United Utilities

Strategic Environmental Assessment of United Utilities' Revised Draft Drought Plan 2017

Environmental Report

January 2017

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NON-TECHNICAL SUMMARY

Introduction

Under the Water Act 2014, United Utilities (UU) is required to prepare and update a Drought Plan every five years. UU published their current statutory Drought Plan on the 17th July 2014. On 26 January 2016, UU published an updated environmental assessment report for the Crummock Water drought permit option in West Cumbria, which resulted in a reduction to the volume of water available for abstraction from this reservoir. UU believe that this change, in-combination with the development of a new source of water, the South Egremont boreholes to support Ennerdale Water in West Cumbria, results in a material change to their current published Drought Plan. Therefore, UU are revising their Statutory Drought Plan in 2016. It has been determined that Strategic Environmental Assessment (SEA) and a Habitats Regulations Assessment (HRA) are required.

The Drought Plan provides a comprehensive statement of the actions UU will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact. It is consistent with UU's Water Resources Management Plan (WRMP), the objective of which is to set the strategic plan for the delivery of adequate water resources over a 25 year period.

Drought Plans encompass a number of drought options that will only be implemented if and when required. Each drought is different in terms of its severity, season, location and duration and each combination of these factors may require a bespoke reaction in terms of measures. In the context of drought planning, individual drought options are taken to constitute alternatives. UU's Revised Draft Drought Plan 2017 comprises a total of 34 drought options (12 supply side options, 4 demand options and 17 drought permit/order sites).

SEA of plans and programmes is a statutory requirement under Directive 2001/42/EC, as transposed into UK law by the Environmental Assessment of Plans and Programmes Regulations 2004. The purpose of SEA is to provide high level and strategic protection of the environment by incorporating environmental considerations into the preparation of plans and policy. In the context of drought planning, SEA assists in the identification of the likely significant environmental effects of UU's drought options and determines how any adverse impacts might be mitigated.

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

SEA Screening confirmed that UU's Revised Draft Drought Plan 2017 required both SEA and Habitats Regulations Assessment (HRA). The HRA of UU's Revised Draft Drought Plan 2017 has been undertaken in parallel with the SEA and is reported separately. The HRA screening process identifies whether each drought option in the Revised Draft Drought Plan 2017 (either alone, in combination or with other plans or projects) is likely to have significant effects on

European designated sites, i.e. sites of international conservation importance. Where HRA screening could not conclude no adverse effects of a drought option on a European site, an Appropriate Assessment of the drought option has been undertaken. The findings of both the SEA and HRA have fed into the revision of the Drought Plan in an iterative process.

The findings of the SEA are presented within this Environmental Report, which accompanies UU's submission of the Revised Draft Drought Plan 2017 to Defra and the Welsh Government and has been subject to public consultation.

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; and inter-relationships. The overall findings of the SEA describe the extent to which objectives for each topic are met by each of the drought options.

The outputs of the assessment are a completed appraisal framework table for each drought option, and a colour coded summary matrix (ranging from major beneficial impacts to major adverse impacts) which provides a comparative assessment of the residual environmental effects of implementing each drought option (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 likely significant effects of each of the drought options in combination with each other (both intra- and inter- water resource zone) and in combination with the implementation of other relevant plans and programmes.

Findings of the Assessments

Supply side options

The majority of UU's supply side options are groundwater sources. In most cases, minor construction works are required to bring the source back into operation and few residual environmental effects are anticipated. Operationally, all of the supply side options are within existing licensed abstraction limits and it is assumed that the existing abstraction licences would not have been granted if these options resulted in unsustainable abstraction. The supply side option for the West Cumbria Resource Zone involves tankering of treated water from the Integrated Resource Zone to support Ennerdale Water. Overall, most of the impacts of implementing these options are anticipated to be negligible or minor adverse, with minor to major beneficial impacts associated with benefits to security of public water supply.

Demand side options

Demand side measures serve to reduce pressure on water resources by reducing customer demand for water, and therefore reducing the abstraction at source. This will in turn contribute to reducing the amount of energy needed for water abstraction, treatment and distribution. Overall, impacts for these drought options are considered to be negligible to minor beneficial.

Drought permit/order options

The magnitude of impacts on SEA objectives for drought permit/order options (i.e. where there is modification to the conditions of an existing abstraction licence) varies between and within the options, ranging from major beneficial for the SEA objective for population and human health, to major adverse for the SEA objective for biodiversity, flora and fauna. The latter were associated with adverse changes to surface water levels and flows. Those options which have the potential to adversely impact designated conservation sites had a higher magnitude of impacts on the SEA objective for biodiversity, flora and fauna.

Cumulative Impacts

The cumulative, or in-combination, assessment identified the potential for adverse impacts if two drought options were to be implemented at the same time, either intra- or inter- water resource zone. In the majority of combinations, no impacts are considered likely, however, in some cases, impacts have been identified where, for example, both options draw on the same water resource (e.g. same groundwater catchment or same river). Due to the uncertainty of timing of implementation of drought options, assessments of each drought option with each other drought option have been undertaken with the intention that in the event of a drought, the findings of the SEA be reviewed and a cumulative assessment made of the options proposed for implementation at that time, based on the findings of the one-on-one assessments.

Assessment of UU's Revised Draft Drought Plan 2017 with other plans and programmes, including UU's WRMP, Environment Agency / Natural Resources Wales Drought Plans, other water company Drought Plans and National Policy Statements, concluded that no significant cumulative, or in-combination, effects are anticipated.

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, i.e. those impacts likely to remain after the implementation of reasonable mitigation.

During implementation of one or more drought options, 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, UU will review the specific requirements for environmental monitoring in consultation with the Environment Agency, Natural England and Natural Resources Wales.

Going Forward

The Draft Drought Plan and the SEA Environmental Report have been issued for public consultation. Comments received through this consultation have led to a Revised Draft Drought Plan 2017, and, where appropriate to do so, these changes have been assessed using the approach to SEA set out in this report. The Revised Draft Drought Plan 2017 will subsequently be published as a Final Drought Plan and an SEA post-adoption statement produced. When the Drought Plan is implemented during an actual drought event, UU will monitor its effects on the environment, helping to ensure that the potential impacts identified in the SEA are considered in practice.

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF REPORT

United Utilities (UU) published their current statutory Drought Plan on the 17 July 2014. On 26 January 2016, UU published an updated environmental assessment report for the Crummock Water drought permit option in West Cumbria, which resulted in a reduction to the volume of water available for abstraction from this reservoir. UU believe that this change, in-combination with the development of a new source of water, the South Egremont boreholes, to support Ennerdale Water in West Cumbria, results in a material change to their current published Drought Plan. Therefore, UU are revising their Statutory Drought Plan in 2016. It has been determined that Strategic Environmental Assessment (SEA) and a Habitats Regulations Assessment (HRA) are required.

The focus of this SEA is on the Drought Plan, not the Water Resources Management Plan (WRMP). The aim of the Drought Plan is for UU to identify drought options available to meet water demand in times of severe water shortage. UU's water supply system, the drought planning process and links with the WRMP are discussed further in Section 1.3.

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 UU's Revised Draft Drought Plan 2017, is provided in Section 1.2.

This Environmental Report (ER) is the second output of the SEA. Its purpose is to present the predicted environmental effects of UU's Drought Plan, in a form suitable for public consultation and use by decision-makers. In March 2016, a Scoping Report, which summarised the baseline and framework that would be used for the SEA, was issued for consultation to environmental regulators in support of UU's Draft Drought Plan 2016[1]. Issues raised by consultees in response to the Scoping Report have been considered in preparing this Environmental Report (see Section 1.8 Consultation). Section 1.8.3 provides details of how to comment on this Environmental Report.

This Environmental Report presents the baseline information that sets the context for the assessment (Section 2) and provides details of the methods employed in undertaking the assessment (Section 3). The potential impacts of the various Drought Plan options are outlined in Section 4, with the impacts of cumulative, or in-combination, effects of options included in the Revised Draft Drought Plan 2017 set out

[1] Cascade Consulting (2016) *Strategic Environmental Assessment of United Utilities' Draft Drought Plan 2016. Scoping Report*. Prepared by Cascade Consulting for United Utilities. March 2016.

in Section 5. Information regarding mitigation and monitoring is provided in Section 6. A summary is provided in Section 7.

This SEA Environmental Report will accompany UU's submission of their Revised Draft Drought Plan 2017 to Defra and the Welsh Government.

1.2 APPLICATION OF SEA TO DROUGHT PLANNING

1.2.1 Overview of Strategic Environmental Assessment

SEA became a statutory requirement following the adoption of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. This was transposed into legislation on 20 July 2004 as Statutory Instrument 2004 No.1633 – The Environmental Assessment of Plans and Programmes Regulations 2004.

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 Office of the Deputy Prime Minister (ODPM) SEA Guidelines[2] *"It is not the purpose of the SEA to decide the alternative to be chosen for the plan or programme. This is the role of the decision-makers who have to make choices on the plan or programme to be adopted. The SEA simply provides information on the relative environmental performance of alternatives, and can make the decision-making process more transparent."* The SEA can, therefore, be used to support the timing and 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 1.2.3 below.

The range of issues to be 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 impacts. However, it is current best practice within the water industry to examine the broader social effects of water

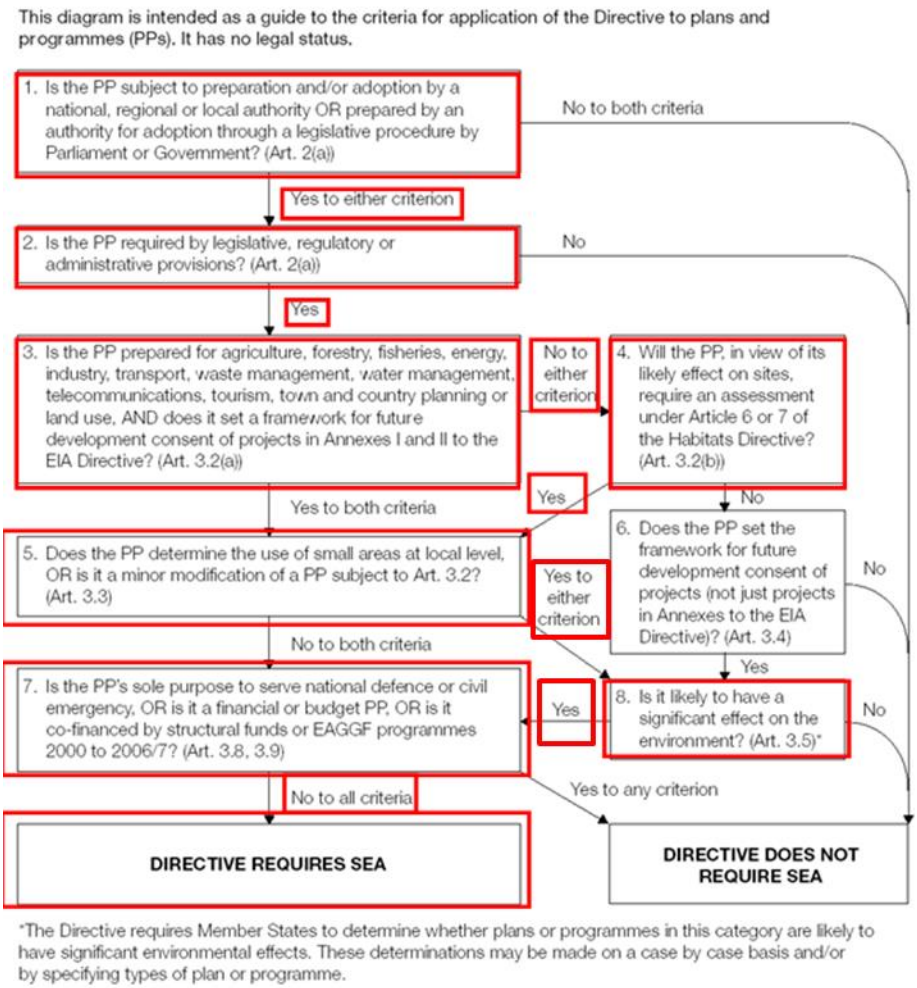
[2] Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

resource management 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 UU's Revised Draft Drought Plan 2017 are considered.

1.2.2 Requirement for SEA and HRA of UU's Drought Plan

SEA Screening has been carried out by UU in accordance with the requirement for a SEA identified under the Environmental Assessment of Plans and Programmes Regulations 2004 and the ODPM SEA Guidelines[3]. The flow diagram presented in Figure 2 of the ODPM Guidelines has been applied to UU's Revised Draft Drought Plan 2017 and is presented in **Figure 1.1**.

Figure 1.1 SEA Screening route of UU's Revised Draft Drought Plan 2017 through Figure 2 flow diagram from ODPM (2005) Guidelines; highlighted in red



The route through the flow diagram has been highlighted in red on **Figure 1.1**, and is

[3] Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

described below:

1. Is the Plan subject to preparation and/or adoption by a national, regional or local authority OR prepared by an authority for adoption through a legislative procedure by Parliament or Government?

   - **Yes, prepared by an authority for adoption through a legislative procedure by Parliament or Government.**

2. Is the Plan required by legislative, regulatory or administrative provisions?

   - **Yes, required by legislative provisions.**

3. Is the Plan prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use, AND does it set a framework for future development consent of projects in Annexes I and II to the EIA Directive?

   - **No to latter criterion.**

4. Will the Plan, in view of its likely effect on sites, require an assessment under Article 6 or 7 of the Habitats Directive[4]?

   - **Yes (from environmental assessments undertaken on behalf of UU for site specific drought permits/orders there is evidence of significant effects on a European Special Area of Conservation (SAC) which triggers the requirement for Appropriate Assessment under the Habitats Regulations.**

5. Does the Plan determine the use of small areas at local level, OR is it a minor modification of a PP subject to Art. 3.2?

   - **Yes to latter criterion.**

8. Is it likely to have a significant effect on the environment?

   - **Yes (see response to Step 4).**

1. Is the PP's sole purpose to serve national defence or civil emergency, OR is it a financial or budget PP, OR is it co-financed by structural funds or EAGGF programmes 2000 to 2006/7?

   - **No to all criteria.**

RESULT: DIRECTIVE REQUIRES SEA

It has been confirmed with Natural England and the Environment Agency that UU's Revised Draft Drought Plan 2017 requires both SEA and HRA.

The HRA of UU's Drought Plan is being undertaken in parallel with the SEA and is

[4] Superseded by the Conservation of Habitats and Species (Amendment) Regulations (2011), Sections 61 to 67 and 102 to 105.

reported separately.

1.2.3 Applying Strategic Environmental Assessment to Drought Planning

The water industry has now achieved experience in undertaking and delivering SEAs with the most recent round of Water Resource Management Plans (WRMPs). These SEAs consider a wide range of possible water resource options (and programmes of options) to inform the delivery of a WRMP that defines a preferred programme of water resource options, including the proposed timing of their implementation. It was relatively easy to combine the effects of the individual measures to predict an overall cumulative environmental effect for the whole plan.

Drought Plans are different. They encompass a basket of measures that will only be implemented if and when required because of the unpredictable occurrence of a drought event, and thus 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 and duration. Each combination of these factors may require a bespoke reaction in terms of measures.

A Drought Plan does not comprise a discrete, well defined programme of options selected from a long list of potential options in the same way that a WRMP does. Because of the nature of the consenting system for drought actions, it must include all measures that the company may need to take progressively as the severity of a drought increases, including those that would only be needed in the worst possible drought. These will typically have very significant environmental effects, but are extremely unlikely to be required in the period of the plan.

The Drought Plan therefore includes a range of possible measures, or alternatives to allow UU to respond to a particular drought in the most appropriate way. It is impossible to predict in advance which and how many of the measures will be required, and in which order of priority, to respond to each particular drought event (although it is noted that for some resource zones with fewer drought options, it may easier to predict which measures would be implemented in a drought scenario).

The traditional approach to SEA is therefore difficult to apply to Drought Plans. There are no pre-defined programmes of options as such, so the SEA does not assess competing measures or recommend the most sustainable selection or programme of measures. It cannot provide a certain prediction of an overall environmental effect of adopting the plan, as its implementation is uncertain. The outputs of the SEA will provide a comparative assessment of the environmental effects of implementing each drought option, which can be used by UU to advise the bespoke measures to be implemented at the time of an actual drought event.

While an environmental appraisal of each measure can be set out in the SEA for the

plan, the lack of predictability of which measures will be implemented in any particular drought event means that it may be impossible to provide an accurate cumulative assessment of the impacts of the plan for a possible future drought event. The approach to cumulative assessment is proposed in Section 3.4 and includes consideration of intra- and inter- water resource zone effects, as well as cumulative effects with neighbouring water company Drought Plans.

The Government has produced an SEA guidance, which sets out the stages of the SEA process[5]. This, together with guidance for undertaking SEA of Drought Plans, which has been produced on behalf of United Kingdom Water Industry Research (UKWIR)[6], has been used to inform the methodology for the SEA. These documents remain the recommended best practice guidance for preparation SEAs of drought plans.

A Drought Plan Guideline was published by the Environment Agency in 2011[7] and included recommendations for SEA of Drought Plans. A revised guideline was published by the Environment Agency in December 2015[8]. This revised guidance informs UU's Revised Draft Drought Plan 2017 preparation and the SEA.

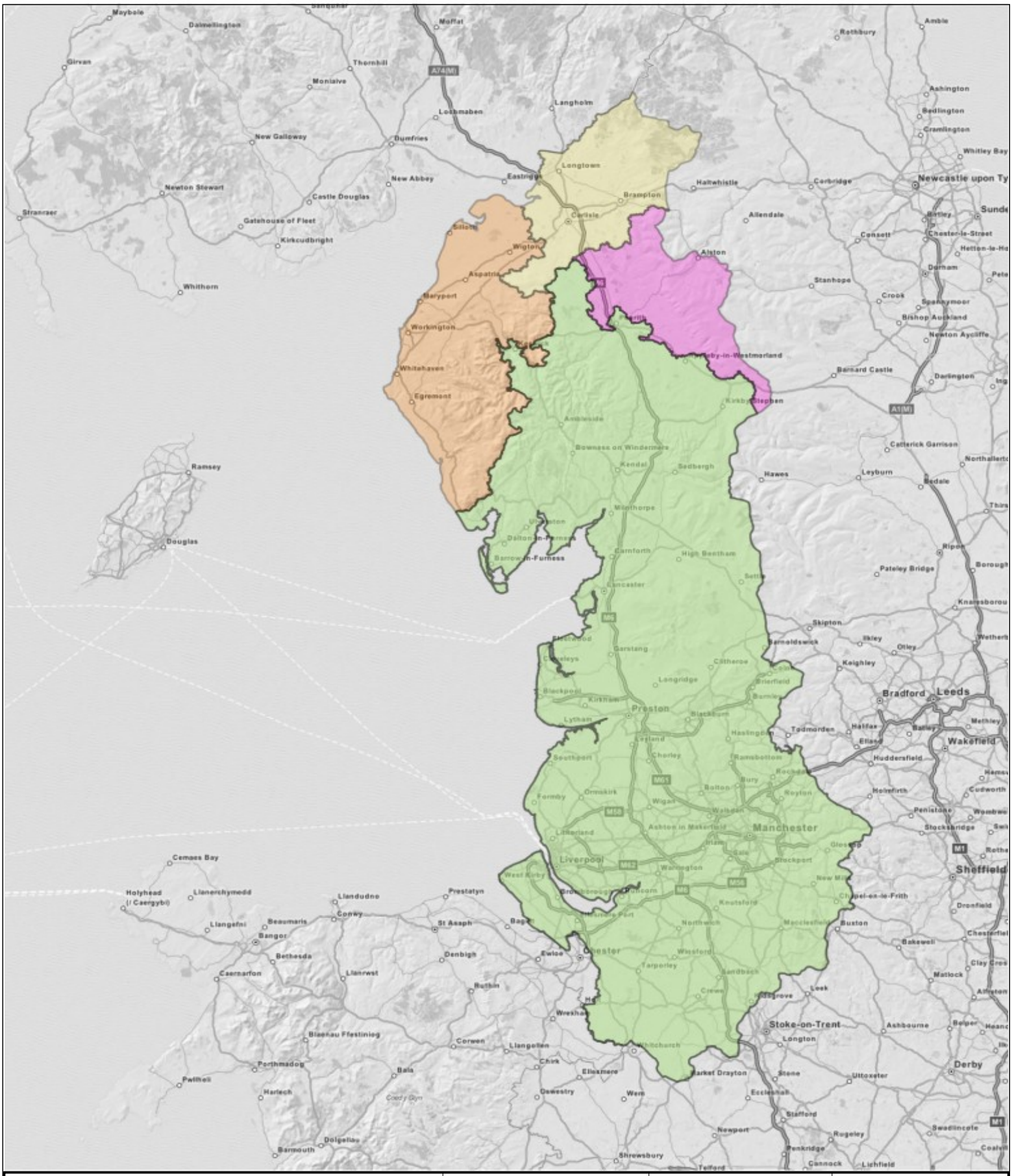
1.3 UU'S WATER SUPPLY SYSTEM, WATER RESOURCE MANAGEMENT AND DROUGHT PLANNING

1.3.1 Introduction

UU supplies water to approximately 7 million people and 0.2 million non-household customers in Cumbria, Lancashire, Greater Manchester, Merseyside, most of Cheshire and a small portion of Derbyshire.

