This drought management measure would have no adverse effects across all the SEA objectives as promoting water efficiency activities would not adversely interact with any environmental receptors. Promoting water efficiency would have minor beneficial effects on public health and the economy through reduction in customer water use during periods of drought. The option would also have minor beneficial effects on a range of other SEA objectives resulting from the alleviated pressure on water sources due to the reduced requirement to abstract water during periods of drought.
Temporary use bans (TUBs)															The ban would have minor adverse effects across a range of the objectives due to the restrictions imposed on watering gardens, sports fields, private swimming pools, the maintenance of some landscape and heritage site settings. There would be moderate adverse effects on some vulnerable customers and on some livelihoods where small businesses are very reliant on water uses that would be affected by the ban. There would be minor adverse effects in respect of soils and air quality due to restrictions on dust suppression and watering of soils in gardens and landscaped areas. There would be minor beneficial effects on public health and the economy through a reduction in customer water use during periods of drought. The ban would also have minor beneficial effects on a range of objectives resulting from the alleviated pressure on water sources due to the reduced requirement to abstract water during periods of drought.
Non-essential use bans (NEUBs)															The drought order to implement a non-essential use ban would have moderate adverse effects on the watering of all gardens, sports fields, and similar amenities. There would be moderate adverse effects on some vulnerable customers and on the livelihoods of small businesses dependent on non-essential water use. The ban would have minor adverse effects on the setting of some water-dependent heritage assets and landscapes, as well as on air quality due to further measures to restrict dust suppression activities. The drought order would have minor beneficial effects on public health and the economy through a reduction in customer use during periods of drought. There would also be minor beneficial effects on a range of objectives resulting from the alleviated pressure on water sources due to the reduced requirement to abstract water during periods of drought.
Emergency drought order/emergency plans															The emergency drought order would have major adverse effects on human health, socio-economic functioning, livelihoods, vulnerable customers and recreation due to the significant restrictions on water use. There would be moderate adverse effects on the setting of archaeology and cultural heritage assets; and landscape and visual amenity resulting from restrictions on watering flora. There would also be minor adverse effects air quality due to localised increases in dust emissions due to the lack of water for dust suppression activities. The emergency drought order would have minor beneficial effects on public health and the economy through the additional reduction in customer water use during periods of drought. There would also be minor beneficial effects on a range of objectives resulting from the alleviated pressure on water sources due to the reduced requirement to abstract water during periods of drought.

Figure 5.2 Visual evaluation matrix summary for supply-side measures

Drought Permits and Orders	SEA Topics and Objectives														Commentary
	Biodiversity, flora & fauna		Population & human health		Material assets & resource use	Water			Soil, geology & land use	Air & climate			Archaeology & cultural heritage	Landscape	
	1.1	1.2	2.1	2.2	3.1	4.1	4.2	4.3	5.1	6.1	6.2	6.3	7.1	8.1	
Ambergate on River Derwent															The implementation of the drought permit/order would have minor adverse effects on water levels, flows and quality, along with associated minor adverse effects on fish and macroinvertebrate communities in the River Derwent. Moderate adverse effects on cultural heritage are due to the impact of reduced water levels on the setting of the Derwent Valley Mills World Heritage Site. Reduced water levels would also have moderate adverse effects on informal recreation and minor adverse effects on the landscape setting of the watercourses in the vicinity of Belper. There would be moderate beneficial effects on public health and the economy through the provision of 10-50 Ml/d of reliable water supplies during periods of drought. The permit/order would also have minor beneficial effects relating to climate change resilience to drought.
Brownsover on River Avon															The implementation of the drought permit/order would have minor adverse effects on water quality in the River Avon, along with associated minor adverse effects on macroinvertebrates and a number of fish species in the river. There would be minor beneficial effects on public health and the economy through the provision of 1-4 Ml/d of reliable water supplies during periods of drought. The permit/order would also have minor beneficial effects relating to climate change resilience to drought.
Derwent Valley Reservoirs															The implementation of the drought permit/order would have minor adverse effects on water levels and flows, along with associated minor adverse effects on fish and macroinvertebrate communities and a SSSI hydrologically connected to the River Derwent. Reduced water levels could also have minor adverse effects on the landscape setting of the river valley and informal recreational activities along the River Derwent. The drought permit/order would have moderate beneficial effects on public health and the economy through the provision of <20 Ml/d of reliable water supplies during periods of drought. The permit/order would also have minor beneficial effects relating to climate change resilience to drought.
Eathorpe on River Leam															The implementation of the drought permit/order would have minor adverse effects on water levels, flows and quality, along with associated adverse effects on water vole. Reduced water levels would also have minor adverse effects on the landscape setting of the watercourses and informal recreational activities on the River Leam. Geomorphological adverse effects associated with lower flows would be minor. The drought permit/order would have minor beneficial effects on public health and the economy through the provision of 6 Ml/d of reliable water supplies during periods of drought. The drought permit/order would also have minor beneficial effects relating to climate change resilience to drought.
Tittesworth Reservoir and River Churnet															The implementation of the drought permit/order would have moderate adverse effects on water flows and levels between the Tittesworth Reservoir and Abbey Green borehole discharge point. This would result in moderate adverse effects on some fish species in this impacted reach. Reduced water levels would also have minor adverse effects on the informal recreational activities and the landscape setting of the surrounding area. Potential adverse effects on groundwater levels due to the increased abstraction at Abbey Green are considered to be negligible but there is some uncertainty as to the precise effects. Increased abstraction from the borehole would result in a minor increase in energy use and associated GHG emissions. The drought permit/order would have minor beneficial effects on public health and the economy through the provision of <6 Ml/d of reliable water supplies during periods of drought. The permit/order would also have minor beneficial effects relating to climate change resilience to drought.
Site G on River Severn															The implementation of the drought permit/order is anticipated to have only negligible adverse effects due to the counter-balancing effects of additional River Severn Regulation Scheme releases to maintain the prescribed flow in the River Severn at Bewdley to protect flows in the lower River Severn and the Severn Estuary (including the European Marine Site). The drought permit/order would have major beneficial effects on public health and the economy through the provision of up to 120 Ml/d of reliable water supplies during periods of drought. The drought permit/order would also have minor beneficial effects relating to climate change resilience to drought.
Wyelands on River Wye															The implementation of the drought permit/order would have negligible adverse effects on water flows, levels and quality in the River Wye downstream of the abstraction intake. As such, there would be no adverse effects on any receptors associated with the river. Reduced water levels in the Elan Valley Reservoirs could have minor adverse effects on the visual amenity of the surrounding landscape. The drought permit/order would have minor beneficial effects on public health and the economy through the provision of 5.7 Ml/d of reliable water supplies during periods of drought. The permit would also have minor beneficial effects relating to climate change resilience to drought.