UU owns and operates over 100 water supply reservoirs, various river and stream intakes, as well as lake abstractions and numerous groundwater sources. Abstracted water is treated at water treatment works before being supplied to customers through an extensive network of aqueducts and water mains. UU's region is split into four water resource zones (see **Figure 1.2**).

[5] Office of the Deputy Prime Minister (2005). *A Practical Guide to the Strategic Environmental Assessment Directive*.
[6] UKWIR (2012) *Strategic Environmental Assessment and Habitats Regulation Assessment – Guidance for Water Resources Management Plans & Drought Plans (12/WR/02/A).* Prepared by Cascade Consulting
[7] Environment Agency (2011) *Water Company Drought Plan Guideline*.
[8] Environment Agency (2016*) How to write and publish a drought plan,* December 2015. Available at https://www.gov.uk/guidance/drought-plans-environmental-assessment-and-monitoring#carry-out-an-environmental-assessment, Accessed 1 March 2016.



United Utilities Water Resource Zones

- Carlisle Resource Zone
- Integrated Resource Zone
- North Eden Resource Zone
- West Cumbria Resource Zone

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Environmental Report

Figure Title:

United Utilities Water Resource Zones

Figure 1.2

Water supplies to the majority of the region (with more than 90% of total water supplied) are managed in a fully integrated manner and constitute a single resource zone. The same four water resource zones are used for both drought planning and water resources planning and comprise:

- Integrated Resource Zone
- West Cumbria Resource Zone
- Carlisle Resource Zone
- North Eden Resource Zone.

1.3.2 Link to Water Resources Management Plan

UU published its last Water Resources Management Plan (WRMP) in 2015 which provides a comprehensive statement of UU's water supply and water demand forecasts over the period 2015 to 2040. It also describes the resulting supply-demand balances and the actions UU propose to take as part of the preferred strategy to achieve water supply reliability standards for their customers. The WRMP is updated every 5 years.

The aims of UU's Water Resources Management Plan are aligned with UU's strategic direction principles. As part of the preparation of its business plan for the 2015-2020 period, UU consulted its customers on what is important to them, leading to the development of five customer promises which guide the way in which UU deliver their services, now and in the future:

- Provide great water
- Dispose of wastewater
- Give customers value for money
- Deliver customer service
- Protect and enhance the environment.

The WRMP identifies if there is expected to be a deficit in the future availability of water supplies compared to demand over a 25 year horizon, resulting in the need for new sources of water or demand measures to ensure the balance between supply and demand is maintained. The assessment takes climate change in to account, as well as any changes to abstraction licences (e.g. the Environment Agency's review of our abstraction licences under the Habitats Directive referred to as the Review of Consents). The WRMP also makes allowance for parts of the water supply system being out of service for maintenance. The Final WRMP 2015 identified the preferred solutions for dealing with forecast deficits over the 2015-2040 period. The plan identified a supply deficit in the West Cumbria Resource Zone and the Thirlmere Transfer scheme as the preferred long term solution for securing water supply in West Cumbria. The Thirlmere Transfer solution has also been scrutinised as part of an Examination in

Public on the Water Resources Management Plan which took place in September 2014. The scheme will be operational in 2022 and will facilitate the revocation of the abstraction licence at Ennerdale Water. Therefore, the operation of the scheme will be considered in the next revision of UU's Drought Plan as the current plan covers the period to 2021.

The aim of the Drought Plan is for UU to identify drought options available to meet water demand in times of severe water shortage, and leakage control is a key priority of both the WRMP and Drought Plan. Leakage detection and repair activities will be enhanced during a period of severe water shortage, as set out in the Drought Plan. The predicted future baseline for leakage control is outlined in the WRMP. The supply-demand appraisal demonstrates that reducing leakage to the levels shown below is an efficient and integral part of UU's water resources and demand strategy.

To clarify, the aim of this SEA Environmental Report is to focus on the Drought Plan, not the WRMP. UU's drought planning process is discussed further in Section 1.3 below.

1.3.3 The Integrated Resource Zone

The Integrated Resource Zone is an integrated regional network serving south Cumbria, Lancashire, Greater Manchester, Merseyside and most of Cheshire, representing over 90% of total water supplied by UU. A new 55km bi-directional pipe, the West-East link, was commissioned in 2011 to allow up to 100Ml/d of water to be transferred between Cheshire/Merseyside and Manchester. This new link allows UU more flexibility to move water around the region to where it is most needed, and enables UU to carry out aqueduct cleaning by providing a second pipeline. This is in addition to the link between Liverpool and Manchester which was constructed following the 1995/6 drought.

1.3.4 The West Cumbria Resource Zone

The West Cumbria Resource Zone serves the areas of Workington, Whitehaven, Wigton and Solway. There is some limited connectivity between the sources in this zone.

1.3.5 The Carlisle Resource Zone

The Carlisle Resource Zone serves the Carlisle area. It is supplied by two sources – the River Gelt and the River Eden.

1.3.6 The North Eden Resource Zone

The North Eden Resource Zone comprises solely of boreholes that serve the rural, northern part of the Eden district of Cumbria. The Alston area is supplied from a bulk water supply from Northumbrian Water.

1.4 UU'S DROUGHT PLANNING PROCESS AND DROUGHT OPTIONS

1.4.1 Overview and timetable of drought planning process

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 subsequently Water Act 2014, which set out the sort of operational steps a company will take before, during and after a drought. The Water Industry Act 1991 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*'.

UU published its first Final Statutory Drought Plan in January 2008. The Drought Plan Direction 2011 sets out the review cycle for drought plans:

6(b) for a revised drought plan –

i. if section 39B(6)(a) of the Act applies as a result of a material change of circumstances arising from a new statutory provision, within 12 months after the date on which the change occurs;

ii. if section 39B(6)(a) of the Act applies as a result of a material change of circumstances arising for any other reason, within 6 months after the date on which the change occurs;

iii. if section 39B(6)(c) of the Act applies, within 3 years and 6 months after the date on which its drought plan, or its last revised drought plan, is 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. UU considered these changes in legislation to be a material change and submitted a revised Draft Drought Plan to the Secretary of State (and copied to the Welsh Government) by 1 October 2011 (i.e. 12 months after the date the new legislation came into force). The Draft Drought Plan was accompanied by the SEA Environmental Report and the HRA Screening Report, which identified the requirement for several of UU's drought options to progress to Stage 2 Appropriate Assessment. Following completion of these Appropriate Assessments, and direction from Defra, UU published a Final Drought Plan on 13 June 2013; however this did not include any drought options at Ennerdale Water.

Subsequently, following discussions with Defra in summer 2013, UU updated the Final Drought Plan 2013 to include revised drought triggers, a supply-side option and two drought order options at Ennerdale Water. Following endorsement from the Secretary of State, UU published its Draft Drought Plan, SEA and HRA for public consultation, which ran from 13 January 2014 to 17 February 2014. Following stakeholder

consultation and comment, UU considered representations from consultees on the Draft Drought Plan and made amendments, as set out in the published Statement of Response (SoR). UU submitted a Revised Draft Drought Plan to Defra which incorporated the changes set out in the SoR, including the removal of the Ennerdale Water Scenario 2 drought option from the Plan. Following direction from Defra, UU published their current statutory Drought Plan on the 17 July 2014.

Following an engineering review of the operation of Crummock Water, UU have revised the Crummock Water drought permit option from the version included in the Final Drought Plan 2014. The revised option is presented in the January 2016 environmental assessment report of the drought permit which was published on 26 January 2016[9]. In addition, the development of a new source of water, the South Egremont boreholes, has been undertaken to support Ennerdale Water in West Cumbria. These alterations are considered a 'material change' to the Final Drought Plan 2014. Consequently, a revised draft Drought Plan must be submitted to Defra within 6 months of the material change, therefore, by 26 July 2016. The period encompassed by the revised Drought Plan will be 2017-2021.

Permissions to abstract water, granted through licences issued by the Environment Agency and held and operated by UU, have been subject to a 'Review of Consents' in accordance with Regulation 63 of the Habitats Regulations. This Review of Consents was undertaken by the Environment Agency and includes screening to determine likely significant effect and Appropriate Assessment where likely significant effects are identified, to either affirm an abstraction licence or recommend action to amend the licence conditions. This is in order to ensure that the integrity of the European site is not at risk from the impacts of abstraction. The conclusion of the HRA Screening and the SEA for each drought option should be reviewed at the time of any future application for drought powers to ensure they remains valid.

Only those drought options which are relevant to the period encompassed by the revised Drought Plan will be included for consideration as part of the SEA and HRA process. To this end, environmental effects of the Revised Draft Drought Plan 2017 options will be considered within the context of the current licence operating conditions. Potential new sources (which UU may bring on line in the future), new drought options, or revisions to existing options which are only envisaged to become operational post July 2021 have, therefore, been excluded from the SEA and HRA assessments. Where changes to a licence with an associated drought option have been identified as part of the Review of Consents, this will be referenced in the Environmental Report.

[9] Cascade Consulting (2016) Environmental Assessment of the Crummock Water Drought Permit, report prepared for United Utilities.

1.4.2 UU's Drought Options

UU have identified four triggers that act as decision-points for implementing drought management actions and options. The drought triggers at Crummock Water and Ennerdale Water have been reviewed as part of the 2016 plan update. The nature of the triggers varies for each water resource zone and the nature of the drought management actions associated with the triggers varies depending on the prevailing situation.

Drought actions 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 that time. The Revised Draft Drought Plan 2017 contains a range of potential drought management options available to UU, for example bringing contingency water sources into use, implementation of drought permits/orders and water use restrictions.

There are three overall categories of drought options which are described below:

- utilisation of existing licensed water sources within UU's resource base (referred to as supply side options)
- demand side options (e.g. water use restrictions)
- drought permits/orders (i.e. modification to the conditions of an existing abstraction licence).

Supply Side Options

All supply side options are actions within existing licensed abstraction limits which have been subject to the Environment Agency's Review of Consents process. However some of the supply side options are licensed stood-down sources which are currently non-commissioned and which do not operate as 'business as usual' and would require recommissioning in the event of use as a drought option. Supply side drought options are listed in **Table 1.1**. A summary of the construction activities required in order to bring each of the supply side drought options into operation is provided in **Appendix A**.

Table 1.1 Supply side drought options included in the SEA and HRA

Licence
Integrated Resource Zone
Belle Vale Boreholes
Croft Boreholes
Daresbury Borehole
Landside Borehole
Netherley Boreholes
Pex Hill Boreholes
Stocks Wells Boreholes
Walton Boreholes
Water Lane Boreholes
Worsthorne Borehole
West Cumbria Resource Zone
Tankering of treated water to support Ennerdale Water
Carlisle Resource Zone
Castle Carrock Reservoir, dead water storage
North Eden Resource Zone
None

Demand Side Options

Demand side options are designed to reduce the demand for water and the options available to UU are consistent between all resource zones (see **Table 1.2**). Demand side options have been included in both the SEA and HRA screening.

Table 1.2 Demand side options (all water resource zones)

Measure	Comments
Drought publicity	Increased water efficiency messages via increased customer communications
Increased leakage detection and repair activity	
Water Use Restriction	Voluntary water use restrictions (applying to the general use of a hosepipe for domestic purposes) and statutory water use restrictions as set out in Section 76 of the Water Industry Act 1991 (as amended by Section 36 of the Flood and Water Management Act 2010)
Ordinary Drought Order (Non-Essential Use Ban)	Drought order to ban non-essential uses of water (as set out in the Drought Direction 2011)

Demand measures are just part of a suite of options which will be put in place by UU as part of its Drought Plan alongside supply-side options and drought permits/orders.

Drought Permits/Order Options

Drought permits and orders are drought management actions that, if granted, can allow more flexibility to manage water resources and the effects of drought on public water supply and the environment. Guidance has been prepared by Defra[10]: which highlights the main differences between drought permits and orders. One of the key differences is that drought permits are granted by the Environment Agency, with drought orders being granted by the Secretary of State, or the Welsh Minsters, as appropriate.

Potential drought permit/order sites that are included in the Revised Draft Drought Plan 2017 are identified in **Table 1.3**. These options were considered in both the SEA scoping and HRA screening processes.

[10] Department for Environment, Food and Rural Affairs (2011) *Drought permits and drought orders: Information from the Department for Environment, Food and Rural Affairs, Welsh Assembly Government and the Environment Agency*. May 2011. Defra (2015) *Apply for a drought order or emergency drought order*, https://www.gov.uk/guidance/apply-for-a-drought-order-or-emergency-drought-order#after-youve-received-your-drought-order, Accessed 1 March 2016.

Table 1.3 Drought permit/order options (all water resource zones).

Water Source	Potential Drought Permits/Orders
Integrated Resource Zone	
Longdendale Reservoirs	Reduce compensation flow from 45.5 to 22.5 or 15.0 Ml/d
Rivington Reservoirs – White Coppice	Reduce compensation flow from 4.9 to 2.0 Ml/d
Rivington Reservoirs – Brinscall Brook	Reduce compensation flow from 3.9 to 2.0 Ml/d
Jumbles Reservoir	Reduce compensation flow from 19.9 to 12.0 or 6.0 Ml/d
Delph Reservoir	Reduce compensation flow from 3.7 to 1.0 Ml/d
Dovestone Reservoir	Reduce compensation flow from 15.9 to 10.0 or 5.0 Ml/d
Lake Vyrnwy	Reduce compensation flow from 45.0 to 25.0 Ml/d
River Lune LCUS abstraction	Reduce prescribed flow from 365.0 to a minimum of 200 Ml/d
Lake Windermere – Scenario 1	Reduce hands-off flow conditions to a minimum of 95 Ml/d Relax 12-month rolling abstraction licence limit
Lake Windermere – Scenario 2	Relax 12-month rolling abstraction licence limit Permit drawdown of lake level (up to a maximum of 0.5m below weir crest)
Ullswater	Reduce hands-off flow conditions to a minimum of 95 Ml/d Relax 12-month rolling abstraction licence limit
Swineshaw Boreholes	Allow abstraction of up to 4Ml/d from Swineshaw Boreholes 2 and 3.
West Cumbria Resource Zone	
Scales boreholes	Increase annual licence limit from 365 Ml/yr to between 438 and 621 Ml/yr to enable continuation of a higher daily abstraction rate (up to licence limit of 6 Ml/d)
Ennerdale Water	Allow drawdown of the lake to 2.5m below weir crest
Crummock Water	Allow pumping of abstraction and compensation flows at lake levels below 0.97m below weir crest level to 1.5m below weir crest level
Carlisle Resource Zone	
None	-
North Eden Resource Zone	
Bowscar boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction
Gamblesby boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction
Tarn Wood boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction

Defining the list of Drought Options and Alternatives

In the context of drought planning, individual options are taken to constitute alternatives.

It should be noted that revision of the Drought Plan options has been undertaken in parallel with preparation of the SEA and HRA, and the results of these latter two assessments has fed into the revision of the Drought Plan in an iterative process.

The list of drought options and the assessments provided in this document will be revised to reflect any changes between the Draft and Final Drought Plans.

Supporting Information

Drought options included in the SEA and HRA will be documented by UU in its Revised

Draft Drought Plan 2017 and presented in drought management option forms as specified by Drought Plan Guideline[11]. Examples of these forms are provided in **Appendix B**. Information provided in these forms has been used to inform the SEA and vice versa.

It is noted that some drought options may have different environmental effects depending on season of implementation (for example a summer *vs*. a winter drought). As drought measures can theoretically be required and implemented at any time of year, overall impacts are assessed on a worst-case basis.

Detailed environmental assessment studies of all of UU's drought permit/order sites have been carried out and information from these studies has been used to inform the SEA and HRA Screening (see Sections 1.5 and 3.3).

1.5 DROUGHT PERMIT/ORDER ENVIRONMENTAL STUDIES

Environmental assessment reports have been prepared for all of the drought permit/order sites identified in **Table 1.3**, as part of UU's drought contingency planning.

The aim of these studies was to produce environmental reports such that in the event of a drought they are readily available for refreshing based on the prevailing drought situation at that time. The Environment Agency and Natural England were key consultees for the studies. The environmental studies consider all potentially affected habitats and species including, but not limited to, SAC, SPA and Ramsar features as well as any SSSI or BAP interest features. The reports also include Environmental Monitoring Plan (EMP) recommendations for each drought permit/order site. These environmental studies, undertaken outside of an actual drought event, are intended to be used as the basis for the Environmental Report to be prepared in support of a specific drought permit/order application, should the need arise.

In the Final Drought Plan 2008, UU outlined the intention to extend these environmental studies to the other drought permit/order sites identified in the plan. UU has now completed environmental studies at all of the drought permit/order sites identified within the current Revised Draft Drought Plan 2017 (see **Table 1.3**). Environmental Reports, with date of completion are listed in **Table 1.4**.

[11]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, Accessed 1 March 2016

Table 1.4 Drought permit/order sites Environmental Assessments

Drought Permit/Order Site	Date Completed
Integrated Resource Zone	
Lake Windermere	**2016**
Lake Ullswater	**2016**
River Lune LCUS abstraction	**2016**
Longdendale Reservoirs	**2010**
Jumbles Reservoir	**2010**
Lake Vyrnwy	**2010**
Rivington Reservoir – White Coppice	**2010**
Rivington Reservoir – Brinscall Brook	**2010**
Delph Reservoir	**2010**
Dovestone Reservoir	**2010**
Swineshaw Boreholes	**2017**
West Cumbria Resource Zone	
Ennerdale Water	**2014**
Crummock Water	**2016**
Scales Borehole	**2010**
Carlisle Resource Zone	
None	**-**
North Eden Resource Zone	
Bowscar Boreholes	**2010**
Gamblesby Boreholes	**2010**
Tarn Wood Boreholes	**2010**

Information from the detailed environmental assessments has been used to inform the SEA and HRA. The methodology for the SEA is described in further detail in Section 3.

1.6 STAGES OF SEA PROCESS

SEA screening has been undertaken, and it has been confirmed that UU's Revised Draft Drought Plan 2017 required SEA (see Section 1.2.2).

Table 1.5 is an extract from the Government's SEA guidance[12] that sets out the main stages of the SEA process and the purpose of each task within the process.

Stage A: *Setting the context and objectives, establishing the baseline and deciding on the scope* has been completed by UU. A Scoping Report was issued to consultees from the environmental regulators (Environment Agency, Natural England and Natural Resources Wales, Historic England and Cadw) on 4 March 2016 (see Section 1.8 below) which provided an opportunity for them to provide views on the proposed scope and level of detail of the Environmental Report.

This Environmental Report represents work carried out in Stages B and C of the SEA process.

Specific guidance on the application of the SEA process to Drought Plans is provided

[12] Office of the Deputy Prime Minister (2005). *A Practical Guide to the Strategic Environmental Assessment Directive*.

in a best practice publication by UKWIR[13].

Table 1.5 SEA stages and tasks

Stages in the SEA Process	
SEA Stages and Tasks	**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
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.

[13] UKWIR (2012) *Strategic Environmental Assessment and Habitats Regulation Assessment – Guidance for Water Resources Management Plans & Drought Plans (12/WR/02/A).* Prepared by Cascade Consulting

Stages in the SEA Process	
SEA Stages and Tasks	**Purpose**
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.

1.7 STRUCTURE OF THE ENVIRONMENTAL REPORT

This Environmental Reports presents the findings of SEA Tasks B1 to B6 set out in **Table 1.6** and provides the consultation bodies with the information required to understand and comment on the potential impact of the Revised Draft Drought Plan 2017.

This Section (**Section 1**) describes the overall purpose and process of the SEA and background to UU's water supply system and drought planning process. The remainder of the report is structured as follows:

Section 2 – Baseline and Context, presents the baseline information that sets the context for the assessment. Information on the current state of the environment within UU's water supply area is provided along with a review of other policies, plans and programmes which will influence the Drought Plan.

Section 3 – Methodology, provides details of the methods employed in undertaking the assessment including the cumulative effects assessment methodology.

Section 4 – Assessment of Drought Options, presents the potential impacts of the various drought plan options against the SEA framework.

Section 5 – Cumulative Effects Assessment, discusses the potential in-combination impacts of drought options (intra-zone and inter-zone), demand management options and other plans and projects in the region.

Section 6 – Mitigation and Monitoring, discusses measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the Drought Plan and monitoring to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures.

Section 7 – Summary.

1.8 CONSULTATION PROCESS

1.8.1 Overview

Two opportunities are available for consultation bodies to be formally involved during the SEA process: during the scoping process; and at the environmental reporting stage. These are discussed below.

When the Revised Draft Drought Plan 2017 is approved by the regulators and adopted by UU, the company will prepare an SEA Statement setting out how the SEA and any views expressed by the consultation bodies or the public have influenced the Drought Plan.

UU set up a Project Steering Group (PSG) to include key consultees and parties involved in the SEA and HRA process, including the Environment Agency, Natural England and Natural Resources Wales. This forum encouraged regulators to voice any concerns in a timely manner outside the formal consultation process, which, as documented below, was also undertaken in parallel, according to statutory requirements.

1.8.2 Consultation on the Scoping Report

Consultation bodies were invited to express their views on the Scoping Report and the scope of the SEA proposed in accordance with SEA Regulation 12(5).

The Scoping Report was issued on 4 March 2016 to the Environment Agency, Natural Resources Wales, Historic England, Natural England and Cadw. The consultation period ran from 4 March 2016 to 8 April 2016. The Statutory consultees were invited to comment on the report and the proposed scope of the SEA. A summary of the issues raised and responses to comments are presented in **Appendix C**.

1.8.3 Consultation on the Environmental Report

This Environmental Report has been produced in accordance with the approach agreed by UU and taking into consideration the responses received from consultation bodies in response to the Scoping consultation. SEA reporting provides assessments of the likely significant effects of the drought options considered and selected by UU. This information is set out in this Environmental Report which has been publically consulted upon alongside UU's Draft Drought Plan 2016.

2 BASELINE AND CONTEXT

2.1 INTRODUCTION

Annex 1 of the SEA Directive (Directive 2001/42/EC) requires the following specific baseline information to be included within an Environmental Report to identify the environmental characteristics of areas likely to be significantly affected by the Drought Plan:

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

In accordance with the SEA Directive, a review of relevant policies, plans and programmes is presented in Section 2.2. Baseline environmental information is presented in Section 2.3. A summary of key issues has been prepared and is presented in Section 2.4.

2.2 REVIEW OF POLICIES, PLANS AND PROGRAMMES

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

The plans and programmes were identified from the wide range that have been produced at an international, national, regional and local level. The following criteria were used to help ensure that the review focused on the plans and programmes most relevant to this SEA:

- Relevance to the Drought Plan - if the plan or programme did not have a significant

effect on achieving the objectives of the Drought Plan or the Drought Plan does not have a significant effect on achieving the objectives of the other plan or programme, then it was not included.

- Relevance to UU - plans for the North West of England region (which covers an area broadly similar to the area covered by UU) and relevant parts of Wales which reflected national and international priorities which were considered to be most relevant.

International, national, regional and local policies, plans, programmes and strategies reviewed are listed in **Table 2.1**, with the findings of the review provided in **Appendix D**. The information from this review has been used to direct the presentation of baseline information on the current environmental and social characteristics of UU's water source and supply area (Section 2.3), and to develop proposed objectives for the SEA (Section 3.2).

Table 2.1 Policy, plans and programmes reviewed

International
Bern Convention (1979), The Convention on the Conservation of European Wildlife and Natural Habitats
Bonn Convention (1979), The Convention on the Conservation of Migratory Species of Wild Animals
The Cancun Agreement (2011) & Kyoto Agreement (1997)
Council of Europe (2006), European Landscape Convention
Council of Europe (2003) European Soils Charter
European Commission (2006) Thematic Strategy for Soil Protection
European Commission, The Water Framework Directive (2000/60/EC))
European Commission, Fresh Water Fish Directive (2006/44/EC)
European Commission, Habitats Directive (1992/43/EEC)
European Commission, Birds Directive (2009/147/EC)
European Commission, Marine Strategy Framework Directive (2008/56/EC)
European Commission, Floods Directive (2007/60/EC)
European Commission, Urban Waste Water Treatment Directive (1991/271/EEC)
European Commission, Drinking Water Directive (1998/83/EC)
European Commission, Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)
European Commission, Environmental Liability Directive (2004/35/EC)
European Commission Ambient Air Quality and Cleaner Air for Europe (2008) (Directive 2008/50/EC)
European Commission, The Environment Noise Directive (Directive 2002/49/EC)
European Commission (2007) Addressing the challenge of water scarcity and droughts in the European Union: Communication from the Commission to the European Parliament and the Council(COM/2007/0414) & A Resource-Efficient Europe – Flagship Initiative Under the Europe 2020 Strategy (policy review 2012)
European Union, The Seventh Community Environment Action Programme to 2020
European Union Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of effects of certain plans and programmes on the environment
Ramsar Convention (1971), The Convention on Wetlands of International Importance
United Nations (2002) Commitments arising from the World Summit on Sustainable Development, Johannesburg
United Nations (1992) Convention on Biological Diversity (CBD)
United Nations Economic Commission for Europe (1998), Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters
UN Millennium Declaration (2000) & UN Millennium Development Goals (2002)
National
Cadw, CCW and ICOMOS (UK)(International Council on Monuments and Sites) (2001) Register of Landscapes of Historic Importance

Countryside Council for Wales (CCW) (2003) Priority Habitats of Wales
DECC (2010) CRC Energy Efficiency Scheme
DECC (2011) National Policy Statements for Energy Infrastructure
DECC (2011) Planning our electric future: a White Paper for secure, affordable and low carbon electricity
Defra (2008) Future Water: the Government's water strategy for England
Defra (2005) Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England
Defra (2002) Working with the grain of nature: a biodiversity strategy for England
Defra (2004) Rural Strategy 2004
Defra (2002) The Strategy for Sustainable Farming and Food – facing the future
Defra (2004) The First Soil Action Plan for England
Defra (2011) UK National Ecosystem Assessment and Defra, 2014, UK National Ecosystems Assessment Follow on, Synthesis of Key Findings Defra, Invasive Non-Native Species Framework Strategy for Great Britain (2008)
Defra (2009) The Groundwater (England and Wales) Regulations 2009
Natural Environment and Rural Communities Act, 2006
Defra (2005) Securing the Future; Delivering UK Sustainable Development Strategy
Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network, (2010)
Defra (2008), England Biodiversity Strategy –climate change adaptation principles Defra, Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt, (2007)
Defra (2010), Eel Management Plans for the United Kingdom: Dee River Basin District
Defra (2010), Eel Management Plans for the United Kingdom: Northwest River Basin District
Defra (2008), England Biodiversity Strategy –climate change adaptation principles
Defra (2006) Shoreline Management Plan Guidance
Defra (2000) Waterways for Tomorrow
Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland Defra (2009) Safeguarding our Soils – A Strategy for England
Defra (2012) National Policy Statement for Waste Water
Defra, 2011, Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services
Defra (2015) The government's response to the Natural Capital Committee's Third State of Natural Capital report
Defra (2016) Creating a great place for living: Defra's strategy to 2020
Defra and Environment Agency (2015) How to Write and Publish a Drought Plan
Department of Trade and Industry, Energy white paper. Our energy future: creating a low carbon economy (2003)
Department for Culture, Media and Sport (2001) The Historic Environment – A Force for the Future
Environment Agency (2001) Water resources for the future – a strategy for England and Wales
Environment Agency (updated 2015) Creating a Better Place: Environment Agency Corporate Strategy 2014-2016
Environment Agency, (2009) Water Resources Strategy for England and Wales
Environment Agency, (2010) Water Resources Action Plan for England and Wales
Environment Agency, (1999) Restoring Sustainable Abstraction Programme
Environment Agency (2015) CRC Energy Efficiency Scheme Guide for Participants Phase 2 (2014-2015 to 2018-2019)
Environment Agency (2004), Catchment Flood Management Plans: Guidelines – Volume 1 Policy
Environment Agency (2013), Managing Water Abstraction
Environment Agency (2009), Water for People and the Environment - Water Resources Strategy for England and Wales
Environment Agency, WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation. EA, undated
Environment Agency, Shoreline Management Plans
Environment Agency (2007), Soil: A Precious Resource
Environment Agency Wales (2009) Water Resources Action Plan
Environment Agency (2005) Cleaner Coasts, Healthier Seas: EA Marine Strategy
Environment Agency (2008) Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021
Environment Agency Water Level Management Plans
Environment Agency (2003) Chemical Strategy
English Heritage (2008), Climate Change and the Historic Environment
English Heritage (2010), Heritage at Risk
Historic England (2013) Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment
HM Government, (2012) Marine Strategy
HM Treasury Infrastructure UK (2014) National Infrastructure Plan
National Planning Policy Framework
ODPM, Sustainable Communities Plan – Building for the future (2003)

Cabinet Office, National Strategy Action Plan for Neighbourhood Renewal (2001)
ODPM, Urban white paper: our towns and cities (2000)
Planning Policy Wales (2016) Edition 8
Environment Agency, Managing Water Abstraction – the Catchment Abstraction Management Strategy Process (2002)
Environment Agency, Catchment Flood Management Plans: Guidelines – Volume 1 Policy (2004)
The Water Act, 2003
Flood and Water Management Act, 2010
The Water Environment (WFD) (England and Wales) Regulations, 2003
The Water Resources Management Plan Regulations 2007
Urban Waste Water Treatment Regulations 1994, as amended
Environment Agency (undated), WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation
UKTAG: Phase 3 Review of Environmental Standards
The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI 3104
UK Marine and Coastal Access Act, 2009
Salmon and Freshwater Fisheries Act, 1975
The Countryside and Rights of Way (CROW) Act, 2000
Wildlife and Countryside Act, 1981
Water Industry Act 1991 was amended by the commencement of Section 36 of the Flood and Water Management Act 2010
Well-being and Future Generations (Wales) Act 2015
Conservation of Habitats and Species Regulations 2010 (as amended by the Conservation of Habitats and Species (Amendment) Regulations 2011 and 2012)
The Eels (England and Wales) Regulations 2009
Environment Act, 1995
UKCIP (2009) UK Climate Projections UKCP09,
Ancient Monuments and Archaeological Areas Act 1979
Environment (Wales) Bill 2015 (currently anticipated to receive Royal Assent by Spring 2016)
Natural Environment and Rural Communities Act, 2006
Planning (Listed Buildings and Conservation Areas) Act 1990
Welsh Assembly Government (2014) National Strategy for Flood and Coastal Erosion Risk Management
Welsh Assembly Government (consultation document 2012), Sustaining a Living Wales: a green paper on a new approach to natural resource management.
Welsh Assembly Government (2012), State of the Environment Report – Wales
Welsh Assembly Government (1997), Technical Advice Note 13: Tourism
Welsh Assembly Government (2004), Technical Advice Note 15: Development and Flood Risk
Welsh Assembly Government (2006), Environment Strategy for Wales
Welsh Assembly Government (2008) Fisheries Strategy
Welsh Assembly Government (2013) Wales Marine and Fisheries Strategic Action Plan
Welsh Assembly Government (2008), People, Places, Futures: The Wales Spatial Plan 2008 Update
Welsh Assembly Government (2009), One Wales: One Planet – a new sustainable development scheme for Wales
Welsh Assembly Government (2009), Technical Advice Note 5: Nature Conservation and Planning
Welsh Assembly Government (2009), Technical Advice Note 16: Sport, Recreation and Open Space
Welsh Assembly Government (2010), Climate Change Strategy for Wales and First Annual Progress Report (2012
Welsh Assembly Government (2010), Low Carbon Revolution – The Welsh Assembly Government Energy Policy Statement
Welsh Assembly Government (2010), Technical Advice Note 6: Planning for Sustainable Rural Communities
Welsh Assembly Government (2011), Strategic Policy Position Statement on Water
Welsh Assembly Government (2016) Planning Policy Wales
Wales Biodiversity Partnership Section 42 Species and Habitats of Principle Importance to Wales

Regional

Dee Valley Water (2015), Drought Plan
Environment Agency, (undated) Managing Drought in the North West
Environment Agency (2001) Water Resources for the Future – a strategy for the northwest
Environment Agency (2009) Water Resources Strategy Regional Action Plan for North West Region
Environment Agency (2010), Blue Horizons 2010-2015
Environment Agency (2015) Cumbria and Lancashire Drought Plan
Environment Agency (2015) Greater Manchester, Merseyside and Cheshire Drought Plan

Environment Agency (January 2012), Midlands Region Drought Plan
Environment Agency, North West Region Catchment Abstraction Management Strategies
Environment Agency (2016) North West River Basin District River Basin Management Plan
Environment Agency (2009), River Basin Management Plan Dee River Basin District
Defra and Welsh Government (2014) River Basin Planning Guidance
Environment Agency, River Severn Catchment Flood Management Plan
Environment Agency, Severn Uplands (2005)/ Corridor (2003) Catchment Abstraction Management Strategies (CAMS)
Environment Agency Wales (2010) River Dee Catchment Flood Management Plan
Environment Agency (2015) Draft Water Resources Planning Guidelines
Environment Agency (2016), River Basin Management Plan Severn River Basin District
Environment Agency Wales Salmon Action Plans
Natural Resources Wales, Drought Plan
Northumbrian Water (2013), Drought Plan
North West Development Agency, Rural Renaissance – the Regional Rural Recovery Action Plan (2002)
Rural Partnerships, North West Regional Rural Delivery Framework (2006)
Culture North West, Regional Cultural Strategy (2004)
North West Biodiversity Forum, 'Wild about the North West' Biodiversity Audit of North West England
Northwest Regional Forestry Framework Partnership, Agenda for Growth: The North West Regional Forestry Framework (2005)
Ofwat (2008) Water Supply and Demand Policy
Severn Trent (2014),Drought Plan Our plan for managing water supply and demand during drought
Environment Agency (2007)River Basin Planning – Summary of significant water management issues Consultation Document
Northwest Regional Development Agency, Strategy for Tourism in England's North West 2003-2010 (2003, revised March 2007)
Wales Biodiversity Partnership (2002), Powys Local Biodiversity Action Plan
Yorkshire Water (2013), Drought Plan
United Utilities (2015) Water Resources Management Plan

Sub-regional

Cheshire and Warrington Enterprise Partnership (2014) Cheshire and Warrington Matters, A Strategic and Economic Plan for Cheshire and Warrington Cumbria Strategic Partnership, Sustainable Cumbria - A sub-regional strategy for Cumbria (2004)
Greater Manchester Combined Authority (2013), Stronger Together: Greater Manchester Strategy
Lancashire West Partnership (2004)Lancashire West Matters
Peak District National Park Authority (2012), Peak District National Park Management Plan 2012-2017 Snowdonia National Park Authority, Snowdonia National Park Management Plan 2010-2015
Yorkshire Dales National Park Authority (2013), Yorkshire Dales National Park Management Plan 2013-18
Lake District National Park Authority (2006)A Vision for 2030
Lake District National Park Authority (2008) Landscape Character Assessment and Guidelines
Lake District National Park Partnership - The Partnership's Plan – The Management Plan for the Lake District National Park 2015-2020
Lake District National Park Authority (2010) Core Strategy
Hadrian's Wall Partnership Board (2015), Hadrian's Wall Management Plan 2015-2019
Local authority land use plans
Outline Water Cycle Studies

Key policy messages have been reviewed for each SEA topic and are summarised in **Table 2.2**.

Table 2.2 Key policy messages

SEA Topic	Key Messages	Policies
Biodiversity, flora and fauna	Conservation and enhancement of the natural environment and of biodiversity including fish populations (particularly migratory fish), particularly internationally and nationally designated sites 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 Prevent the spread of invasive species and ensure management practices allow early detection and eradication of any introduced invasive species. Avoidance of activities likely to cause irreversible damage to nature conservation and geological interest	Bern Convention (1979), The Convention on the Conservation of European Wildlife and Natural Habitats Bonn Convention (1979), The Convention on the Conservation of Migratory Species of Wild Animals Defra (2002), Working with the grain of nature: a biodiversity strategy for England Defra (2007), Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt Defra (2008), England Biodiversity Strategy –climate change adaptation principles Defra, 2011, Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services Defra (2008), Invasive Non-Native Species Framework Strategy for Great Britain Defra (2009), Consultation on modernisation of salmon and freshwater fisheries legislation; new order to address the passage of fish Defra (2011) UK National Ecosystem Assessment and Defra, 2014, UK National Ecosystems Assessment Follow on, Synthesis of Key Findings Defra (2010), Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network Defra (2015) The government's response to the Natural Capital Committee's third State of Natural Capital report Defra and Environment Agency (2015) How to Write and Publish a Drought Plan European Commission, Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC) European Commission, Birds Directive (2009/147/EC) European Commission, Habitats Directive (1992/43/EEC) European Union, The Seventh Community Environment Action Programme to 2020 National Planning Policy Framework Ramsar Convention (1971), The Convention on Wetlands of International Importance The Countryside and Rights of Way (CROW) Act, 2000 Wildlife and Countryside Act, 1981 Conservation of Habitats and Species Regulations 2010 (as amended by the Conservation of Habitats and Species (Amendment) Regulations 2011 and 2012) The Eels (England and Wales) Regulations 2009 United Nations, Convention on Biological Diversity (CBD) (1992)

SEA Topic	Key Messages	Policies
	Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital contributes to the economy and therefore should be protected.	Wales Biodiversity Partnership (2002), Powys Local Biodiversity Action Plan Wales Biodiversity Partnership Section 42 Species and Habitats of Principle Importance to Wales Environment (Wales) Bill 2015 Welsh Assembly Government (2013) Wales Marine and Fisheries Strategic Action Plan Environment Agency and Natural Resources Wales Salmon Action Plans
	Improving access to nature for people.	
Population and human health	Water resources play an important recreation role. Effective water resource management can create opportunities for regeneration	Cabinet Office (2001)National Strategy Action Plan for Neighbourhood Renewal Defra (2005) Securing the Future; Delivering UK Sustainable Development Strategy Environment Agency (2009) Creating a Better Place: Environment Agency Corporate Strategy 2010-2015 European Commission, Drinking Water Directive (1998/83/EC) European Union, The Seventh Community Environment Action Programme to 2020 National Planning Policy Framework ODPM (2003)Sustainable Communities Plan – Building for the future ODPM (2000) Urban white paper: our towns and cities Environment (Wales) Bill 2015 HM Treasury Infrastructure UK (2014) National Infrastructure Plan Peak District National Park Authority (2012), Peak District National Park Management Plan 2012-2017 Well-being and Future Generations (Wales) Act 2015 Yorkshire Dales National Park Authority (2013), Yorkshire Dales National Park Management Plan 2013-18
	Networks and systems such as those that provide water are important to support economic growth and can be a development constraint in some areas. A high quality, resilient water service is required.	
	Economic and Social Regeneration – support enterprise across rural England, targeting greater resources at areas of greatest need	
	To ensure all communities have a clean, safe and attractive environment in which people can take pride	
	Improve productivity and grow the market , develop the size and capability of the workforce and create the right conditions for sustainable growth	
	Promotion of healthy communities and protection from risks to health and wellbeing.	