5.2 Assessment Findings Summary

Demand-side measures serve to alleviate pressure on water resources by reducing customer demand for water in a drought, and therefore reducing the need for supply-side options to abstract more water from the environment. These measures generally have beneficial environmental effects but adverse effects of demand-side options have been identified with respect to population and human health, the value of water to society and effects on livelihoods where water use restrictions are involved. These adverse effects increase in significance with those measures that restrict a greater range of water uses.

The drought permit/order measures are assessed as having a wide range of potential effects, from moderate adverse effects on biodiversity, flora and fauna for some options to moderate beneficial effects for water resource reliability and resilience. All of these measures involve abstracting more water from existing licensed water sources under temporary revisions to the abstraction licence conditions. The adverse effects arising from the implementation of the drought permits and orders are associated with reduced water levels and flows in watercourses. In many cases this may result in adverse effects on the water quality and ecology of the impacted watercourses. In some instances there are also adverse effects on aquatic recreational activities, water-dependent cultural heritage assets and landscapes characterised by watercourses. Beneficial effects are associated with maintaining public health, livelihoods and wider societal benefits through the provision of water supplies during prolonged periods of drought. The drought permits and orders also ensure resilience to drought which may become more prevalent due to climate change.

The SEA highlights that the majority of the drought permit/order measures considered for inclusion in the draft DP would have no greater than minor adverse effects across the SEA objectives. This includes the drought orders/permits for Brownsover on River Avon, Derwent Reservoirs, Eathorpe on River Leam and Wyelands on the River Wye.

In contrast, more significant adverse effects have been identified for two drought permits/orders associated with the River Derwent and River Churnet. Operation of the Ambergate on River Derwent drought permit/order would reduce water levels and flows in the river such that there would likely be moderate adverse effects on informal recreational activities in vicinity of Belper. The River Derwent is a key feature of the Derwent Valley Mills World Heritage Site, as such, reduced water levels in the river may also have moderate adverse effects on the setting of this designated site.

The Tittesworth Reservoir and River Churnet drought permit/order also performs relatively poorly across the SEA objectives with the most significant adverse effects relating to water and biodiversity, flora and fauna. Operation of the drought permit/order would result in moderate adverse effects on water flows and levels between Tittesworth Reservoir and the Abbey Green borehole discharge point. These reduced freshwater flows would be associated with moderate adverse effects on the brook lamprey fish species and the migration of salmon.