SEA Topic	Key Messages	Policies
	Promotion of a sustainable economy and thriving communities with good access to the services they need.	
Material assets and resource use	Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently	Defra (2008) Future Water: the Government's water strategy for England Environment Agency (undated), Managing Drought in the North West Environment Agency (January 2012), Midlands Region Drought Plan Environment Agency Wales (January 2012), Drought Plan Environment Agency (2001), Water Resources for the Future – a Strategy for England and Wales Environment Agency (2001), Water Resources for the Future – a Strategy for the Northwest Environment Agency (2009) Water Resources Strategy for England and Wales The Water Act, 2003 Environment Agency (2009), Water Resources Strategy Regional Action Plan for North West Region, European Union, The Seventh Community Environment Action Programme to 2020 United Utilities (2015) Water Resource Management Plan Welsh Assembly Government (2008), Wales Spatial Plan Welsh Assembly Government Planning Policy Wales (2016) Edition 8 Environment (Wales) Bill 2015 Welsh Assembly Government (consultation document 2012), Sustaining a Living Wales: a green paper on a new approach to natural resource management.
	Consider issues of water demand, water supply and water quality in the natural environment and ensured 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	
	Accelerating the transition to sustainable forms of energy and achieving regional renewable energy deployment targets	
	Sustainable management of natural resources.	
Water	Reduce the sources of flooding and harm to people, and the natural, built and historic environment caused by floods and promote sustainable flood risk management measures	Defra (2005) Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England Defra and Environment Agency (2015) How to Write and Publish a Drought Plan Environment Agency (2004) Catchment Flood Management Plans: Guidelines – Volume 1 Policy Environment Agency (2013), Managing Water Abstraction Environment Agency (1999) Restoring Sustainable Abstraction Programme Environment Agency (2010) Water Resources Action Plan for England and Wales Environment Agency (2001) Water Resources for the future – a strategy for England and Wales Environment Agency (2009) Water Resources Strategy for England and Wales Environment Agency, WFD River Basin Characterisation Project: Technical Assessment Environment Agency (2014) Corporate Plan 2014 – 2016
	Promote sustainable water resource management including a reduction in water consumption	
	Maintain and improve water quality (surface waters, groundwater and bathing waters)	

SEA Topic	Key Messages	Policies
	Expanding the scope of water protection to all waters, surface waters and groundwater	European Commission, Drinking Water Directive (1998/83/EC) European Commission, Floods Directive (2007/60/EC) European Commission, The Water Framework Directive (2000/60/EC)) European Commission, Urban Waste Water Treatment Directive (1991/271/EEC) Flood and Water Management Act, 2010 HM Government, (2012) Marine Strategy Northumbrian Water (2013), Drought Plan Severn Trent (2014),Drought Plan Yorkshire Water (2013), Drought Plan Environment (Wales) Bill 2015 The Water resources management plan Regulations 2007 Water Industry Act 1991 was amended by the commencement of Section 36 of the Flood and Water Management Act 2010 Welsh Assembly Government (2014) National Strategy for Flood and Coastal Erosion Risk Management Welsh Assembly Government Planning Policy Wales (2016) Edition 8
	Improve the quality of the water environment and the ecology which it supports, and continue to provide high levels of drinking water quality	
	Ensure appropriate management of abstractions and protect flow and level variability across the full range of regimes from low to high conditions	
	A need to achieve Good Environmental Status in marine waters and avoiding coastal erosion.	
	Protect and improve water resources through increased efficiency and demand management of water, particularly in those areas where additional water resources may not be available.	
	Address effects on WFD status and on river basin management plans.	
Soil, geology and land use	To ensure sensitive and integrated development	Defra (2004) Rural Strategy 2004 Defra (2002) The Strategy for Sustainable Farming and Food – facing the future Defra (2004) The First Soil Action Plan for England Lake District National Park Authority (2006) A Vision for 2030 Northwest Regional Forestry Framework Partnership (2005) Agenda for Growth: The North West Regional Forestry Framework Peak District National Park Authority (2012), Peak District National Park Management Plan 2012-2017 Snowdonia National Park Authority, Snowdonia National Park Management Plan 2010-2015 Welsh Assembly Government (2010), Technical Advice Note 6: Planning for Sustainable Rural Communities Welsh Assembly Government(2009), Technical Advice Note 16: Sport, Recreation and Open Space
	Maintain the quality and diversity of geology and soils, 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	

SEA Topic	Key Messages	Policies
		Yorkshire Dales National Park Authority (2013), Yorkshire Dales National Park Management Plan 2013-18
Air and climate	To reduce the health risk and environmental degradation from main air pollutants without imposing unacceptable economic or social costs	Defra (2007) Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt, Defra (2008), England Biodiversity Strategy –climate change adaptation principles DETR (2009) The air quality strategy for England, Scotland, Wales and Northern Ireland. UKCIP, UK Climate Projections UKCP09
	Cut the UK's carbon dioxide emissions by 60% by the year 2050 and in general reduce the levels of greenhouse gas emissions	
	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	
	Climate change impacts on water supply and demand and therefore a need for adaptive measures.	
Archaeology and cultural heritage	Built development in the vicinity of historic buildings could have implications for the setting and/or built fabric	Cadw, Countryside Council for Wales and ICOMOS (UK)(International Council on Monuments and Sites) (2001), Register of Landscapes of Historic Importance Department for Culture, Media and Sport (2001) The Historic Environment – A Force for the Future English Heritage, (2008) Climate Change and the Historic Environment English Heritage (2010) Heritage at Risk Hadrian's Wall Partnership Board (2015), Hadrian's Wall Management Plan 2015-2019 Historic England (2013) Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment National Planning Policy Framework
	Any adverse effects to heritage should be minimised or avoided altogether, particularly to Hadrian's Wall World Heritage Site	
	Ensure active management of the Region's environmental and cultural assets	

SEA Topic	Key Messages	Policies
	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, particularly in the Peak District and Yorkshire Dales National Parks.	Planning (Listed Buildings and Conservation Areas) Act 1990
	Consider effects on important wetland areas with potential for paleo-environmental deposits.	
Landscape and visual amenity	Protection and enhancement of landscape (including designated landscapes, landscape character and the countryside) including the protection of the outstanding universal value (OUV) of features such as Hadrian's Wall world heritage site and the Lake District.	Defra, (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network Environment Agency (2010) Blue Horizons 2010-2015 Council of Europe (2006), European Landscape Convention Hadrian's Wall Partnership Board (2015), Hadrian's Wall Management Plan 2015-2019 Lake District National Park Partnership - The Partnership's Plan – The Management Plan for the Lake District National Park 2015-2020
	Abstraction and low river flows	
	General development pressure	
	Cumulative loss of landscape features and character from various sources including increased development	
	Enhance the value of the countryside by protecting the natural environment for this and future generations	

2.3 REVIEW OF BASELINE

2.3.1 Introduction

An essential part of the SEA process is to identify the current baseline conditions and their likely evolution. It is only with knowledge of existing conditions that impacts of the Drought Plan can be identified, mitigated and subsequently monitored.

The SEA Directive (Directive 2001/42/EC) requires that the evolution of baseline conditions of the plan area (that would take place with or without implementation of the plan) is identified. This is useful when determining impact significance, particularly with regards to baseline conditions that may already be improving or worsening and the rate of such change.

The baseline assessment has drawn on data for the North West of England, as this region is closely related to the UU's water supply operating boundaries, as shown in **Figure 1.2**. Water supplies derived from North East Wales, including the River Dee and Lake Vyrnwy, have been acknowledged and appropriate baseline information from these areas has also been included.

However, further to consultation on the SEA Scoping Report, it was agreed that certain topics are not relevant to sources in Wales and are only relevant to UU's supply area in North West England. As such, baseline information relating to source areas of Wales for the specific topics of population and health and material assets and resource use has been excluded.

Baseline data given below has been drawn from a variety of sources, including a number of the plans and programmes reviewed as part of the SEA process given in **Table 2.1**. These sections also summarise the likely future trends for the environmental issues being considered (where information is available). The key issues arising from the review of baseline conditions are summarised at the end of each sub-section.

2.3.2 Limitations of the data and assumptions made

Information used in the baseline relates to the North West of England and North East Wales regions. As such, this baseline information may not identify the more localised issues that may be against the general trends of the regions. This may include pockets of deprivation in relatively affluent areas or any localised differences in environmental quality.

Data has generally been sourced from national or regional bodies, where information is collected for regions of the UK (including the North West). While this allows for a more effective comparison between the region and national averages, reliance on these data sets has in some cases meant that information is a number of years old.

2.3.3 Overview

The North West of England is the largest region outside London and the South East, encompassing an area of approximately 14,100 km², and comprises the metropolitan areas of Manchester and Merseyside and the three counties of Cheshire, Cumbria, and Lancashire. The region stretches 150 miles from north to south, from the border with Scotland down to the Dee estuary, and is bounded on the west by the Irish Sea and on the east by the Pennines.

It is a diverse region in many ways. Most of the population live in the cities, with approximately 60% in Liverpool and Manchester, but there are significant areas that are characterised by small towns and villages. In these rural areas, there is important landscape heritage, with a large area of the North West designated as the Lake District National Park. This area, along with the other National Parks crossing into the UU area and a larger number of sites designated for biodiversity importance, provide a wealth of natural heritage.

It is also acknowledged that the Drought Plan may have an impact upon some areas of Wales including the River Dee and Lake Vyrnwy, and information relating to North East Wales has been presented where relevant and available.

2.3.4 Biodiversity, Fauna and Flora

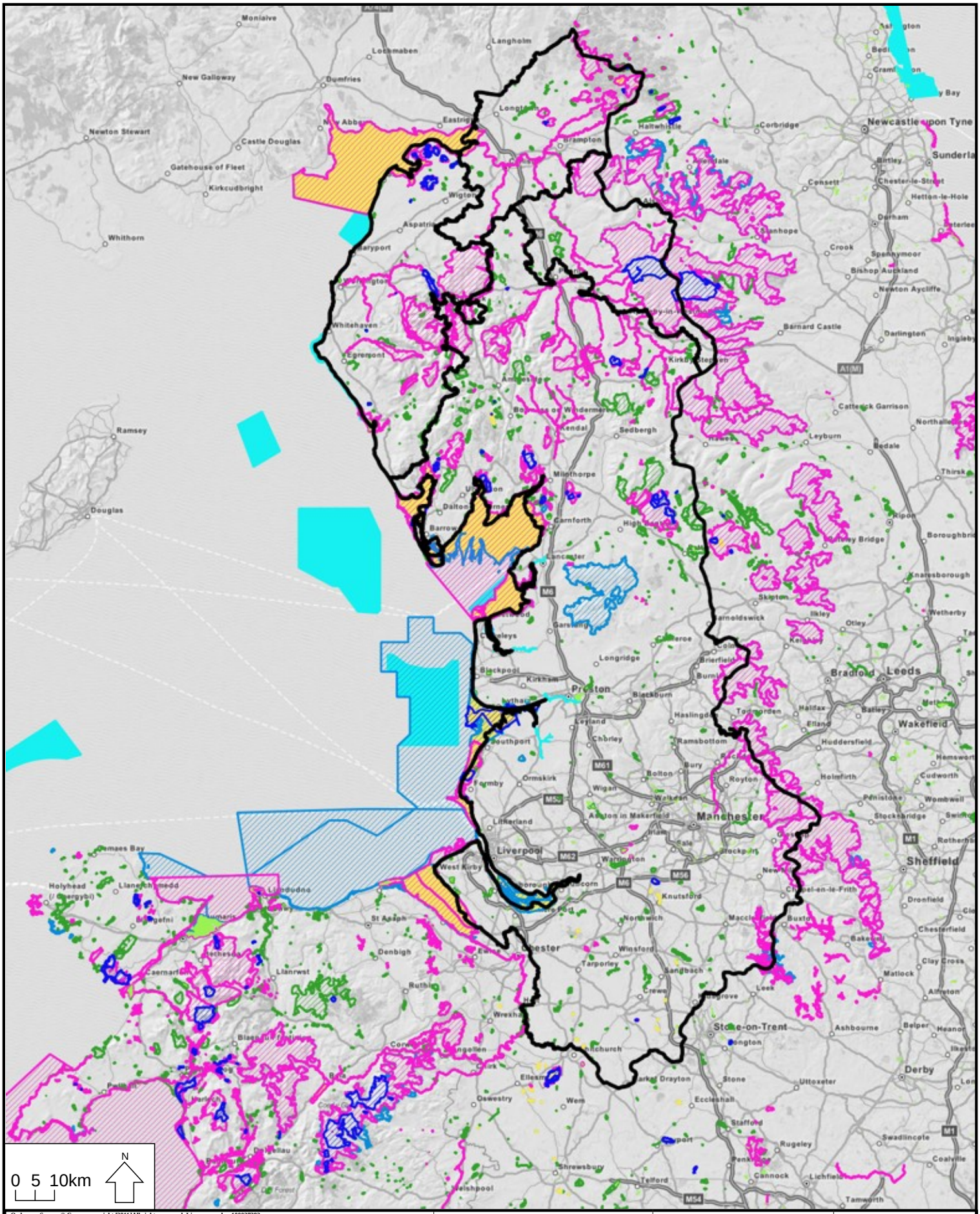
Baseline

Biodiversity is the variety of plants (flora) and animals (fauna) in an area, and their associated habitats. The importance of preserving biodiversity is recognised from an international to a local level. Biodiversity has importance in its own right, and has value in terms of quality of life and amenity.

The North West of England is rich in areas of biodiversity interest, and it contains some of the most varied upland and lowland terrain in England. The North West Biodiversity Audit[14] shows that the region contains 31 out of the 37 different 'Broad Biodiversity Action Plan habitat classifications', one of the most diverse in the country. Wildlife indicators show that the region is also a haven for a significant number of species, with 135 rare species that are a UK or regional priority to protect. 47 out of the 65 UK Biodiversity Action Plan (BAP) terrestrial, freshwater and marine priority habitats are found within the North West and important populations of rare species are dependent on these habitats[15].

The region also includes a number of sites that are designated at a European, national or local level as important for biodiversity (see **Figures 2.1** and **2.2**).

[14] North West Biodiversity (1999) *Wild About the North West: A Biodiversity Audit of North West England.*
[15] *Counting up! Delivering action for biodiversity in the North West 2010 to 2015* – NWBF 2010.



- Site of Special Scientific Interest
- Special Area of Conservation (Including single pink lines)
- National Nature Reserve
- Special Protection Area
- Marine Conservation Zone
- RAMSAR site
- Local Nature Reserve
- United Utilities Water Resource Zone

CASCADE

United Utilities

Project:

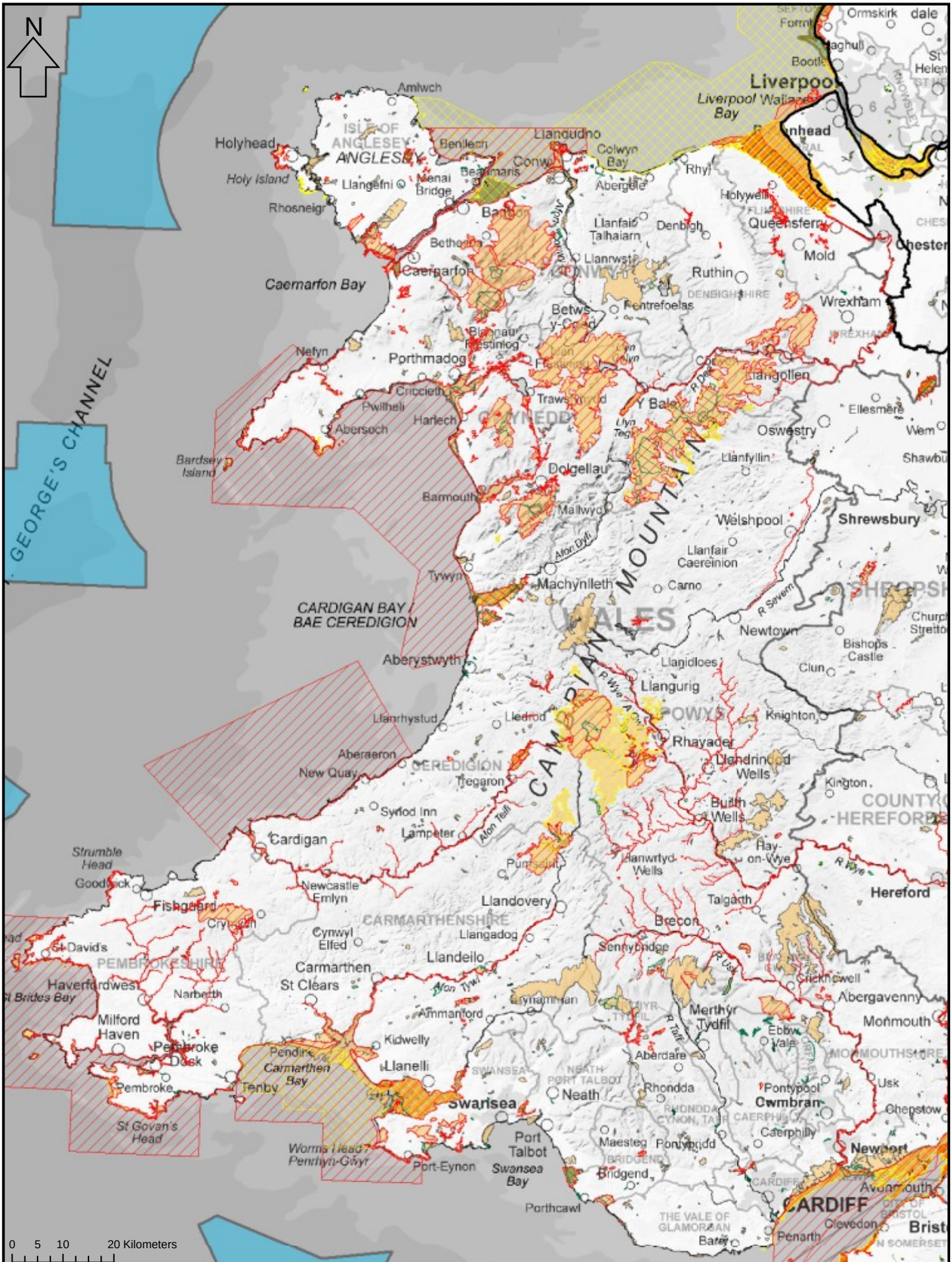
SEA of United Utilities Drought Plan 2017:

Environmental Report

Figure Title:

Designated Sites

Figure 2.1



- United Utilities Water Resource Zones
- Marine Conservation Zone
- Special Protection Area
- Special Area of Conservation (including single red lines)
- National Nature Reserve
- Site of Special Scientific Interest
- RAMSAR Site
- Local Nature Reserve

CASCADE

United Utilities

Project:
SEA of United Utilities Drought Plan 2017:

Environmental Report

Figure Title:
Designated Sites - Wales

Figure 2.2

The region has:

- 1 National Park, and parts of 2 other National Parks
- 445 Sites of Special Scientific Interest (SSSIs)
- 15 Ramsar Sites
- 16 Special Protection Areas (SPAs) (Natura 2000)
- 22 Special Areas of Conservation (SACs)
- 9 Marine Conservation Zones (MCZs)
- 31 National Nature Reserves (NNRs)
- 3 Areas of Outstanding Natural Beauty (AONBs)
- 135 Local Nature Reserves (LNRs)[16].

Information provided by the Natural England database indicates that an area of at least 21,300ha of freshwater, wetland and peatland habitat is designated in the North West, comprising over 100 SSSIs, with much of this area also designated as SPA, SAC and/or Ramsar Site. In Cumbria alone, there are 634km of SAC river systems, including within them approximately 2,500ha of component lakes. A total of 31 lakes and tarns in Cumbria are designated as open water SSSIs. In addition to these SSSIs designated specifically for their freshwater and wetland interest, there are numerous additional SSSIs and international sites with freshwater and wetland habitats present as an important component feature within the wider site.

The condition of habitats in the region has improved over recent years, and this is reflected in a gradual increase in woodland and farmland wild bird populations, one of the UK's key indicators for biodiversity. Improvements in inland and coastal water based habitats have also seen a noteworthy increase in numbers of otters, salmon and trout in some areas. However, the long term regional population trends for some of these species is still showing a general decline.

Across the country, the number of SSSIs identified as having a condition of 'favourable' or 'unfavourable recovering' is 95.77%[17]. The Biodiversity 2020 strategy[18] contains the UK Governments commitment to improving the condition of more SSSIs to favourable condition. There are a number of legislative instruments, including notably the European Union Habitats Directive and the UK's Restoring Sustainable Abstraction programme, which should contribute towards future improvements to the quality of habitats in the region.

[16] Natural England – www.naturalengland.org.uk
[17] Natural England SSSI Condition Summary (2016) – www.naturalengland.org.uk
[18] Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services.

To the west of UU's water supply area, the West Cheshire and North East Wales area contains some significant areas that are protected nationally or internationally. **Figure 2.2** shows designated conservation sites across Wales. This includes the Clwydian Range AONB, a 35km long chain of hills rising between the Vale of Clwyd to the west and the Dee Estuary to the east. The area also has 8 SACs, 4 SPAs and 3 Ramsar Sites including the Dee Estuary which is of particular importance for its total populations of internationally important wintering waterfowl and waders. As shown in **Figure 2.2**, there are several designated sites in the vicinity of the Lake Vyrnwy drought option, including Berwyn SPA and SSSI, the Berwyn and South Clwyd Mountains SAC and Y Berwyn NNR. The River Dee and Bala Lake SAC is also in the vicinity of several of UU's drought options (although no drought options include abstraction from the River Dee). The River Dee flows from Llyn Tegid and is important for a range of species and habitats including migratory fish, particularly salmon, and three species of lamprey. The Dee is also important for its population of otters, which live and breed in the river and tributaries throughout the catchment, and for bullhead which are widespread throughout the river system.

There has been a dramatic increase in the number of non-native species arriving in Britain over recent decades, as well as in the numbers of invasive species being established[19]. There are approximately 2000 non-native species establish in Britain, with the majority in the terrestrial environment and smaller numbers in marine and freshwater environments. Non-native species cause significant adverse impacts, including out- competing native species and spreading disease[20]. The UK Government 2015 strategy on invasive non-native species builds on previous strategies to provide a framework for coordination action to prevent spread and work to eradicate species across the UK.

Future Baseline

Current trends in data have shown that the condition of SSSIs in the region has increased over the recent years with 95.77% being in favourable or unfavourable recovering condition. Considerable effort is being made to ensure condition of SSSIs improve and condition assessments are undertaken regularly, as such, the condition of SSSIs in the region is likely to continue to improve.

Trend data has also shown that incidents of otters are showing a gradual positive increase in numbers in recent years and this trend is expected to continue[21,22]. Salmon and eel stocks in the North West and North Wales have shown a decline over recent

[19] Defra (2012) Non-Native Species in Great Britain: establishment, detection and reporting to inform effective decision making.
20 Defra (2015) The Great Britain Invasive Non-native Species Strategy
[21] Environment Agency, *North West Environment Summary*
[22] Environment Agency, *North West Regional Contribution 2010-2015 Evidence Pack*

years, in common with a wider national trend[23,24,25]. The Environment Agency has prepared Eel Management Plans for every river catchment in England, which set out actions to halt and reverse the decline in the European eel stock.

Wild bird species indicators have shown an increase in the incidence of farmland and woodland bird species in the region. However, this is in contrast to national trends and as such, possible future trends for the region are difficult to predict or determine.

Key Issues

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

- The need to protect, maintain or enhance biodiversity, ecological functions and biodiversity connectivity within UU's supply and source areas, particularly protected sites designated for nature conservation.
- The need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species in the region.
- The need to maintain and enhance biodiversity connectivity and adaptability to climate change effects.

2.3.5 Population and Human Health

Baseline

Population

In 2014, the North West had a population of 7.1 million[26]. Until the early part of the 21st century, the total population was relatively stable, although declining in the Merseyside area. However, estimates show that the population is increasing, with an annual growth rate of 0.49% and it is projected to reach 7.65 million by 2037, an increase of 7.9% from 2012[27].

The majority of its residents live in urban areas, with approximately 60% of them in the two cities of Liverpool and Manchester. Population densities vary greatly: Manchester has the highest population density in the region with 4,448 people per square kilometre, followed by Liverpool and Blackpool with 4,209 and 4,057 respectively. In contrast, the district of Eden in Cumbria has the lowest population density in England

[23] Cefas (2015) *Salmon Stocks and Fisheries in England and Wales, 2014*
[24] Defra (2010), *Eel Management Plans for the United Kingdom: Dee River Basin District*
[25] Defra (2010), *Eel Management Plans for the United Kingdom: Northwest River Basin District*
[26] Office for National Statistics (2015) *Overview of the UK Population 2014*
[27] Office for National Statistics (2014) *2012-based Population Projections,* Available at http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2014-05-29

with 25 people per square kilometre[28]. Household growth projections show that the number of households in the region is likely to increase from 2.93 million in 2008 to 3.47 million in 2033, an increase of approximately 18%[29].

The population and household figures also reflect the predicted fall in average household size, from 2.3 people in 2008, to 2.11 people in 2033. This is due to a large growth of one-person households (an anticipated increase of 43.7% between 2008 and 2033), and a reduction in married couple households (a reduction of 11% between 2004 and 2029), and reflects national trends. .

Economy and Employment

The North West region has a large and diverse economy, and different areas within the region are facing different challenges. The North West's share of total UK gross value added (GVA) declined from 10.1% in 2001 to 9.4% in 2011[30].

The economic performance of sub-regional areas does vary significantly. The growth of areas such as Liverpool and Manchester has been good, and the general economic performance of other areas such as Cheshire and Lancashire has also been reasonable on the regional level. However, there does continue to be a degree of variation in economic performance within these sub-regions. Cumbria remains the poorest performing sub-region, particularly in areas such as Carlisle and Barrow-in-Furness which have suffered due to the loss of some of the manufacturing base and agriculture.

Gross value added is an indicator that has been developed to measure the contribution to the economy of individual firms, industries or sectors in the United Kingdom. The gross value added for the North West was £149,869 billion in 2014, which is approximately £21,011 per person[31]. This is 18.7% below the UK national average of £24,958 per person.

The median gross weekly earnings for residents of the North West is £394.5/week, which is below the national median of £417.99/week[32]. The unemployment rate in the region was below the national average in 2015 at 4.9% (national average 5.1 %)[33]. This rate has dropped from 8.2% in 2013.

[28] Office for National Statistics (2016) *Neighbourhood Statistics,* Available at www.neighbourhood.statistics.gov.uk
[29] Office for National Statistics (2014) *2012-based Population Projections,* Available at http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2014-05-29
[30] Office for National Statistics (2013) Regional Profile of the North-West Economy
[31] Office for National Statistics (2015) *Regional, Sub-Regional and local gross value added 2014*
[32] Office for National Statistics (*2016) Median gross weekly earnings by workplace, UK, April 1997-2015*
[33] Office for National Statistics (2016) *Local Area Labour Markets: Statistical Indicators February 2016*

Education and Skills

The levels of qualifications in the region are reasonably representative of England and Wales (**Table 2.3**). A slightly higher than average percentage of people have qualifications equivalent to GCSE Grades A-C or above, although the proportion of people with degree level qualifications is slightly below the average, and those with no qualifications is above. Reducing the number of working-age people without qualifications is a target in Regional Economic Strategy, so that these levels should reduce in the future.

Table 2.3 Level of qualifications

Qualifications (economically active population of working age)	North West	England and Wales
Degree or equivalent and above (NVQ 4 equivalent and above)	30.9%	35.8%
Higher education below degree level (NVQ3 equivalent)	17.9%	17.2%
GCSE A level or equivalent (NVQ2 equivalent)	18.7%	16.6%
GCSE grades A-C or equivalent (NVQ1 equivalent)	12.1%	11.7%
Other qualifications	6.0%	6.2%
No qualifications	10.6%	9.0%

Source: National Statistics, Annual Population Survey Dec 2014

The performance of school pupils in the region has been improving consistently in recent years[34]. The performance of pupils at Key Stage 1 is consistent with the national average. In 2015, the percentage of pupils achieving level 4 or above in reading, writing and mathematics at Key Stage 2 was slightly higher than the national average (81% in the North West compared to 80% nationally). At GCSE levels, the percentage of pupils achieving five A*-G grades in the North West was 93.8%, compared with 91% nationally.

Health and Deprivation

The health of the region is relatively poor compared to other regions and the national average. Census data from 2011 shows 79.3% of people in the region claimed to be in 'very good health' or 'good health', compared to a national average of 81.2%. In the same responses, 5.3% stated their health was 'bad', compared to a national average of 4.3%[35]. This is also reflected in activity rates, with only 33% of the population participating in 30 minutes of moderate activity 5 times a week[36]. The main urban conurbations in Merseyside, Manchester and Lancashire contained the highest

[34] Department for Education (2015) Statistical collections.
[35] Office for National Statistics (2013), General Health I England and Wales: 2011 and comparison with 2001
[36] Sport England (2004) *North West Plan for Sports and Physical Activity*

proportion of people stating that their health was 'not good', with the lowest proportion in southern Cumbria.

The Office of National Statistics compiled the 'Indices of Multiple Deprivation' in 2015, which score and rank local authorities and smaller 'Super Output Areas' according to their performance against seven distinct categories of deprivation. The indices show that there are some significant pockets of deprivation in all of the counties and districts in the region, with particularly large concentrations in and around the urban conurbations of Knowsley, Liverpool, Manchester and Blackpool.

Recreation and Tourism

The North West offers a variety of opportunities for recreation and tourism, from the cultural offerings of the major cities to recreation in the region's National Parks and AONBs. Tourism also generates value for the region's economy, with tourist numbers in Cumbria as a whole at 41.5 million in 2014, spending just over £2.44 billion[37]. The region's tourism strategy[38] notes that tourism relies on the quality of public spaces, transport and links, the built environment, and cultural activity, and that these also benefit other visitors, recreational users, and local communities. The Environment Agency has also prepared a strategy for water based recreation in the North West[39]. The report identifies priorities and initiatives which will help to address gaps in information or activity provision in the North West.

UU contributes to the recreational and tourism assets of the region through its ownership and management of land and water bodies, and through the impact of its activities on the wider natural environment. The company owns over 58,000 hectares of land, the majority of which is open to the public for recreational use. There are also specific opportunities for angling, water sports activities, walking and cycling trails as well as educational centres on nature reserves, reservoirs, and other land. These activities contribute towards the health and quality of life of the residents and visitors of the region.

Future Baseline

The population demographics of the region are likely to continue to change, particularly with an increasing ageing population. Increased investment and economic development in the region may reduce outward migration in the long-term and therefore the population of the region is set to increase in line with national trends.

According to the latest published reports, the region has seen the largest decrease in

[37] https://www.cumbriatourism.org/what-we-do/research/economic-impact-of-tourism/ [Accessed 19 February 2016]]
[38] Northwest Regional Development Agency (2003, revised March 2007), *Strategy for Tourism in England's North West 2003-2010*
[39] Environment Agency (2010), *Blue Horizons 2010-2015*

the number of homeless households since 1998, and this trend is expected to continue. In 2013/2014, 24,543 households in the North West were reported as homeless[40]. It is also expected that house prices will continue to rise in line with national trends (according to the latest published reports).

Employment levels have gradually increased since 1992. Recent statistics have shown the region has seen a decrease in the unemployment rates and it is expected that this trend will continue.

Key Issues

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

- The need to ensure sufficient infrastructure to ensure the gradually rising population does not have a negative impact upon the provision of educational, health and other essential service provision.
- The need to ensure continued improvements in levels of health across the region, particularly in urban areas.
- The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for tourists and local residents, including opportunities for formal and informal recreation.
- To safeguard the economic performance of the area, including operations of other water abstractors.
- The need to reduce outward migration, and attract investment to the region to raise employment and levels of income. This is particularly important in Merseyside, but also other key towns in Lancashire and Manchester.

The implications of a changing population on material assets and resource use, including water resources, are considered in Section 2.3.6 below.

2.3.6 Material Assets and Resource Use

Baseline

In 2012/13, UU supplied about 1,715 million litres per day (Ml/d). Of this, around 70% was abstracted from the North West of England region, with the remainder transferred from mid and North East Wales[41]. Just under half of all water is used by households,

[40] DCLG (2014) Homeless Statistics, table 770. https://www.gov.uk/government/statistical-data-sets/live-tables-on-homelessness
[41] United Utilities (2008) *Strategic Environmental Assessment of United Utilities Draft Water Resources Management Plan*. Prepared by Entec, February 2008.

with around a quarter used by businesses and a quarter lost through leakage. The quantity of water for public supply has reduced from approximately 2,500Ml/d in 1994/5 as a result of a major leakage reduction programme and a continuing fall in use by industry. Use of water per person is low in comparison to many other regions, with an average use of 128 litres/person/day in 2012/13 compared to a Government target of 130 litres/person/day by 2030[42]. UU's Final WRMP 2015 shows household consumption for a normal year reducing to a predicted 110 litres/person/day by 2039/40.

As well as public water supply, some water users abstract water directly, without treatment by water companies. The data in **Table 2.4** shows that only half of all water abstracted in the North West is accounted for by public water supply, with nearly 19% used in power stations and 28% used in other ways.

Table 2.4 Water use

Purpose of abstractions from non-tidal surface waters and ground waters (2014)	Million cubic meters North West	Million cubic litres England and Wales
Public water supply	458	4075
Agriculture (including spray irrigation)	0	54
Electricity supply industry	650	5328
Other industry	173	788
Fish farming, cress growing, amenity ponds	8	832
Private water supply	0	1
Other	1	9

Resource Use and Waste

The North West is a major producer and consumer of energy. Total energy consumption in the region was 14 million tonnes of oil equivalent (mtoe) (about 11% of the total UK figure), and it is expected that this will continue to increase in the future[43]. **Table 2.5** shows that the proportional use of total energy in the region used for industry, commercial uses and transport is slightly above the UK average, whilst domestic energy use is lower than average. Energy consumption by type is fairly representative of national trends, with most energy coming from natural gas (42.3%) and petroleum (39.9%).

Table 2.5 North West energy demand by sector (2009)

Energy demand by sector	North West	UK
Industry and Commercial	38.95%	37.18%
Domestic	33.70%	33.33%
Transport	26.3%6	27.12%

Source: DTI, Regional Energy Consumption Statistics 2009

[42] Defra (2008) *Future Water; the Governments Water Strategy for England*. February 2008.
[43] Department of Energy & Climate Change (2015) Sub-national total final energy consumption statistics: 2013 statistics

During 2014/15 3.47 million tonnes of waste (from all sources) was produced in the North West[44], which comprises 13.5% of England's total waste.

Defra figures from 2015[45] show the total amount of household waste collected by local authorities has remained largely static between 2010 and 2015 at approximately 410-425kg per person per year. The figures also show that the recycling rate across the region has risen significantly from 7.4% in 2000/1 to 46.5% in 2014/15 and the amount of municipal waste sent to landfill has fallen from 90% to 31.8% over the same period.

The process of water abstraction, treatment and distribution also consumes a significant amount of resources. This includes direct use of resources such as chemicals to control water quality, and indirect use through the requirement for energy for pumping and treatment.

Housing

In 2009, there were 3.1 million dwellings in the North West, which represents 14% of England's housing stock[46]. The Regional Spatial Strategy[47] sets out a projected average annual increase to 2021 of 22,844 dwellings, net of replacing buildings that have been cleared. The increases focus on providing sufficient dwellings to meet local need as well as allowing for economic growth and regeneration, particularly in the urban areas.

The quality of the housing stock is slightly below national averages, with 164,000 (5.4%) households classified as 'unfit', slightly above the national average of 4.4%. The tenure of dwellings in the North West is divided as shown in **Table 2.6**. This shows a slightly above average level of residences leased from a Registered Social Landlord, and a slightly lower than average amount of owner occupied and privately rented residences.

Table 2.6 Dwellings in the North West by tenure (2007)

Dwellings by tenure	
Local Authority	17%
Registered Social Landlord	12%
Owner Occupied and Private Rented	71%

Source: Northwest Regional Development Agency (2010) *Environment Evidence Base RS2010*,

Future Baseline

Energy demand in the region has increased significantly in recent years and is expected to continue to rise in the future. The Government has committed to meeting a target of

[44] Defra (2015) Management of Local Authority Collected Waste 2000/01 to 2014/15
[45] Defra (2012) Local Authority collected waste statistics – England 2010-2015
[46] Office for National Statistics (2011) Portrait of the North West
[47] Government Office for the North West(2008), *The North West of England Plan Regional Spatial Strategy to 2021*

15% of the UK's energy demand from renewable sources by 2020[48].

Increased kerbside collection schemes are helping, and will continue to improve recycling rates across the region.

There are many factors that are to be considered when predicting future water demand. The Environment Agency forecasts show that there could be a rise or fall in water demand over the next 25 years. Demand could increase by as much as 33% or conversely decrease by 30% relative to current levels[49]. UU's Draft WRMP 2013 shows household consumption for a normal year reducing to a predicted 110 litres/person/day by 2039/40. In 2012/13 actual household consumption was 128 litres/person/day. Targets set out in the Government's "Future Water" Strategy state that the vision for 2030 is to reduce water use to 120-130 litres per person per day50.

As described in Section 1.3.2, leakage control is a key priority of UU's WRMP and Drought Plan. Leakage detection and repair activities will be enhanced during a period of severe water shortage, as set out in the Drought Plan. The predicted future baseline for leakage control is outlined in the WRMP, with UU planning to maintain leakage at its sustainable economic level of 462.7Ml/d from 2015 to 2040.

Key Issues

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

- The need to reduce the total amount of water resource used in the region both by managing demand and addressing leakage issues.
- The need for efficient water resource management and to ensure water supply for homes and industry in the region is maintained.
- The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill;
- The need to reduce overall energy consumption and encourage energy efficiency, particularly energy used for transport and domestic use.

[48] DECC (2012) UK Renewable energy roadmap: Update
[49] Environment Agency (2001), *Water Resources for the Future - Northwest*
[50] Defra (2008) *Future Water; the Governments Water Strategy for England*. February 2008.

2.3.7 Water

Baseline

Rivers, Lakes, Groundwater and Flooding

UU sources water from both England and Wales. Lake Vyrnwy is the only drought option in Wales in UU's Revised Draft Drought Plan 2017. There are no drought options which directly use the River Dee within UU's Drought Plan, although it is acknowledged that a number of groundwater drought options are located in England within or in the vicinity of the River Dee catchment which straddles the border of England and Wales. Although it is acknowledged that other sites within Wales are utilised by UU, the SEA Environmental Report focuses on the Drought Plan and the drought options contained therein. As such, the issue of UU's wider operations in Wales is considered a water resources issue and not an issue for drought planning specifically.

The North West of England region has many lakes, particularly in Cumbria, which provide a valuable source of freshwater for agricultural, domestic and industrial uses. They also provide amenity value and opportunities for water sports recreation including boating and angling. The region's lakes, rivers and other freshwater-dependent habitats are of importance for biodiversity and many of these habitats are internationally or nationally designated sites for nature conservation. Around 85% of the region's water supply is abstracted from rivers or collected and stored in upland reservoirs[51] (UU's water supply system is described in Section 1.3, and water use summarised in Section 2.3.6). Groundwater provides about 15 per cent of public water supply in north-west England and is particularly valuable during times of surface water shortages and as such is a valuable resource in the North West[52]. We are awaiting information from the Environment Agency to allow risk deterioration of the groundwater bodies to be assessed within the region.

In 2014, 1.3 billion m^3 of water were abstracted from non-tidal surface waters and ground waters in the North West Environment Agency Region per day[53].

Water abstraction may impact hydrologically sensitive nationally and internationally designated sites and/or influence wider biodiversity. Water abstraction may also impact landscape and visual amenity of landscapes, including those designated as AONBs or as part of National Parks.

Lake Vyrnwy, the River Dee, and other freshwater-dependent habitats in North East Wales are of importance for biodiversity and it is noted that many of these habitats are

[51] Defra, *North West England Rural Development Plan*
[52] British Geological Survey (2010), www.bgs.ac.uk/research/highlights/NWenglandDrought
[53] Defra (2016) *Estimated abstractions from non tidal surface waters by purpose and Environment Agency/NRW charge region: 2000 to 2014*

internationally or nationally designated sites for nature conservation.

The high proportion of upland landscape in the region means many of the rivers and streams in the North West of England are short and steep and often flow over impermeable rock, which results in large variations in flow especially during periods of heavy rain. In 2010 the Environment Agency identified that around 159,000 homes and 14,000 commercial properties are at risk of flooding in the North West region, although many of these are already protected by flood defences. . In 2008-2009, the Environment Agency spent approximately £427 million on building, improving and keeping flood defences such as managed river channels, walls and raised embankments, flood barriers and pumps in good condition, which reduced the risk of flooding to over 176,000 households across England. The Government further recognised the importance of investing in flood risk and coastal management and committed to increase public spending on it from £600 million in 2007-2008 to £800 million in 2010-2011. Climate change may have a significant effect upon future flood risk in the region.

The Environment Agency Wales report that in 2008 there were 220,000 properties at risk of flooding from rivers and the sea in Wales[54]. The study also reported that over 80% of water and sewage pumping stations/treatment works in Wales are in flood risk areas, with 67% at significant risk.

Water Quality

The quality of river waters in the region has improved in recent years, and this is noteworthy in rivers such as the Mersey which are now able to support fish stocks along its entire length for the first time in a number of years. The ecological standard of rivers, according to the Environment Agency classification status published in River Basin Management Plans (2015)[55], is shown in **Table 2.7**, which shows that overall ecological status for the north west region is above national averages and comparative to other river basin districts.

Table 2.7 Overall Ecological Status of Surface Waterbodies (2015)

River water quality	North West	England	Dee River Basin District	Severn River Basin District
Rivers classified as 'Good' or 'High'	21.7%	18.2%	26.9%	20%
Rivers classified as 'Moderate', 'Poor' or 'Bad'	78.3%	81.8%	73.1%	80%

The Environment Agency's 2015 River Basin Management Plan for the North West river basin district identifies several challenges to continued improvement in water

[54] Environment Agency (2009), Flooding in Wales: a National Assessment of Flood Risk.
[55] Environment Agency (2016) River Basin Management Plans- Cycle 2

quality across the region. These include:

- physical modifications;
- pollution form waste water;
- pollution from towns and cities;
- changes to the natural flow and level of water;
- pollution from rural areas;
- pollution from abandoned mines.