The Site G on River Severn drought permit/order measure performs the best across the SEA objectives with no more than negligible adverse effects and major beneficial effects on population and human health. This is due to the fact that flows in the River Severn would continue to be supported by the River Severn regulation scheme, such that the additional abstraction at Site G under the drought permit/order would be offset by maintenance by the Environment Agency of the 5-day average 850 Ml/d minimum flow requirement at Bewdley. Therefore, effects of the Site G drought permit/order acting alone on freshwater inflows to the Severn estuary would be expected to be negligible, since any effects would be counterbalanced by additional river regulation releases upstream.

The significance of effect on SEA objectives of the supply-side measures varies depending on the scale of the abstraction changes being sought relative to low flow conditions and the sensitivity of the environment in the impacted reaches. The assessment showed that a distinction can be made between the different measures and this has been taken into account in deciding the sequencing of implementation of drought permits/orders. However, such decisions must also reference the cumulative effect of measures implemented in the same river basin, as discussed in Section 5.3.

5.3 Cumulative Effects Assessment

5.3.1 Demand-side Measures

5.3.1.1 Cumulative effects between demand-side measures

Table 5.1 describes the potential cumulative impacts between the demand management measures.

Table 5.1 Cumulative impacts between demand-side measures

Cumulative beneficial effects	Cumulative beneficial effects identified for all measures 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 effects 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 measures for promoting water efficiency or leakage reduction.

5.3.1.2 Cumulative effects between demand-side measures and supply-side measures

Cumulative effects with supply augmentation measures have been only been identified in relation to carbon and air quality effects between leakage control measures and drought permit/orders involving increased pumping of water. These cumulative effects are considered to be negligible given the small additional carbon and air quality effects associated with increased leakage reduction activities.

5.3.2 Supply-side Measures

5.3.2.1 Cumulative Effects with Existing Severn Trent Water Abstractions

The supply-side measures will generally operate simultaneously with existing Severn Trent Water abstraction. The drought permits/orders do not conflict with the abstraction of water under normal licence conditions and are mutually compatible.

The SEA assessment of each supply-side measure has assessed the additional environmental effects of abstracting more water (and/or reducing compensation flow releases) over and above the pressures on the environment already in place from existing licensed abstractions during a drought. Cumulative effects between the various supply-side measures are discussed below.

It should be noted that in drought conditions, the amount of water being abstracted from the environment would, in many cases, be less than the full licensed abstraction volumes due to river flow restrictions in abstraction licences and/or lower inflows or river flows precluding full abstraction. It is for this reason that drought permits and orders are required to be able to increase the amount of water available for abstraction.

5.3.2.2 Cumulative Effects Between Supply-Side Measures

Cumulative effects resulting from concurrent implementation of supply-side options have been assessed as follows (see **Figure 5.2**):

Figure 5.2 Cumulative Effects Matrix

Ambergate on River Derwent						
Tittesworth Reservoir and River Churnet						
Brownsover on River Avon						
Trimpley on River Severn						
Wyelands on River Wye						
Earthorpe on River Leam						
	Derwent Valley Reservoirs	Ambergate on River Derwent	Tittesworth Reservoir and River Churnet	Brownsover on River Avon	Trimpley on River Severn	Wyelands on River Wye

Key	
	Potential adverse effects if operated simultaneously
	Potential beneficial effects if operated simultaneously
	No cumulative effects

River Derwent at Ambergate cumulative effects with Derwent Reservoirs

Concurrent operation of these drought permits/orders could potentially exacerbate the hydrological and ecological effects on the Derbyshire River Derwent. However, the options are 'almost independent' because the River Derwent at Ambergate drought permit/order relates to flows with a flow exceedance in a range of about 75% to 85%, demonstrably not at the lowest flows in a year and especially in a drought period. By contrast, the Derwent Reservoirs drought permit/order is triggered when reservoir storage falls below the Drought Control Line which occurs at the most critical time in a drought at the lowest river flows, i.e. with a flow exceedance of 95% (or Q95) or higher. Although both of the drought permits/orders may technically be in force at the same time, their effects will rarely be apparent together, for the reasons outlined above. Furthermore, the HRA screening assessment concluded there would be no likely significant effects on the qualifying features of the Humber Estuary European Marine Site given the minimal contribution of the Derbyshire River Derwent to Q95 flows to the Humber estuary.

Tittesworth Reservoir and River Churnet cumulative effects with River Derwent at Ambergate and Derwent Reservoirs

These three drought permits/orders are all located in the Humber River Basin, so consideration must be given to any cumulative effects that concurrent operation could cause on the Humber Estuary European Marine Site. The HRA screening concluded that cumulative effects are likely to be negligible given the minimal contribution (<4%) of the affected water bodies to the Q95 flow to the Humber Estuary.