2014 mandatory results for bathing waters in the UK are presented in **Table 2.8** below.

Table 2.8 2014 Mandatory compliance results for bathing waters in the UK

Bathing Waters in the UK	North West			England			Wales		
	Pass	Fail	Compliance	Pass	Fail	Compliance	Pass	Fail	Compliance
Coastal Bathing Waters	27	0	100%	403	2	99.5%	101	0	100%
Inland Bathing Waters	3	0	100%	11	0	100%	-	-	-

Future Baseline

The quality of water in rivers and seas in the region has been gradually improving over recent years. With current targets and measures in place, this trend is expected to continue. However, climate change is expected to have a significant effect on flood risk in the region. The climate in the North West of England and North East Wales is set to get warmer during the summer and wetter during the winter with periods of more intense weather events. This will increase the risk of storms and flooding. Climate change may also result in the alterations to the frequency and duration of drought events. Increases in the frequency and duration of drought events could have knock-on effects on biodiversity, both directly and through cumulative impacts such as, for example, reduced dilution in areas of poor water quality.

Key Issues

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

- The need to further improve the quality of the regions river, estuarine and coastal water quality, particularly the biological quality of rivers.
- The need to avoid adverse impact on surface water levels and flows.
- The need to ensure the quality of still waters is maintained or improved.
- The need to maintain the quantity and quality of groundwater resources.
- The need to ensure the continued risk of flooding is mitigated effectively.

2.3.8 Soil, Geology and Land Use

Baseline

There is a great diversity in the composition of the geology across the region. The majority of the lowland Cheshire plains, Merseyside and western Lancashire are dominated by Triassic mudstone and sandstone. The uplands of Cumbria are partly made up of volcanic igneous rock from the Devonian period. Moving eastwards towards the Yorkshire Dales, the geology becomes dominated by distinctive carboniferous limestone, and south into Lancashire millstone grit and coal becomes abundant. The north eastern area of Wales is also made up of significant areas of carboniferous limestone. The River Dee catchment area consists of ancient Pre-Cambrian metamorphosed sediments of the Moine series and, to the west, the Dalradian series brings mixed acid-basic soils with some limestone. The variety of underlying geology in the region is reflected in the region's soils, the agricultural value of which varies across the region.

Grassland is the predominant use of agricultural land in the region with the majority being permanent pasture more than 5 years old. Arable farming is confined mostly to the Lancashire Plain and Mersey Basin. Livestock farming is the major agricultural use of the uplands of the region and involves extensive grazing of semi-natural vegetation. The Agricultural Land Classification System developed by Defra provides a method for assessing the quality of farmland, principally for the use in planning. The system divides the quality of land into five categories as well as non-agricultural and urban; the regional data is summarised in **Table 2.9** and is shown on **Figure 2.3**. The 'best and most versatile land' is generally defined as the agricultural land which falls into Grades 1, 2 and 3a. The quality of the agricultural land in the region is significantly below the national average, with 44.7% of land being classed as 'Poor' or 'Very Poor', compared to a national average of 22.5%. This reflects the large proportion of upland area which generally has low agricultural quality due to exposure and poor soil cover. There is also an above average proportion of urban land.

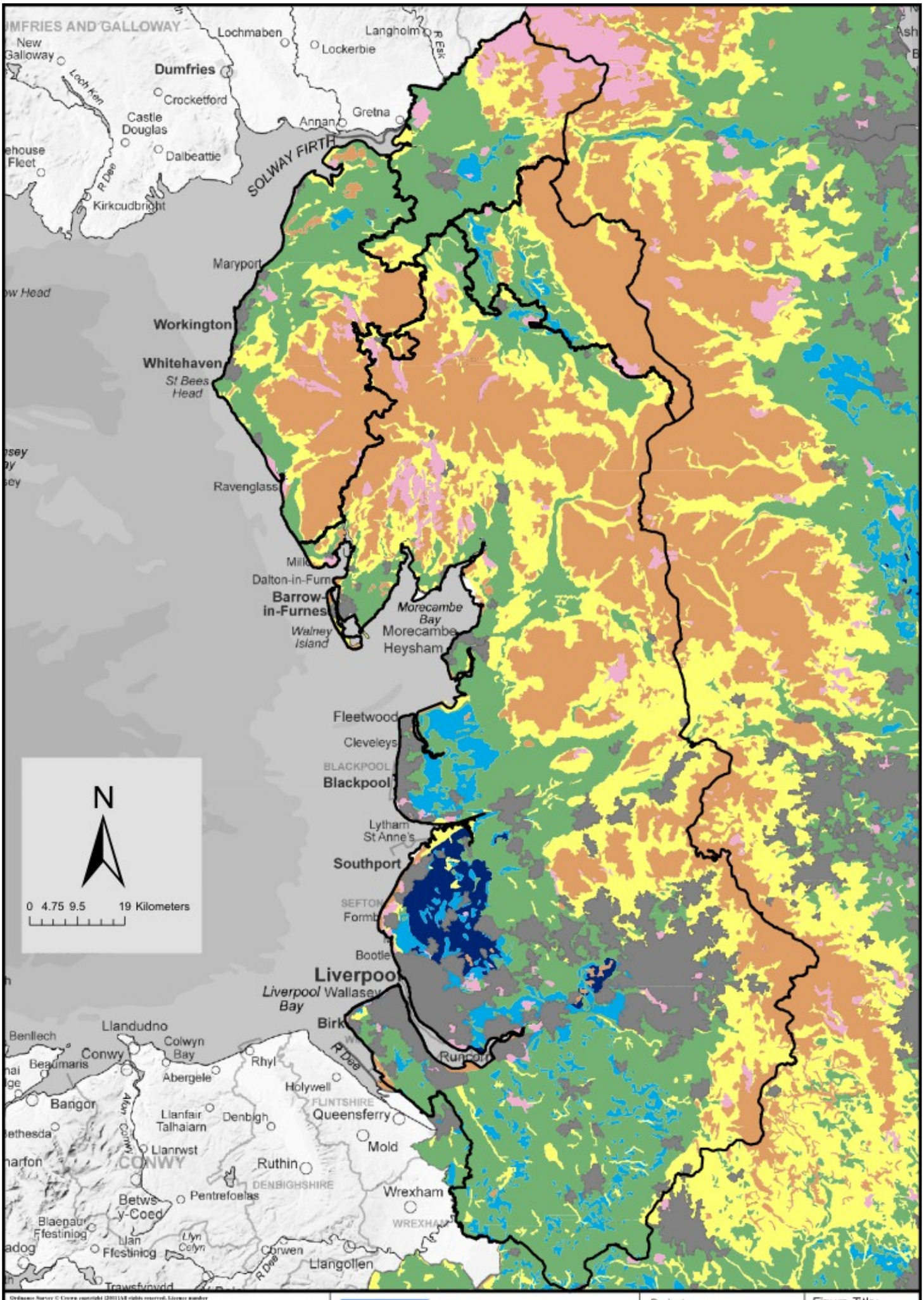

DUMFRIES AND GALLOWAY
New Galloway
Loch Ken
Dumfries
Crocketford
Castle Douglas
Dalbeattie
Kirkcudbright
R Dee
Lochmaben
Lockerbie
Langholm
R Esk
Annan
Gretna
SOLWAY FIRTH
Maryport
Workington
Whitehaven
St Bees Head
Ravenglass
Millom
Dalton-in-Furness
Barrow-in-Furness
Walney Island
Morecambe Bay
Morecambe
Heysham
Fleetwood
Cleveleys
BLACKPOOL
Blackpool
Lytham St Anne's
Southport
SEFTON
Formby
Bootle
Liverpool
Liverpool Bay
Wallasey
Birkenhead
Runcorn
R Dee
Holywell
FLINTSHIRE
Queensferry
Mold
Wrexham
WREXHAM
Rhyl
Abergele
Colwyn Bay
Llandudno
Conwy
Benllech
Beaumaris
Bangor
Llanfair Talhaiarn
Denbigh
Llannwst
CONWY
Ruthin
DENBIGHSHIRE
Pentrefoelas
Betws y Coed
Blaenau Ffestiniog
Llan Ffestiniog
Llyn Celyn
Corwen
Llangollen
Trawsfynydd
N
0 4.75 9.5 19 Kilometers
United Utilities Water Resource Zone
Grade 1 (Excellent)
Grade 2
Grade 3
Grade 4
Grade 5 (V.Poor)
Non-urban
Urban
CASCADE
United Utilities
Project:
SEA of United Utilities Drought Plan 2017:
Environmental Report
Figure Title:
Agricultural Land Classifications
Figure 2.3

Table 2.9 Agricultural land classification

Agricultural Land Grade (2005 data)	North West	England
Grade 1 – Excellent	2.1%	2.7%
Grade 2 – Very Good	5.2%	14.2%
Grade 3 – Good / Moderate	34.0%	48.2%
Grade 4 – Poor	19.5%	14.1%
Grade 5 – Very Poor	25.2%	8.4%
Non agricultural	3.5%	5.0%
Urban	10.5%	7.3%

The regional and national statistics were produced prior to Grade 3 being divided into 2 sub-categories – so only figures for Grade 3 are available.
(Statistics source: http://www.defra.gov.uk/rds/lgmt/docs/ALC-Stats071105.pdf)

The region contains a high proportion of land protected for its national importance. In 2008, 18% of the region was designated as National Park (largely comprising the Lake District), and 11% of the region was designated as an AONB[56]. However, in the same year, over 18% of the region's total area was classified as 'derelict, underused or neglected', the largest proportion in England. The region has a generally lower than average tree coverage at approximately 6% of the total land area, but does have the largest area of community forest in England comprising the Mersey and Red Rose Forests.

Future Baseline

The Environment Agency has been researching and developing methods to improve water efficiency in agricultural practices in order to help reduce water consumption.

There are a number of Environmentally Sensitive Areas (ESAs) in the region including the Lake District and parts of the North Peak, the South West Peak and the Pennine Dales. The ESA Scheme is designed to protect and enhance the environment by offering payments to landowners and occupiers in these areas to adopt environmentally beneficial agricultural practices[57]. The scheme has now been superseded by the Environmental Stewardship Scheme. Continued development of this scheme is expected to see an improvement in land use in the future.

Key Issues

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

[56] Natural England (2008), *State of the Natural Environment in the North West.*
[57] Defra (2005), "*Rural Development Programme for England"*

- The need to sustainably manage and/or improve the quality of agricultural land in the region.
- The need to make use of previously developed land in urban areas, and to reduce the prevalence of derelict land in the region.
- The need to protect the natural beauty of the region's national parks and areas of natural beauty, and encourage the considerate growth of native woodland and forest in the region.
- The need to protect, maintain and enhance soil function and health.

2.3.9 Air and Climate

Baseline

Data for the UK has shown that net CO_2 emissions have been steadily reducing since 2001 from 561 to 422 (million tonnes)[58]. Air quality in the North West has improved in recent years, with emissions from industrial sites and processes being controlled effectively. There are eight key industrial pollutants which are monitored on regulated premises. Of these, seven have shown some significant reductions and only carbon monoxide levels have increased. The region's air quality is now most significantly affected by the increasing amount of traffic. Traffic has increased by 7.4% in the last 10 years[59], which causes some local air pollution issues, particularly in urban areas and at peak times. In Wales, CO_2 emissions have reduced slightly from 33 million tonnes in 2005 to 29.6 million tonnes in 2013[60]. However in Powys, the local authority area surrounding Lake Vyrnwy, there has been an 8.4% per capita reduction in CO_2 emissions since 2005[61].

The effects of climate change are potentially some of the most significant environmental problems facing the region. These effects could include increased variability in precipitation and droughts, increased sea levels and a higher risk of flooding in the future.

The key contributors to climate change are greenhouse gases such as carbon dioxide. During 2013 an estimated 40,000 ktonnes carbon dioxide[62] was emitted in the North West, of which 42% came from industrial and commercial premises, 37% from domestic sources and 21% from road transport.

[58] DECC (2015) *2014 UK Greenhouse Gas Emissions, Provisional Figures*
[59] Department for Transport Statistics (2015), *Motor vehicle traffic (vehicle kilometres) by road class and region and country in Great Britain, annual from 1993*
[60] DECC (2015) "*Local Authority CO_2 Emissions Estimates 2013*"
[61] DECC (2015) *"2013 Local Authority Carbon Dioxide Figures"*
[62] DECC (2015) *2005 to 2013 UK local and regional CO2 emissions full dataset*

Future Baseline

The climate in the North West is set to get warmer during the summer and wetter during the winter with periods of more intense weather events. Environment Agency predictions[63] state that by 2080, average temperatures may increase by 4-5 degrees Celsius and there could be a 90% reduction in snowfall. Winter rainfall may increase by as much as 30% but in contrast, summer rainfall may decrease by 50% compared to current patterns. Sea levels could rise by 67cm and the extreme weather patterns experienced today could become the norm by 2080.

The Regional Economic Strategy has stated an aim to reduce carbon dioxide emissions per unit (£) of Gross Value Added.

Key Issues

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

- The need to continue to reduce air pollutant and greenhouse emissions arising from industrial processes.
- The need to reduce the use of the car, and to reduce localised air pollution and greenhouse gas emissions arising from transport.
- The need to take into account, and where possible mitigate for, the potential effects of climate change.
- The need to consider and assess potential future changes in surface water flows resulting from climate change.

2.3.10 Archaeology and Cultural Heritage

Baseline

The cultural and historic heritage of the region is largely dominated by its contribution towards the UK's industrial history, largely due to its wealth of natural resources and good connections via sea and inland waters to other areas of the UK and other countries. The majority of the region's ancient historical and archaeological heritage occurs in the more rural areas, which contain important sites including those designated as part of the Frontiers of the Roman Empire UNESCO World Heritage Site. The Lake District has been included on the UK's submission to UNESCO for consideration as a World Heritage Site. The North East Wales area is particularly noted for its Iron Age hill forts, particularly along the Clwydian Range.

[63] Environment Agency (2006), *State of the Environment Report 2006*

The urban areas of the region however contain significant amounts of more recent historical heritage, particularly buildings dating from the Industrial Revolution. Liverpool's commercial centre and waterfront, and parts of Manchester and Salford are all candidates for nomination for World Heritage status. The heritage and cultural value of the region's diverse range of landscapes are also of importance.

Other baseline information of importance comprises paleoenvironmental deposits. These contain important records of past human activities as well as climate change. Most of this evidence is organic and only survives in favourable conditions. If water levels are reduced, e.g. through surface water abstraction, these delicate materials are highly susceptible to decay and destruction. Such baseline information is site specific and no general trends or regional spatial variability is available.

Future Baseline

There are no significant trends relating to archaeology or cultural heritage, therefore, predicting future changes is extremely difficult. The Rural Development Programme has identified that many of the region's cultural heritage sites are endangered and there are particular concerns regarding buildings on upland sites.

Key Issues

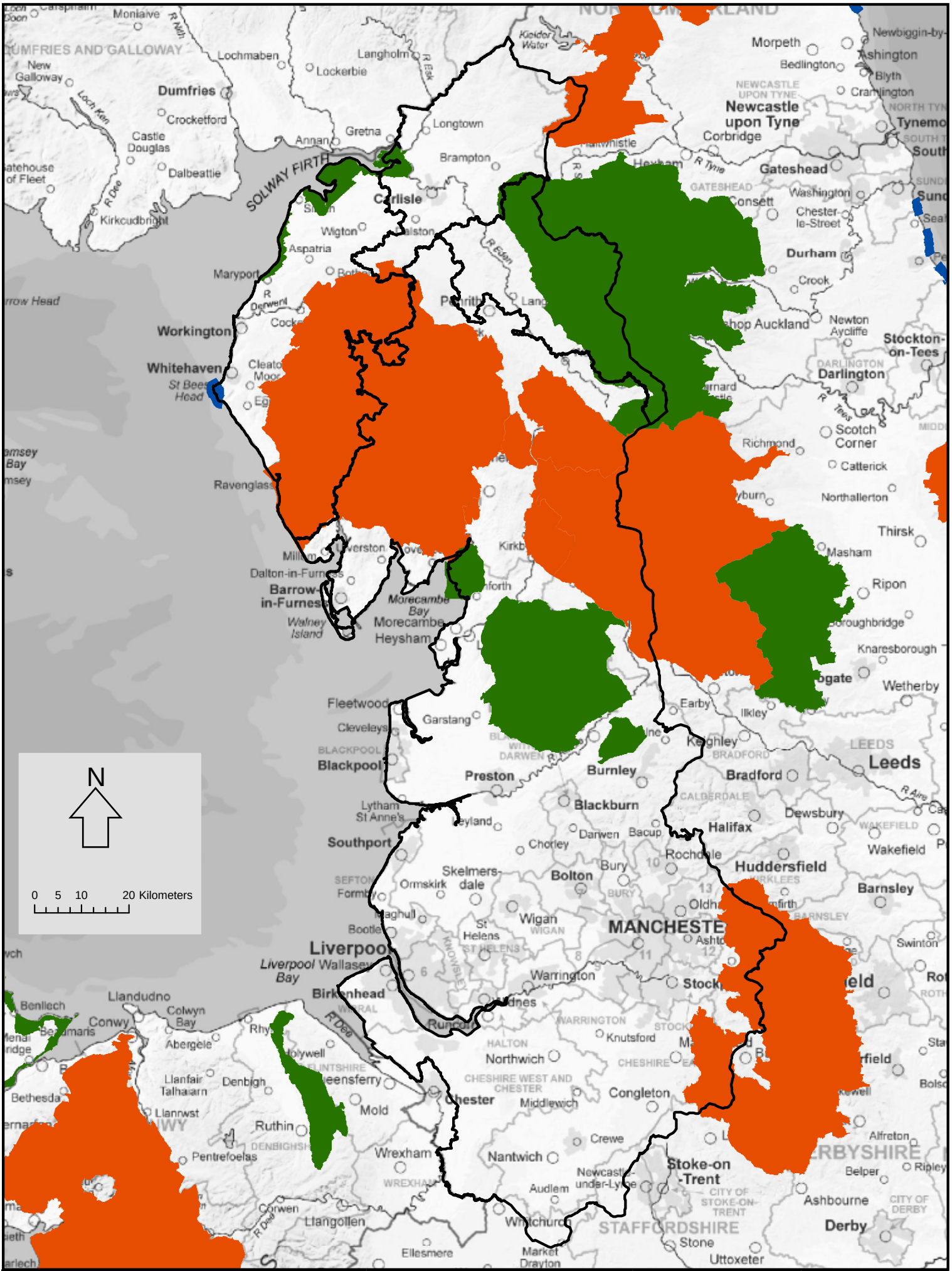
The key sustainability issue arising from the baseline assessment for archaeology and cultural heritage is:

- The need to protect or enhance sites of archaeological importance and cultural heritage interest, taking into account the different types of cultural heritage that occur in rural and urban areas.

2.3.11 Landscape and Visual Amenity

Baseline

The landscape of the North West of England is some of the most diverse in the country, containing many distinct 'Landscape Character Area' types which have been defined by Natural England. Although the region is generally low lying, it also contains some of the most striking upland landscapes in England, particularly within the Lake District National Park. The coastal landscape in the North West contains remnants of the region's industrial history, in particular the Liverpool and Merseyside docklands, as well as having protected areas of Heritage Coastline around St Bee's Head. National Parks and AONBs are shown in **Figure 2.4**.



United Utilities Water Resource Zones
Area of Outstanding Natural Beauty
Heritage Coast
National Parks

CASCADE

United Utilities

Project:
SEA of United Utilites' Drought Plan 2017:

Environmental Report

Figure Title:
Landscape Character Designations

Figure 2.4

The region contains the Lake District National Park in Cumbria, which is a striking combination of upland fells, complex river systems and lakes and contains a large variety of species and habitats. Two other National Parks also fall partly within the region – the Yorkshire Dales and the Peak District. The region has three AONBs which lie wholly or mainly in the region (Solway Coast, Arnside and Silverdale, Forest of Bowland). The North Pennines AONB also straddles Cumbria's eastern border.

The region has been mapped for tranquillity levels as part of a national project carried out by the Campaign to Protect Rural England[64]. Natural England have also developed national indicators of how the countryside is changing, to understand how and where that change occurred, which is referred to as the Countryside Quality Counts project[65].