Eathorpe on River Leam cumulative effects with Brownsover on River Avon

No cumulative effects are anticipated for the Warwickshire River Avon downstream of the River Leam confluence, given the generally negligible/minor nature of the predicted effects on the river reaches upstream and the negligible nature of the predicted changes in flow in the reach downstream.

Eathorpe on River Leam cumulative effects with Brownsover on River Avon and River Severn at Site G

These three drought permits/orders are all located in the Severn River Basin. The managed, regulated flow regime of the River Severn includes maintaining a prescribed flow (controlled by the Environment Agency) to the Severn Estuary to protect the European Marine Site. The drought permits/orders do not

change these prescribed flow requirements (set at Bewdley gauging station) but will require additional river regulation releases to maintain this prescribed flow.

River Severn at Site G cumulative effects with River Wye at Wyelands, Brownsover at River Avon and Eathorpe on River Leam

These four drought permits/orders abstract water from rivers that flow into the Severn estuary so there is potential for cumulative adverse effects on the estuary. The Wyelands drought order has been assessed as having no adverse effects on the Severn estuary if implemented in isolation. Equally, the three drought permits in the River Severn basin have no likely cumulative adverse effects on the Severn estuary due to the prescribed flow protection to the estuary under the River Severn Regulation Scheme. As such, the four drought permits/orders operating concurrently would have no adverse effects on the Severn estuary or the Severn Estuary European Marine Site.

5.4 In-combination Effects of the Draft DP with Relevant Plans, Programmes and Projects

In-combination effects of the DP with other relevant plans, programmes and projects have been considered:

- Severn Trent Water Draft WRMP 2019
- Neighbouring water companies' WRMPs and Drought Plans
- Environment Agency Drought Plans
- Canal and River Trust abstraction from the River Severn (to support Bristol Water)
- Local Development Frameworks
- National Policy Statements and National/Regional Infrastructure Plans
- Major relevant projects.

5.4.1 Severn Trent Water Draft Water Resource Management Plan 2019

A review of the Draft WRMP 2019 identified the potential for operational in-combination effects with one of the Draft DP measures. There is potential for in-combination effects between the River Derwent at Ambergate drought permit/order and the operation of the Ambergate to Mid Nottinghamshire transfer solution included in the Draft WRMP 2019 as both involve abstraction from the Derbyshire River Derwent. However, in-combination adverse effects are not likely as the cumulative effects of simultaneous abstraction on low flow conditions in the river are assessed as negligible.

5.4.2 Neighbouring water companies' WRMPs and Drought Plans

WRMPs and Drought Plans of the following water companies are considered for potential in-combination effects:

- Yorkshire Water
- United Utilities Water
- South Staffordshire Water
- Dee Valley Water
- Anglian Water
- Dwr Cymru Welsh Water
- Bristol Water
- Wessex Water
- Thames Water

All of the neighbouring water companies to Severn Trent Water are in the process of producing draft 2019 WRMP for publication in early 2018. At present (end of January 2018), full details of the solutions within these plans are not available but assumptions have been made which will be updated following

publication of the draft WRMPs and prior to the Final DP. It is likely that all of the neighbouring water companies will include demand-side options in their draft WRMPs, similar to those included in Severn Trent Water's draft WRMP 2019. Improved water efficiency and leakage reduction across the country will result in beneficial in-combination effects in terms of reducing the need for, or scale of, new water resources thereby helping protect the water environment as well as reducing energy use through reduced water pumping and treatment.

The neighbouring water companies are at different stages in updating their Drought Plans: some have published updated plans recently, others have issued draft plans for consultation whilst some plans are not yet due to be updated. The assessment in this Environmental Report has made use of the Drought Plan information available as at January 2018.

The cumulative assessments should be reviewed at the time of implementation of any DP measures to ensure that no changes to neighbouring water company drought plan and/or WRMP measures have been made in the intervening period, and therefore whether the assessment provided in this Environmental Report remains valid.

South Staffordshire Water

The South Staffordshire Water draft 2017 Drought Plan contains a drought order relating to abstraction at their River Severn Shared South Staffordshire Asset. The drought order would either allow up to 192 MI/d to be abstracted when a 5% reduction in abstraction would otherwise be imposed, or to increase abstraction to the maximum operational capacity of Shared South Staffordshire Asset Water (216 MI/d). The EAR of this drought order prepared by South Staffordshire Water concluded that in the event that the Severn Trent Water Site G drought permit/order and the Shared South Staffordshire Asset drought order were implemented simultaneously, there would be no significant adverse effects on the River Severn downstream of Site G.