There are 96,171 hectares of forest in the North West, representing 6.8% of the region's total area. The majority of the forest in the region comprises broadleaved woodland (43.7% of the total) and coniferous woodland (36.7% of the total)[66]. There are also some significant areas of semi-natural and relict ancient woodland, particularly in Cumbria and the Mersey and Red Rose forests comprise the largest area of community forest in the country.

Snowdonia National Park and the Clwydian Range AONB are the significant designated landscape sites within the region of Lake Vyrnwy and the River Dee.

Future Baseline

It is envisaged that landscape and designated sites will be maintained and enhanced for the enjoyment of the public.

Defra has set a number of future targets in order to see significant expansion and restoration of a number of priority woodland habitats. These include Upland Oak, Upland Mixed Ash, Wet Woods and Beech[67].

Key Issues

The key sustainability issue arising from the baseline assessment for landscape and visual amenity is:

- The need to protect and improve the natural beauty of the region's national parks, coastline, other areas of natural beauty, including undesignated landscapes and encourage the growth of woodland and forest in the region.

[64] http://www.cpre.org.uk/what-we-do/countryside/tranquil-places. Accessed on 13 February 2013,
[65] http://www.naturalengland.org.uk/ourwork/landscape/englands/character/cqc/default.aspx. Accessed on 13 February 2013.
[66] Forestry Commission, *National Inventory of the North West*
[67] Forestry Commission, *National Inventory of the North West*

2.3.12 Inter-relationships

It is noted that there are inter-relationships between SEA topics, for example, the potential impacts of changes to flow regime and water quality on ecology. Note that inter-relationships and synergistic effects within each SEA topic will be considered and discussed within the assessment for each topic.

Key Issues

The key sustainability issue arising is:

- The need to consider the inter-relationships between topics.

2.4 SUMMARY OF KEY ISSUES

A summary of the key issues identified by the policies, plans and programmes review (Section 2.2) and the baseline data review (Section 2.3) is presented in **Table 2.10**. These key issues have been used to develop draft SEA objectives in Section 3.

Table 2.10 Key sustainability issues arising from the baseline assessment

Topics	The key sustainability issues arising from the baseline assessment
Biodiversity, flora and fauna	• The need to conserve, maintain or enhance the natural environment and biodiversity, ecological functions and biodiversity connectivity within UU's supply and source areas, particularly protected sites designated for nature conservation. • The need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species in the region. • The need to prevent the spread of invasive species. • The need to consider adaptability to climate change effects. • The need to protection, conserve and enhance natural capital. Ecosystem services from natural capital contributes to the economy and therefore should also be protected. • The need to improve access to nature for people.
Population and human health	• To safeguard the economic performance of the area and promote a sustainable economy and thriving communities with good access to the services they need including a resilient water service and the infrastructure to provide water to support economic growth. To also take into account the needs of a changing population. To promote healthy communities and protect from risks to health and wellbeing. • The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for tourists and local residents, including opportunities for formal and informal recreation.

Topics	The key sustainability issues arising from the baseline assessment
Material assets and resource use	• The need to reduce the total amount of water resource used in the region both by managing demand and addressing leakage issues. • The need for sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the region is maintained. • The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill; • The need to contribute to a resource efficient, green and low carbon economy, reduce overall energy consumption and encourage energy efficiency, particularly energy used for transport and domestic use.
Water	• The need to protect and improve the quality of the regions river, estuarine and coastal water quality, particularly the biological quality of rivers including a need to achieve Good Environmental Status through increased efficiency and demand management of water, particularly in those areas where additional water resources may not be available. • The need to avoid adverse impact on surface water levels and flows. • The need to ensure the quality of still waters is maintained or improved. • The need to maintain the quantity and quality of groundwater resources. • The need to ensure the continued risk of flooding is mitigated effectively.
Soil, geology and land use	• The need to sustainably manage and/or improve the quality of agricultural land in the region. • The need to make use of previously developed land in urban areas, and to reduce the prevalence of derelict land in the region. • The need to protect the natural beauty of the regions national parks and areas of natural beauty, and encourage the considerate growth of native woodland and forest in the region. • The need to protect, maintain and enhance soil function and health. • The need to avoid coastal erosion.
Air and climate	• The need to continue to reduce air pollutant and greenhouse emissions arising from industrial processes. • The need to reduce the use of the car, and to reduce localised air pollution and greenhouse gas emissions arising from transport. • The need to take into account and where possible mitigate for the potential effects of climate change impacts on water supply and demand and therefore a need for adaptive measures. • The need to consider and assess potential future changes in surface water flows resulting from climate change.
Archaeology and cultural heritage	• The need to conserve and enhance the historic environment, statutory and non statutory heritage assets and their settings and historic landscapes/townscapes. • The need to consider effects on important wetland areas with potential for paleo-environmental deposits. • The need to protect archaeologically important sites.

Topics	The key sustainability issues arising from the baseline assessment
Landscape and visual amenity	• To protect and enhance the landscape for this and future generations (including designated landscapes, landscape character and the countryside) including the protection of the outstanding universal value (OUV) of features such as Hadrian's Wall World Heritage Site and the Lake District World Heritage Site candidate status. • The need to consider the effects of abstraction and low lake levels and river flows on the landscape. • The need to consider the cumulative effects on landscape features and character from a range of actions and developments.
Inter-relationships	• The need to consider the inter-relationships between topics.

3 METHODOLOGY

3.1 INTRODUCTION

This section describes the methodology that has been used to undertake the SEA of the drought options in UU's Revised Draft Drought Plan 2017.

What the SEA Regulations require:

According to Regulation 12:

(2) The report shall identify, describe and evaluate the likely significant effects on the environment of –
(a) implementing the plan or programme; and
(b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme

and according to Schedule 2, the Environmental Report should include:

6. The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects and secondary, cumulative and synergistic effects..

8. An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information.

3.2 ASSESSMENT METHODOLOGY AND SEA FRAMEWORK

The environmental assessments of the drought options have been 'objectives-led', the overall findings of which describe the extent to which these objectives have been met. 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 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 listed in Section 2.2).

An assessment framework of objectives has been developed based on:

- The current state of the environment in the UU's water supply area (see Section 2.3).
- The key environmental issues identified (see Section 2.3 and summarised in **Table 2.10**).

- The key policy messages and environmental protection objectives identified in the review of policies, and other plans and programmes (see Section 2.2).

It is important that the assessment takes these objectives into account as this will help it to highlight any area where the Drought Plan will help or hinder the achievement of the objectives of other plans.

SEA objectives are set out in **Table 3.1**. As well as the overall SEA objectives, a number of key questions have been developed for each SEA topic which have been used to inform whether the objectives have been met, or not. These key questions have prompted the assessment and ensured it considers all the relevant aspects. A draft list of SEA objectives was developed around these environmental themes and issues, and was included in the Scoping Report. The list and wording of the objectives was subsequently refined (see **Table 3.1**) following receipt of consultation comments on the Scoping Report from the Environment Agency, Natural England, Natural Resources Wales and English Heritage.

The following sections describe how SEA objectives have been used in the assessment of the environmental effects of the drought options.

The SEA objectives are intended to reflect changes that contribute to sustainability. By assessing each drought option against the objectives, it is more apparent where drought options might have a negative impact, and where options could be developed to reduce potential impacts.

Table 3.1 SEA objectives

SEA Topic	Objectives	Key Questions
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	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 minimise habitat fragmentation and protect connectivity? Will it provide opportunities for new habitat creation or restoration and link existing habitats? 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 ecosystems from natural capital? Will it improve access to nature for people? Will it increase the spread of invasive species?
Population and human health	To protect and improve health and well-being and reduce inequalities To protect and enhance opportunities for formal and informal recreation To promote a sustainable economy and thriving communities with good access to the services they need.	Will it help to ensure access to a resilient and secure supply of drinking water? Will it help to promote healthy communities and protect from risks to health and wellbeing? Will it protect or enhance opportunities for recreation?
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	Will it help to minimise the demand for water? Will it increase efficiency in water use? Will it minimise greenhouse gas emissions through energy efficiency? Will it minimise waste? Will it enable efficient water resource management and ensure maintenance of supply?

SEA Topic	Objectives	Key Questions
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	Will it help to minimise risks associated with unsustainable abstraction of ground and surface waters? Will it help to mitigate the risks associated with droughts or floods? Will it minimise risks of adverse impacts on water quality? Will it minimise risks of adverse impacts on surface water levels and flows? Will it affect WFD compliance e.g. Good Environmental Status? Will it affect river basin management plans?
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	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? Will it avoid contributing to coastal erosion? Will any development make use of previously developed land?
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	Will it minimise the need for energy? Will it increase efficiency in the use of energy? Will it reduce or minimise greenhouse gas emissions? Will it reduce vulnerability to potential impacts of climate change on water supply and demand? Will it take into account the need for adaptability to climate change?
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	Will it avoid damage to and protect the historic environment, heritage assets and their settings, places and spaces that enhance local distinctiveness, landscape/townscape character and appearance? Will it avoid damage to and protect archaeologically important sites? Will it avoid damage to important wetland areas with potential for paleo-environmental deposits?

SEA Topic	Objectives	Key Questions
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	Will it result in changes to access to the countryside and open space? Will it avoid adverse impacts and enhance designated landscapes including the protection of OUV features? Will it improve access to the countryside and open space? Will it avoid indirect effects on the landscape resulting from effects of abstraction and low river flows? Will it avoid cumulative effects on landscape features and character from a range of actions and developments?
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	Will there be synergistic effects between topics?

3.3 PRIMARY ASSESSMENT

An appraisal framework has been developed and used to assess each of the drought options against the SEA objectives (as set out in **Table 3.1**). The appraisal framework has been applied to test the performance of the drought options against the SEA objectives to see how far they go towards meeting the latter. An example of the appraisal framework table is given in **Table 3.2**.

The first and second columns of **Table 3.2** set out the SEA topics and objectives. The third column has been populated during the assessments with discussion and evaluation of the impact of the drought option on the objectives for each topic, with reference to the key questions set out in **Table 3.1**. The completed appraisal framework tables are presented in full in **Appendix E**.

With regard to effects, or predictions, ODPM Guidelines for SEA (2005) state:

> *5.B.10 Predictions do not have to be expressed in quantitative terms. Hard data may enable Responsible Authorities or expert advisers to make detailed quantitative predictions, and this can be particularly useful where a plan's or programme's effects are uncertain, close to a threshold, or cumulative. However quantification is not always practicable, and qualitative predictions can be equally valid and appropriate. In current practice, these are often expressed in easily understood terms such as 'getting better or worse' or a scale from ++ (very positive) to – – (very negative). It can be useful to link predictions to specific objectives, e.g. 'will the plan or programme promote change in a desired direction?'*

The overall findings of the SEA of each topic (e.g. biodiversity, flora and fauna) for each drought option has been expressed by one overarching description of impact significance. This has been colour coded representing a range from major adverse residual impact in red through to major beneficial impacts in dark green (as set out in **Figure 3.1**). In addition, an additional descriptor of "Uncertain" has been included to indicate where there is insufficient data available to undertake the assessment and reach a satisfactory conclusion regarding the impact. Where an SEA topic is not applicable to a drought option, this has been identified by a colour code of white. Where negligible impacts are anticipated (i.e. no perceptible change or environmentally acceptable change), this is identified by a colour code of blue.

Table 3.2 Example of a SEA appraisal framework table completed for each drought option

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To protect and enhance biodiversity, ecological functions and biodiversity connectivity within UU's supply and source areas including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species).	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To maintain the socio-economic performance of the area.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption and loss of resources. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To reduce the amount of water used in the region.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	

Topic	Objectives	Description of Effect and Commentary	Impact
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Archaeology and cultural heritage	To maintain and enhance the quality and accessibility of the cultural and historic environment and archaeology.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	
		Operation *Discussion and impact evaluation of the impact of the option on these objectives, with reference to key questions. Including geographic scale and timescale of impact.*	

Figure 3.1 Legend for colour coding of residual impact significance

Legend:

Major Beneficial	
Moderate Beneficial	
Minor Beneficial	
Negligible	
Minor Adverse	
Moderate Adverse	
Major Adverse	
NOT APPLICABLE	
Uncertain - insufficient data available to undertake assessment	

The assessment has been undertaken by assessing each of the drought options against the objectives and key questions given in **Table 3.1**. The assessment has been informed by determining how far each drought option goes to meeting the objectives, or how far it results in deviation from the identified objective. **Table 3.3** sets out an assessment scale that has been used to determine how far each of the drought options goes towards meeting the objective.

Where suitable mitigation measures are known and identified (e.g. as informed through environmental assessment reports, where available (see **Table 1.5**) or UU's drought management option forms, (see Section 1.4.2 and below)) these have been taken into account, such that the resultant residual impact has been determined. In line with recommendations made in the UKWIR SEA Guidance[68], the SEA appraisals have been based on residual impacts. The guidance states: "*The assessment should be based on residual impacts, i.e. those likely to remain after reasonable mitigation, such as the use of good construction practice*".

If, for one topic, a number of different impact significances are concluded, the overarching description of impact significance has been developed taking into account the range of potential impacts.

[68] UKWIR (2012) *Strategic Environmental Assessment and Habitats Regulations Assessment of Drought Plans* (UKWIR Project WR/02/A). Prepared by Cascade Consulting.

Table 3.3 Assessment scale used to advise evaluation of each drought option against the objectives

SEA Topic	Objectives	Major Beneficial	Moderate Beneficial	Minor Beneficial	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Biodiversity, flora and fauna	To protect and enhance biodiversity, ecological functions and biodiversity connectivity within UU's supply and source areas including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species).	Major positive effects on biodiversity, flora and fauna	Moderate positive effects on biodiversity, flora and fauna	Minor positive effects on biodiversity, flora and fauna	No perceptible change or environmentally acceptable change	Minor negative effects on biodiversity, flora and fauna	Moderate negative effects on biodiversity, flora and fauna	Major negative effects on biodiversity, flora and fauna
Population and human health	To protect and improve health and well-being and reduce inequalities.	Degree of positive effects due to the continued supply of drinking water			No perceptible change or environmentally acceptable change	Degree of negative effects due to disruption to the supply of drinking water		
	To protect and enhance opportunities for formal and informal recreation.	Major positive effects on formal and informal recreation	Moderate positive effects on formal and informal recreation	Minor positive effects on formal and informal recreation	No perceptible change or environmentally acceptable change	Minor negative effects on formal and informal recreation	Moderate negative effects on formal and informal recreation	Major negative effects on formal and informal recreation
	To maintain the socio-economic performance of the area.	Major positive effects on socio-economics	Moderate positive effects on socio-economics	Minor positive effects on socio-economics	No perceptible change or environmentally acceptable change	Minor negative effects on socio-economics	Moderate negative effects on socio-economics	Major negative effects on socio-economics
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions.	Degree of promotion of energy efficiency and energy saving.			No perceptible change or environmentally acceptable change	N/A		

SEA Topic	Objectives	Major Beneficial	Moderate Beneficial	Minor Beneficial	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
	To minimise consumption and loss of resources.	Degree of minimisation of consumption of resources			No perceptible change or environmentally acceptable change	Degree of increase in consumption of resources		
	To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle.	Degree of minimisation of waste production and/or potential for use of recycled materials during construction phase			No perceptible change or environmentally acceptable change	Degree of increase in waste production		
	To reduce the amount of water used in the region.	Degree of reduction of water use			No perceptible change or environmentally acceptable change	Degree of increase in water use		
Water	To avoid adverse impact on surface and groundwater levels and flows.	Major positive effects on surface water or groundwater levels and flows	Moderate positive effects on surface water or groundwater levels and flows	Minor positive effects on surface water or groundwater levels and flows	No perceptible change or environmentally acceptable change	Minor negative effects on surface water or groundwater levels and flows	Moderate negative effects on surface water or groundwater levels and flows	Major negative effects on surface water or groundwater levels and flows
	To protect and enhance surface and groundwater quality.	Major positive effects on surface water or groundwater quality	Moderate positive effects on surface water or groundwater quality	Minor positive effects on surface water or groundwater quality	No perceptible change or environmentally acceptable change	Minor negative effects on surface water or groundwater quality	Moderate negative effects on surface water or groundwater quality	Major negative effects on surface water or groundwater quality

SEA Topic	Objectives	Major Beneficial	Moderate Beneficial	Minor Beneficial	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Soil, geology and land use	To protect and enhance the quality and quantity of soils.	Major positive effects through remediation of contaminated land	Moderate positive effects through remediation of contaminated land	Minor positive effects through remediation of contaminated land	No perceptible change or environmentally acceptable change	Minor negative effects through loss of land, disturbance of areas of contamination or change in soil function	Moderate negative effects through loss of land, disturbance of areas of contamination or change in soil function	Major negative effects through loss of land, disturbance of areas of contamination or change in soil function
	To protect and enhance geodiversity.	Degree of conservation or promotion of conservation of geologically important sites			No perceptible change or environmentally acceptable change	Minor negative effects on geologically important sites	Moderate negative effects on geologically important sites	Major negative effects on geologically important sites
Air and climate	To maintain and improve air quality.	Degree of improvements to air quality e.g. through replacement of equipment with more energy efficient models			No perceptible change or environmentally acceptable change	Degree of air quality impacts during construction e.g. dust, CO_2		
	To minimise greenhouse gas emissions.	Degree of minimisation of greenhouse gas emissions, for example through sourcing energy from renewable sources			No perceptible change or environmentally acceptable change	Degree of increase in greenhouse gas emissions		
Archaeology and cultural heritage	To maintain and enhance the quality and accessibility of the cultural and historic environment and archaeology.	Degree of conservation or promotion of conservation of archeologically important sites			No perceptible change or environmentally acceptable change	Minor negative effects on archeologically important sites	Moderate negative effects on archeologically important sites	Major negative effects on archeologically important sites

SEA Topic	Objectives	Major Beneficial	Moderate Beneficial	Minor Beneficial	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	Major positive effects on designated and undesignated landscapes, and/or landscape character	Moderate positive effects on designated and undesignated landscapes, and/or landscape character	Minor positive effects on designated and undesignated landscapes, and/or landscape character	No perceptible change or environmentally acceptable change	Minor negative effects on designated and undesignated landscapes, and/or landscape character	Moderate negative effects on designated and undesignated landscapes, and/or landscape character	Major negative effects on designated and undesignated landscapes, and/or landscape character
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	Degree of potential for beneficial impacts between topics			No perceptible change or environmentally acceptable change	Degree of potential for negative impacts between topics		

As referred to above, information provided by drought management option forms (included by UU in its Revised Draft Drought Plan 2017) has been used to complete the assessments. Where qualitative and/or quantitative information was available for an option (e.g. as identified by an Environmental Report, Review of Consents etc.), this has been used to inform the assessment, as explained below.

As described in Section 1.5, environmental assessment reports have been prepared by UU for all drought permit/order sites (see **Table 1.5**). These reports have been reviewed and the residual impacts to receptors (i.e. including those mitigation measures incorporated for avoidance, cancellation and reduction of impacts) have been used to inform the SEA. It is noted that the Environmental Reports were prepared with information and data available at the time of writing, and are to be reviewed and updated periodically to incorporate any changes to the baseline and any resulting implications for the impact assessment. As described in Section 1.5, certain outstanding issues remain with the findings of various assessments which are to be resolved through further discussion and agreement between UU, the Environment Agency and Natural England. Where particular issues have been raised for a specific drought permit/order option, this is described in the relevant SEA appraisal table (see Appendix E).

Consideration was also given to the relative locations of drought option sites and internationally and nationally designated sites. Where an Environmental Report has not been prepared for the drought option (e.g. supply side options), screening for effects has been determined on a proximity basis. Designated site(s) that are within 10km of the drought option location were identified and reviewed. Consideration was also given to sites within the same surface and groundwater catchments (where this information was available) to ensure that any connectivity over a longer distance that might affect water-dependent sites was taken into account. The Environment Agency had previously provided GIS mapping of groundwater Source Protection Zones (SPZs). For groundwater supply side options, where the zone of hydrological influence has not been defined, the SPZ has been used to inform the assessment (where SPZs have been defined and noting that a SPZ does not constitute hydrological zone of influence *per se*). The available information on the hydrological influence of each option has been summarised in the assessment tables (**Appendix E**).

Information and assessments from the Environment Agency's Review of Consents has also been used to inform the assessment. This is particularly applicable to supply side drought options (which are all operations within existing licensed conditions). The Review of Consents has also informed the assessment for drought permit/order options. It is noted, however, that the Review of Consents was carried out on normal licensed operating conditions and did not consider drought permit/order actions.