The South Staffordshire Water draft 2017 Drought Plan also includes a drought permit/order involving the River Blithe and River Trent to authorise a reduction in the 'Hands-Off' flow at North Muskham to allow abstraction of 23 MI/d River Blithe and 9 MI/d from the Trent. When the Blithe and the Trent drought permit/order is operated in isolation, the effects on the river system were assessed by South Staffordshire Water as negligible. No cumulative effects were identified between this South Staffordshire Water drought permit/order and concurrent implementation of the Tittesworth Reservoir and River Churnet drought permit/order further upstream in the River Trent catchment.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and any supply-side options likely to be included in the South Staffordshire draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

United Utilities Water

The United Utilities Water revised draft Drought Plan 2017 contains a drought permit to reduce the compensation flow discharge to the Afon Vyrnwy from Lake Vyrnwy reservoir from 45 to 25 MI/d.

The hydrological influence of the Lake Vyrnwy reservoir drought permit extends to Llanymynech gauging station on the Afon Vyrnwy (i.e. upstream of the confluence of the Afon Vyrnwy with the River Severn). None of Severn Trent Water's drought permit/orders have been identified to affect the hydrological zone of influence of the Lake Vyrnwy reservoir drought permit. The cumulative effects on flows in the River Severn downstream of Site G due to concurrent implementation of the Site G drought permit/order and the Lake Vyrnwy reservoir drought permit are assessed as negligible.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and any supply-side options likely to be included in the United Utilities Water draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

Anglian Water

No cumulative effects between drought management options in the Anglian Water Drought Plan 2014 have been identified. A bulk supply agreement between Severn Trent Water and Anglian Water provides up to 18 MI/d to rural Rutland. This bulk supply does not automatically vary with any drought management measures, and the agreement does not stipulate that Severn Trent Water will require Anglian Water have to impose any water use restrictions on its customers that are supplied by this bulk water supply. Severn Trent Water will however liaise closely with Anglian Water in drought conditions.

The Anglian Water Drought Plan includes reference to a drought order option for the Environment Agency to modify its Trent-Wytham-Ancholme transfer scheme. This is discussed below under the Environment Agency drought plan sub-section.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and any supply-side options likely to be included in the Anglian Water draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

Bristol Water

No in-combination effects between drought options in the Bristol Water draft DP 2017 have been identified.

Bristol Water receives raw water supplies from the River Severn at Gloucester via abstraction and conveyance along the Gloucester and Sharpness Canal by the Canal and River Trust. There are no plans by the Canal and River Trust to alter their abstraction during a drought and the impact of this abstraction is already accounted for in the measured flow records used as the baseline for drought permit assessment, in the same way as other licensed abstractions are also taken into account in environmental assessment. Changes to this abstraction under a possible Environment Agency River Severn drought order are discussed below under the Environment Agency drought plan sub-section.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and any supply-side options likely to be included in the Bristol Water draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

Yorkshire Water

Yorkshire Water's draft Drought Plan 2018 includes a range of drought management options with the potential for adverse effects on flows to the Humber Estuary. The HRA of the Yorkshire Water draft Drought Plan 2018 however concluded that there would be no likely significant cumulative effects of these measures on the Humber Estuary European Marine Site. The effects of the Severn Trent Water Drought Plan on the Humber Estuary European Marine Site have also been assessed in the HRA screening report as having negligible cumulative effects on flows to the Humber estuary. Cumulatively, the overall effect of the relevant Severn Trent Water and Yorkshire Water draft drought plan measures that could impact on flows to the estuary has been assessed as having no likely significant effects on the Humber Estuary European Marine Site as the combined flow reduction effects are negligible relative to the large volume of water in the estuary.

In 1989, Severn Trent Water and Yorkshire Water entered into an agreement for the supply to Yorkshire Water of untreated water from the Derwent reservoirs. The amount that can be taken by both Yorkshire Water and STW is set out in operating guidelines. However, there is provision in the agreement to modify these rules and this occurred during the droughts of 1995-96 and in 2003.

In the event of serious drought in the Severn Trent Water supply area, Yorkshire Water could assist by taking a reduced supply from the Derwent reservoirs. The response from Yorkshire Water will depend upon the prevailing water resource situation in Yorkshire. Any reduction in the supply to Yorkshire Water could potentially help to delay the need for implementation of the Derwent Reservoir drought permit/order.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and any supply-side options likely to be included in the Yorkshire Water draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

Wessex Water

Wessex Water has one option in its revised final draft Drought Plan 2017 with the potential for adverse effects on the Severn Estuary European Marine Site. This involves additional abstraction from the Bridgwater and Taunton Canal, with the potential to reduce flows to the River Parrett (which discharges to the southern end of the Severn Estuary European Marine Site at Bridgwater Bay). Assessment of this option by Wessex Water in its draft Drought Plan is that there would be no likely significant effects on the Severn Estuary European Marine Site. The HRA of the Severn Trent Water draft DP concluded that the concurrent implementation of the Wessex Water drought plan measure with the Severn Trent Water River Severn drought permits/orders as well as drought management measures of other parties affecting the Severn Estuary would not lead to any likely significant effects on the Severn Estuary European Marine Site given the location of the Wessex Water drought management measure and the benefits provided by the river regulation scheme on the River Severn.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and the Wessex Water draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

Thames Water

No cumulative effects between drought management measures in the Severn Trent Water draft DP with the Thames Water draft Drought Plan 2017 have been identified.

No cumulative adverse effects are anticipated between the Severn Trent Water draft DP and any supply-side options likely to be included in the Thames Water draft WRMP 2019, taking account of the current WRMP 2014. This will be confirmed once the draft WRMP 2019 has been published.

Dee Valley Water

No in-combination effects between drought management measures in the Dee Valley Water draft Drought Plan 2015 have been identified.

No cumulative adverse effects will arise between the Severn Trent Water draft DP and the Dee Valley Water draft WRMP 2019 as this contains no supply-side solutions.

Dwr Cymru Welsh Water

In the event that the Severn Trent Water Wyelands drought permit/order is simultaneously implemented with the Dwr Cymru Welsh Water drought permit/order options on the River Wye, there could be in-combination effects downstream of the Wyelands abstraction. The simultaneous implementation of the Wyelands drought permit/order with the Welsh Water drought orders will result in a 3.7% reduction in the Q95 flows above the Monmouth intake and a 5.6% reduction in Q95 flows at the tidal limit (assuming implementation of the Monmouth drought permit/order by Dwr Cymru Welsh Water).

As such, low cumulative adverse effects on hydrology and water quality are anticipated in the lower reaches of the River Wye. Low cumulative adverse effects are also identified for European eel, Atlantic salmon and shad, river mussels, yellow mayfly and macrophytes (notably *Ranunculus*). In terms of the SEA significance of these cumulative effects, due to the international importance of the River Wye and its estuary (designated as an SAC), these effects are assessed as being of moderate significance. However, the low magnitude of these cumulative effects will not result in any likely significant effects on the designated features or conservation objectives of the River Wye SAC.

5.4.3 Canal and River Trust

As discussed above, the Canal and River Trust (CRT) abstracts water from the lower River Severn to the Gloucester and Sharpness Canal and conveys this water to support abstraction by Bristol Water from the canal in Bristol.

The concurrent operation of the CRT abstraction for Bristol Water at the same time as Severn Trent Water's River Severn catchment drought permits/orders will not lead to any likely significant effects on the lower River Severn or the Severn Estuary European Marine Site given that the CRT abstraction is accounted for when calculating the River Severn Regulation Scheme flow release requirements to maintain the prescribed flow at Bewdley to protect low flows to the Severn estuary.

5.4.4 Environment Agency Drought Plan

Assessment of the potential for in-combination effects of the Severn Trent Water draft DP measures with the drought management measures in the Environment Agency Midlands Drought Plan 2017 has been undertaken.

Drought measures and triggers are provided in the Environment Agency's Drought Plan. Actions described include drought communications (internal and external), environmental monitoring and potential drought order applications to protect the environment. Of these actions, those which are applicable for cumulative assessment with Severn Trent Water's draft DP are external communications and potential environmental drought orders. The Environment Agency's external communications would have beneficial in-combination effects with Severn Trent Water's draft DP water efficiency promotion measures: these drought communication messages should help reinforce to customers and the wider public the importance of using water wisely in a drought, thereby cumulatively helping to reduce demand for water.

Severn Trent Water's River Severn catchment drought permit/order options were identified as having potential cumulative effects with the Environment Agency's River Severn drought order which includes the following actions:

- reducing the River Severn Regulation Scheme prescribed flow at Bewdley from 850 MI/d to 730 MI/d;
- capping the maximum release from Site T for the River Severn Regulation Scheme at 300 MI/d instead of 500 MI/d;
- imposing a 5% reduction on non-spray irrigation licensed abstractions; and
- imposing restrictions on the Canal and River Trust abstractions for the Montgomery Canal in Wales and the Gloucester and Sharpness Canal in England (restricting abstraction to 300 MI/d).

The Environment Agency has concluded that this drought order, in isolation, will not have any likely significant effects on the Severn Estuary European Marine Site.

Cumulative effects of the Environment Agency's River Severn drought order with the Severn Trent Water River Severn catchment drought permits/orders are assessed as having no greater than minor adverse effects assessment assuming appropriate management of the River Severn Regulation Scheme and the reductions to other abstractions under the Environment Agency's drought order. The HRA screening concluded that there would be no likely significant cumulative effects on the Severn Estuary European Marine Site.

Severn Trent Water's draft DP also includes the option for a drought order to be sought in the event that the Environment Agency has already applied for a drought order on the River Severn. If applied for, this Severn Trent Water drought order would seek authority from the Secretary of State to:

- reverse the 5% reduction on abstraction that would have been introduced by the Environment Agency's River Severn drought order; and
- potentially make other temporary changes as required in terms of the original Severn Trent Water Site G drought permit/order.

The in-combination effects assessment of this drought order with the (modified) Environment Agency River Severn drought order concluded that, with appropriate management of the River Severn Regulation Scheme and the reductions to other abstractions under the Environment Agency's drought order, there would be no greater than minor cumulative adverse effects on the lower River Severn and no likely significant effects on the Severn Estuary European Marine Site.

5.4.5 Multiple Drought Plan implementation in the River Severn catchment

The SEA has also considered the cumulative effects of the multiple implementation of drought permits/orders in the River Severn catchment by the various water companies and the Environment Agency. This assessment concluded that:

- there were no cumulative effects between the UU Lake Vyrnwy drought permit and other drought permit/order options in the River Severn catchment as the effects of the UU drought permit are negligible on the main River Severn downstream of the Afon Vyrnwy confluence;
- cumulative effects of the South Staffordshire Water, Severn Trent Water and Environment Agency drought permits/orders are ameliorated to a large extent by the operation of the River Severn Regulation Scheme and management of flows to the estuary, even with a reduced prescribed flow at Bewdley under an Environment Agency River Severn drought order. In combination, there would be no greater than minor cumulative adverse effects on the lower River Severn and no likely significant effects on the Severn Estuary European Marine Site.

5.4.6 Natural Resources Wales Drought Plan

Natural Resources Wales (NRW) may apply for a drought order if the environment is suffering adverse effects as the result of abstraction during a drought. NRW cannot predict the location of its drought orders in advance but given the drought management measures already in place for the River Wye catchment by Severn Trent Water and Dwr Cymru Welsh Water, it is considered unlikely that NRW would require a drought order for the River Wye. Water efficiency and water conservation messages by NRW during a drought would have cumulative beneficial effects with the water efficiency promotion measure in Severn Trent Water's draft DP.

5.4.7 Land Use and Spatial Plans

Future land use development is principally guided by the National Planning Policy Framework (NPPF) in England (and its equivalent, the Planning Policy Wales) and Local Development Frameworks (LDFs), in particular Local Plans. The Local Plans are relatively high-level policy documents and whilst they identify potential areas for future development and zones for particular activities, the certainty of developments, the precise spatial location and their timing make it difficult to identify any potential in-combination effects with the Severn Trent Water draft DP. The Local Plans and current material planning developments should be consulted at the time of any drought permit/order application to assess whether any cumulative effects might arise during implementation of the permit/order.

5.4.8 National Policy Statements and National/Regional Infrastructure Plans

No in-combination effects have been identified with national policy statements or with national or regional infrastructure plans (including energy and transport sector plans), aside from those major infrastructure projects that are already approved and/or underway (see sub-section below).

5.4.9 Major projects

The potential for in-combination effects was considered for relevant significant projects and developments identified in the STW supply area include: High Speed Two (HS2); M42 Junction 6 Improvement Scheme, M54 to M6 Link Road; Avonmouth Deep Sea Container Terminal; Hinkley Point C Nuclear Power Plant and the Wednesbury to Brierley Hill Metro Extension. In-combination, cumulative adverse environmental effects of the Severn Trent Water drought permits/orders with these projects are not considered likely as these projects do not affect any of the same water bodies.

In the short-term, during construction, the non-essential use ban and emergency drought order may have some minor cumulative adverse effects with these projects by restricting use of water for some construction activities (for example, watering of new landscaping plants), although importantly not any water uses that are required for health and safety reasons.

6 Mitigation and Monitoring

6.1 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.

6.2 Mitigation

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 DP. The SEA appraisals set out in Sections 5 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 mitigation measures have been identified (for example, in drought permit/order Environmental Assessment Reports), these have been taken into account, such that the resultant residual effects have been determined in this SEA; and
- In line with recommendations made in the UKWIR SEA Guidance, the SEA appraisals have assumed the implementation of reasonable mitigation measures such as operation of water sources in line with regulatory requirements and considering exemptions to water use restrictions under the water industry best practice guidelines (for example, for Blue Badge holders).

6.3 Monitoring Requirements

The natural, built and human receptors potentially impacted by implementation of the measures included in the draft DP and possible indicators of such effects are set out in the table below. These proposed indicators would form the core component of an SEA monitoring programme to assess whether the identified effects in the SEA are occurring as anticipated, or whether it is giving rise to greater or lesser effects (adverse or beneficial). In turn, the monitoring may identify changes to the mitigation measures necessary to minimise adverse effects and/or modifications to operation to further augment beneficial effects.

Impacted Receptor	Monitoring Indicators
Water resources, water quality, biodiversity	Proportion of surface waters and groundwater waterbodies at 'Good' WFD status. Specific species and habitats surveys. Condition of European Sites and SSSIs according to Natural England condition assessments.
Climate Factors	Net greenhouse gas emissions per MI (million litres) of treated water (kg CO ₂ equivalent emissions per MI) as monitored by Severn Trent Water
Transport	Traffic disruption (and associated carbon and air quality effects) due to leakage detection and repair activity using data on New Roads and Street Works Acts road closures (partial or full) as monitored by Severn Trent Water.
Nuisance/ Community Amenity Effects	Nuisance/community effects during operation would be monitored through an Environmental Monitoring Plan associated with each drought permit/order. Effects on customers/community of water use restriction measures would be logged through dedicated customer service communication channels during their implementation (telephone, email, social media).

Impacted Receptor	Monitoring Indicators
	<p>Complaints logged with Severn Trent Water and Local Authority Environmental Health Officers or equivalent.</p> <p>Responses gauged through customer satisfaction surveys and reported in Severn Trent Water's annual performance processes.</p> <p>Surveys of recreational and other amenities likely to be affected, including assessment of the success of agreed mitigation measures.</p>
Air Quality	<p>Option-specific monitoring during operation would be monitored through an Environmental Monitoring Plan as part of drought permit/order implementation if required.</p> <p>Changes in air quality as monitored by the Defra Automatic Urban and Rural Network, including using this data to establish the baseline conditions.</p>
Landscape and visual amenity	<p>Option-specific monitoring during operation would be monitored through an Environmental Monitoring Plan as part of drought permit/order implementation if required.</p>
Cultural Heritage	<p>Consultation with Historic England, heritage asset owners and other relevant stakeholders to ensure adverse effects are minimised.</p> <p>Option-specific monitoring during operation would be monitored through an Environmental Monitoring Plan as part of drought permit/order implementation if required following consultation with Historic England and/or asset owners.</p> <p>Reference to Historic England's monitoring of heritage assets such as Listed Buildings and Scheduled Monuments, Registered Battlefields, Registered Parks and Gardens, in particular the 'Heritage at risk' register.</p>

7 Conclusions

Through application of the SEA process (and associated HRA and WFD assessments) from the very outset, Severn Trent Water has actively considered environmental and social effects throughout the development of its draft DP.

The SEA process complies with the regulatory requirements and national best practice guidance. The assessments have been based on a broad range of objective environmental and social criteria to ensure all options have been considered on a consistent basis, in line with the meeting the requirements of the SEA Directive and national SEA Regulations.

The effects of the draft DP vary according to the different measures being considered for implementation. Effects in a severe drought will be greater than in a short duration/lower intensity drought as fewer management measures will need to be implemented.

Overall, most of the draft DP measures are characterised by negligible to minor adverse and beneficial effects. Moderate adverse effects may arise for some SEA topics in respect of the Ambergate on River Derwent and the Tittesworth Reservoir and River Churnet drought permit/order options. Major beneficial effects have been identified in relation to the Site G on River Severn drought permit/order due to the increase in water supplies made available by this measure.

Demand-side measures have negligible to minor beneficial environmental effects as the overall volume of water saved is relatively low. Some moderate and major adverse effects have been identified with respect to population and human health, the value of water to society and effects on livelihoods where temporary use bans, non-essential use bans and emergency drought orders are involved. These adverse effects increase in significance with those measures that restrict a greater range of water uses, with the greatest effects associated with the emergency drought order.

The findings of the SEA have helped to inform decision-making on the sequencing and timing of the different drought plan measures. Those measures that have negligible to low adverse effects should be implemented first wherever possible with those measures having more significant adverse effects being implemented later. However, other factors may preclude such sequencing, including the spatial distribution of drought impacts between the different Water Resource Zones, the intensity of the drought, practicability and possible drinking water quality risks. This balancing of overall effects has determined the final sequencing of measures in the draft DP.

8 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.

Appendices

Appendix A	Statutory consultee responses to the SEA Scoping Report
Appendix B	Review of policies, plans and programmes
Appendix C	Environmental baseline review
Appendix D	Detailed assessment tables
Appendix E	Quality assurance checklist



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