Where detailed environmental information was not available, professional judgement has been used to carry out the assessment, and it is noted that in some cases, there was not sufficient information to undertake the assessment. The assessment was aided by a prompt list of key questions to be considered in relation to each objective. Spatial analysis of each option in relation to environmental baseline features was also used. This used maps showing baseline features that could be affected by the option, to help the assessor determine the likelihood of effects occurring. Assessment of significance is based on the available information, using professional judgement and guidelines where appropriate (including CIEEM[69] and IEMA[70] Guidelines for EIA; noting, however, that these guidelines are focussed towards more detailed EIA assessment).

The impact evaluation includes consideration of the nature of the impact, complexity, duration, frequency, reversibility and probability of impact, 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. Temporary impacts could equate to periods of up to 6 months for the drought option (i.e. 6 months is the duration of a single drought permit/order should one be granted) plus any recovery time thereafter. Where known, any secondary effects of each option have been considered.

The appraisal table completed for each drought option (as documented in Section 1.4.2) includes a discussion of the justification for the impact ascribed, and a summary of the information (quantitative, qualitative, professional judgement, etc.) that it is based on, and any difficulties such as uncertainties or limitations in the information, in line with ODPM recommendations.

The completed appraisal tables for each drought option are presented in full in Appendix E. A summary of the assessment is presented as a colour-coded visual evaluation (VE) matrix in Section 4. An example of a VE matrix is given in **Table 3.4**. For each drought option and each SEA topic listed in the left hand column of **Table 3.1**, the VE matrix summarises the likely significance of impacts (which is discussed in full in the completed appraisal tables presented in Appendix E).

[69] Institute of Ecology and Environmental Management (2016*) Guidelines for Ecological Impact Assessment in the United Kingdom, Second Edition.*
[70] *Guidelines for Environmental Impact Assessment*, Institute of Environmental Management and Assessment, 2004

Table 3.4 Example of a visual evaluation matrix

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
Drought Option 1	*Summary of key impacts of implementing the drought option*										
Drought Option 2	*Summary of key impacts of implementing the drought option*										

Legend:

Major Beneficial	
Moderate Beneficial	
Minor Beneficial	
Negligible	
Minor Adverse	
Moderate Adverse	
Major Adverse	
NOT APPLICABLE	
Uncertain - insufficient data available to undertake assessment	

3.4 SECONDARY, CUMULATIVE AND SYNERGISTIC ENVIRONMENTAL EFFECTS ASSESSMENT

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….*". This involves examining the likely significant effects of each of the drought options individually, in combination with each other (both inter- and intra- water resource zone), and in combination with the implementation of other plans and programmes. In assessing these effects, consideration has been given to factors which may affect the receiving environment in the short, medium and long term. Cumulative effects can include secondary effects and synergistic effects (those which interact to produce an impact greater than the sum of the individual parts)[71].

Supply side, demand side and drought permit/order drought options which have been assessed are listed in **Tables 1.1** to **Table 1.3**. The locations of supply side and drought permit/order options are provided in **Appendix F**. The following cumulative, or in-combination, assessments have been undertaken:

1. For each supply side and drought permit/order option, assessment of the cumulative impacts of the option with UU's existing abstraction licences that operate within the zone of influence of the drought option. The results of these assessments have been summarised in **Table 5.1** (see Section 5.2).

2. Within each of UU's water resource zones, assessment of cumulative impacts of each of UU's supply side and each drought permit/order option, with each of UU's supply side and each drought permit/order option (intra-zone). Incompatible options have also been identified. These assessments are summarised as a matrix for each water resource zone (see Section 5.3).

3. Assessment of cumulative impacts of UU's supply side and drought permit/order options between each of UU's water resource zones (inter-zone) (see Section 5.4).

4. Within UU's entire water supply area, assessment of cumulative impacts of each demand management option with each demand management option. Note that demand management options are consistent across the whole of UU's region, and therefore the assessment takes into account the implementation of each option across the whole of UU's supply region. Demand management measures serve to reduce pressure on water resources and will have a positive influence on both supply side and drought permit/order options within each water resource zone (by reducing the demand for water and reducing abstraction at source). Therefore,

[71] Office of the Deputy Prime Minister (2005). *A Practical Guide to the Strategic Environmental Assessment Directive*.

demand management measures have not been assessed in detail against each supply side and drought permit/order option, other than to acknowledge that they will have a net positive effect by reducing pressure on water resources (see Section 5.5).

5. The following combination of drought options which have the potential to impact on the River Eden SAC has been assessed cumulatively at the request of the Environment Agency[72] (see Section 5.6):

   - North Eden boreholes drought permit/order options (Bowscar, Gamblesby, Tarn Wood)

   - Ullswater drought permit/order option

   - Castle Carrock dead storage supply side option[73].

6. Assessment of cumulative impacts with UU's WRMP schemes which are scheduled to be implemented and become operational within the time period of the Drought Plan (i.e. before July 2021) (see Section 5.7).

7. Assessment of cumulative impacts of UU's Revised Draft Drought Plan 2017 with drought options included in Environment Agency Drought Plans (see Section 5.8)

8. Assessment of cumulative impacts of UU's Revised Draft Drought Plan 2017 with drought options included in neighbouring water company Drought Plans (see Section 5.9).

9. Assessment of cumulative impacts of UU's Revised Draft Drought Plan 2017 with National Policy Statements (see Section 5.10).

As described in Section 1.2.3, Drought Plans comprise a basket of measures, the implementation of which are dependent on the particular drought conditions experienced and are subject to temporal, spatial and other factors. The timing of implementation of drought options will not be known until a drought is experienced.

One of the limitations of the cumulative, or in-combination, assessment of UU's Drought Plan is that whilst an environmental appraisal of each drought option can be undertaken, the lack of predictability of which options will be implemented in any particular drought event means that it is difficult to provide an accurate cumulative assessment of the impacts of the plan for a possible future drought event.

Cumulative assessments of drought options with each other have been undertaken assuming as a worst case that the construction phases and then the operational phases of two options could occur simultaneously. Spatial proximity and therefore potential

[72] Olivier Barthélémy, Environment and Business Advisor - Water Resources, Environment Agency, *pers. comm.*
[73] Note the Environment Agency also requested consideration of any scheme with an impact on the River Gelt within this cumulative assessment, but no such scheme has been included as a drought option in UU's revised draft Drought Plan.

impacts on a common receptor is the primary consideration (e.g. the same designated area or reach of river). In practice, the drought options are generally spatially distant and/or will be implemented at slightly different times (temporally distant).

Due to the uncertainty of timing of implementation of drought options, assessments of each drought option with each other drought option have been undertaken with the intention that in the event of a drought, the findings of the SEA be reviewed and a cumulative assessment made of the options proposed for implementation at that time, based on the findings of the one-on-one assessments (inter- and intra- zone) presented in Sections 5.3 and 5.4.

The assessment of cumulative, or in-combination, effects have been informed by drought option forms prepared by UU (see **Appendix B** for examples). Mapping of the locations of the drought options, surface water catchments and groundwater catchments has been used to inform these assessments. Where information from the Environment Agency's Review of Consents is available for an abstraction licence, this has also been used to inform the in-combination assessment. It is noted, however, that the Review of Consents was carried out on normal licensed operating conditions and did not consider drought permit/order options. As such, information from the Review of Consents has been reviewed for context only. Where detailed information on the potential for cumulative effects is not available, cumulative effects have been considered using professional judgment.

3.5 LIMITATIONS OF THE STUDY

SEA is a high level assessment aimed at highlighting potential environmental concerns. The environmental data used in this assessment is based on that which is readily available from existing sources, e.g. statutory organisations and environmental assessments of drought permit/order options already undertaken by UU. No primary research or survey work has been carried specifically to inform the SEA and therefore it is possible that at the individual option level, there may be additional environmental issues that could have an influence on a drought option.

Limitations of the cumulative, or in-combination assessment of UU's Drought Plan should also be noted as discussed in Section 3.4, as implementation of drought options are dependent on the particular drought conditions experienced meaning that it may be difficult to provide an accurate cumulative assessment of the impacts of the plan for a possible future drought event.

Where site specific limitations or outstanding issues are known, these are briefly described in the SEA appraisal tables for the relevant drought option concerned.

4 ASSESSMENT OF DROUGHT OPTIONS

4.1 DROUGHT OPTIONS ASSESSED

Supply side and drought permit/order drought options which have been assessed for each of the four water resource zones are listed in **Table 1.1** and **Table 1.3**, respectively. The locations of these are provided in **Appendix F**. Demand management schemes which have been assessed are common to all zones and are listed in **Table 1.2**.

4.2 ASSESSMENT OF SCHEMES AGAINST SEA OBJECTIVES

Assessment of drought options has been carried out in accordance with the methodology described in Section 3. Appraisal framework assessment tables have been completed for each drought option, and are presented in full in **Appendix E**. A summary of the assessments are presented in Sections 4.3, 4.4 and 4.5 as colour-coded visual evaluation (VE) matrices. For each drought option and each SEA topic listed in the left hand column of **Table 3.1**, the VE matrix summarises the likely significance of residual impacts. The colour coding represents a range from significant adverse impact in red through to significant beneficial impacts in dark green. The definitions of these significance levels are set out in Section 3.3.

4.3 SUPPLY SIDE OPTIONS

4.3.1 Integrated Resource Zone

A visual summary of SEA conclusions for each of the supply side options in the Integrated Resource Zone is provided in **Table 4.1**. The completed appraisal tables for each of the drought options are provided in **Appendix E**. Ten out of the total of 12 supply side options in UU's Revised Draft Drought Plan 2017 are within the Integrated Resource Zone – there is one supply side option in the West Cumbria Resource Zone and one in the Carlisle Resource Zone. All the ten Integrated Resource Zone supply side options relate to groundwater sources. In most cases, minor construction works are required to bring the source back into operation (see **Appendix A**).

All of the supply side options are actions within existing licensed abstraction limits. It is assumed that the existing abstraction licences would not have been granted if these options resulted in unsustainable abstraction.

Impacts on population and human health range from minor to major beneficial, based on improved security of public water supply, and taking into account the magnitude of any anticipated impacts on recreation (including angling) and local socio-economics.

4.3.2 West Cumbria Resource Zone

The only supply side option identified in the West Cumbria Resource Zone is for tankering of treated water from the Integrated Resource Zone to support Ennerdale Water. It is expected that tankering of approximately 0.6Ml/d (requiring 24 tanker deliveries a day) on reaching Drought Trigger 3; increased to approximately 2Ml/d (requiring 76 tanker deliveries a day) in the event of a drought order being implemented at Ennerdale Water.

4.3.3 Carlisle Resource Zone

Castle Carrock Reservoir dead storage is the only supply side drought option in the Carlisle Resource Zone. A visual summary of SEA conclusions for this option is provided in **Table 4.1**. The completed appraisal table for the drought option is provided in **Appendix E**. The option involves abstraction of dead water from Castle Carrock Reservoir (which is not part of any area designated for nature conservation), and is not dependant on abstraction from the River Gelt i.e. the reservoir can be drawn down even if there is no abstraction from the river. Adverse environmental impacts are associated with drawdown of the reservoir on fish populations within the reservoir itself and landscape and visual amenity, as the site is within North Pennines AONB. There are, however, beneficial impacts on population and human health due to increased security of public water supply.

4.3.4 North Eden Resource Zone

No supply side options have been identified in the North Eden Resource Zone.

Table 4.1 Visual evaluation matrix summary for supply side options

Supply Side Drought option	Summary of potential impacts	SEA Topic									Comments
		Biodiversity, flora and fauna	Population and human health	Material assets and resource	Water	Soil, geology and land use	Air and climate	Archaeology and cultural	Landscape and visual amenity	Inter-relationships	
Integrated Resource Zone											
Belle Vale Boreholes	Beneficial impact due to continued supply of drinking water										
Croft Boreholes	Beneficial impact due to continued supply of drinking water										
Daresbury Borehole	Beneficial impact due to continued supply of drinking water										
Landside Borehole	Beneficial impact due to continued supply of drinking water										
Netherley Boreholes	Beneficial impact due to continued supply of drinking water										
Pex Hill Boreholes	Beneficial impact due to continued supply of drinking water										
Stocks Wells Boreholes	Beneficial impact due to continued supply of drinking water										
Walton Boreholes	Beneficial impact due to continued supply of drinking water										
Water Lane Boreholes	Beneficial impact due to continued supply of drinking water										
Worsthorne Borehole	Beneficial impact due to continued supply of drinking water										
West Cumbria Resource Zone											
Tankering to support Ennerdale Water	Beneficial impact due to continued supply of drinking water										
Carlisle Resource Zone											
Castle Carrock Reservoir, dead water storage	Impacts of reservoir drawdown on biodiversity, flora and fauna, geomorphology and landscape										Option is located within North Pennines AONB
North Eden Resource Zone											
None	-	-	-	-	-	-	-	-	-	-	-

Legend:

Major Beneficial	
Moderate Beneficial	
Minor Beneficial	
Negligible	
Minor Adverse	
Moderate Adverse	
Major Adverse	
NOT APPLICABLE	
Uncertain - insufficient data available to undertake assessment	

4.4 DEMAND SIDE OPTIONS

A visual summary of SEA conclusions for each of the demand side options in UU's Revised Draft Drought Plan 2017 is provided in **Table 4.2**. The completed appraisal tables for each of the drought options are provided in **Appendix E**. Overall, demand side measures serve to reduce pressure on water resources within each water resource zone by reducing customer demand for water, and therefore reducing the abstraction at source. This will in turn contribute to reducing the amount of energy needed for water abstraction, treatment and distribution. Impacts on the SEA topics material assets and resource use and water are minor beneficial for these drought options, due to decreased demand, and correspondingly reduced abstraction at source. Water savings will contribute to increased security of public water supply, resulting in negligible to minor beneficial impacts on population and human health.

It is noted that small scale construction activities are associated with leakage detection and repair activities, which will result in increased energy and material usage, but overall, taking into account reductions in water lost, the impact of this option on material assets and resource use has been summarised as minor beneficial.

Table 4.2 Visual evaluation matrix summary for demand side options

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
Drought Publicity	Drought publicity will result in water savings which will contribute towards improving the security of supply of water										
Increased leakage detection and repair activity	Small scale construction activities and vehicle movements associated with repair activities										
Water use restriction	Restrictions will benefit security of water supply										Includes both voluntary and statutory water use restrictions
Ordinary Drought Order (Non-Essential Use Ban)	Restrictions will benefit security of water supply										

Legend:

Major Beneficial
Moderate Beneficial
Minor Beneficial
Negligible
Minor Adverse
Moderate Adverse
Major Adverse
NOT APPLICABLE
Uncertain - Insufficient data available to undertake

4.5 DROUGHT PERMIT/ORDER OPTIONS

4.5.1 Integrated Resource Zone

A visual summary of SEA conclusions for each of the drought permit/order options in the Integrated Resource Zone is provided in **Table 4.3**. The completed appraisal tables for each of the drought options are provided in **Appendix E**.

Impacts on population and human health range from minor to major beneficial, based on improved security of public water supply, and taking into account the magnitude of any anticipated impacts on recreation (including angling) and local socio-economics.

Many of the drought permit/order options have a negative effect on the objectives for biodiversity, flora and fauna, water and landscape and visual amenity. This reflects the impacts of reduced surface water flows and levels on the environment within the zone of influence of the scheme, of which several areas are subject to nature conservation or landscape designations.

The assessment of the impacts of drought permit/order options has been informed by the Environmental Assessments which have been undertaken by UU for each of these options (see Section 1.5).

4.5.2 West Cumbria Resource Zone

A visual summary of SEA conclusions for each of the drought permit/order options in the West Cumbria Resource Zone is provided in **Table 4.3**. The completed appraisal tables for each of the drought options are provided in **Appendix E**.

Impacts on population and human health range are moderate beneficial, based on improved security of public water supply, and taking into account the magnitude of any anticipated impacts on recreation (including angling).

Many of the drought permit/order options have a negative effect on the objectives for biodiversity, flora and fauna, water and landscape and visual amenity. This reflects the impacts of reduced surface water flows and levels on the environment within the zone of influence of the scheme, of which several areas are subject to nature conservation or landscape designations. Impacts of the drought order at Ennerdale Water on biodiversity, flora and fauna have been assessed as major adverse due to the potential for significant impacts on the River Ehen SAC.

The assessment of the impacts of drought permit/order options has been informed by the Environmental Assessments which have been undertaken by UU for each of these options (see Section 1.5).

4.5.3 Carlisle Resource Zone

No drought permit/order options have been identified in the Carlisle Resource Zone.

4.5.4 North Eden Resource Zone

A visual summary of SEA conclusions for each of the drought permit/order options in the North Eden Resource Zone is provided in **Table 4.3**. The completed appraisal tables for each of the drought options are provided in **Appendix E**. All of the drought permit/order options in the North Eden Resource Zone are groundwater sources.

Impacts on population and human health are major beneficial, based on improved security of public water supply.

The assessment of the impacts of drought permit/order options has been informed by the Environmental Assessments which have been undertaken by UU for each of these options (see Section 1.5).

Table 4.3 Visual evaluation matrix summary for drought permit/order options

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
Integrated Resource Zone											
Longdendale Reservoirs	Impacts of riverine flow reduction on water quality, fish populations and landscape and visual amenity										
Rivington Reservoirs – White Coppice	Impact of hydrodynamics and water quality on riverine fish populations										
Rivington Reservoirs – Brinscall Brook	Impact of hydrodynamics and water quality on riverine fish populations										
Jumbles Reservoir	Impacts of hydrodynamics and water quality on biodiversity and landscape										
Delph Reservoir	Impacts of hydrodynamics and water quality on biodiversity										
Dovestone Reservoir	Impacts of hydrodynamics and water quality on biodiversity										
Lake Vyrnwy	Impacts of hydrodynamics and water quality on biodiversity										
River Lune LCUS abstraction	Impacts of hydrodynamics on biodiversity, recreation, navigation and landscape										
Lake Windermere – Scenario 1	Impacts of resource use due to increase pumped abstraction										
Lake Windermere – Scenario 2 (includes lake drawdown to 0.5m)	Impacts on lake level, recreation (navigation) and landscape and visual amenity										
Ullswater	Flow mediated impacts on biodiversity, noting the potential benefits resulting from augmented flows										

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
Swineshaw Boreholes	Impact on flow reductions are predicted to be negligible										
West Cumbria Resource Zone											
Scales boreholes	Impacts of hydrodynamics on biodiversity and landscape										
Ennerdale Water - (includes lake drawdown to 2.5m below weir crest)	Impacts of lake level on ecological features and landscape and visual amenity. River flow impacts on biodiversity										
Crummock Water – (includes pumping of abstraction and compensation flow, and lake drawdown from 0.97m to 1.5m below weir crest).	Impacts of lake level on lake landscape and visual amenity)										
Carlisle Resource Zone											
None	-	-	-	-	-	-	-	-	-	-	-
North Eden Resource Zone											
Bowscar boreholes	Impact on flow reductions are predicted to be negligible										
Gamblesby boreholes	Impact on flow reductions are predicted to be negligible										
Tarn Wood boreholes	Impact on flow reductions are predicted to be negligible										

Legend:

Major Beneficial	
Moderate Beneficial	
Minor Beneficial	
Negligible	
Minor Adverse	
Moderate Adverse	
Major Adverse	
NOT APPLICABLE	
Uncertain - Insufficient data available to undertake assessment	

4.6 SUMMARY

In general, the assessment has found that supply side options (actions within existing licensed abstraction limits) have a lower magnitude of impacts on SEA objectives than drought permit/order options. This is to be expected as it is assumed that the existing abstraction licence would not have been granted, or would have been modified subsequently (e.g. due to the Environment Agency's Review of Consents for example) if this option resulted in unsustainable abstraction.

Demand side options were found in general to have positive impacts on SEA objectives for population and human health and material assets and resource use. No significant adverse impacts on SEA objectives were determined for these options.

The magnitude of impact on SEA objectives for drought permit/order options varied between the options, and were mainly associated with adverse changes to surface water levels and flows. Furthermore, those options which have the potential to adversely impact designated sites had a higher magnitude of impact on the SEA objective for biodiversity, flora and fauna. Beneficial impacts on population and human health are associated with increased security of public water supply.

5 CUMULATIVE EFFECTS ASSESSMENT

5.1 INTRODUCTION

The cumulative, or in-combination, assessment findings presented in this section have been carried out in line with the methodology described in Section 3.4. Supply side and drought permit/order drought options which have been assessed are listed in **Table 1.1** and **Table 1.3**, respectively. The locations of these are provided in **Appendix F**.

5.2 CUMULATIVE EFFECTS WITH UU'S EXISTING ABSTRACTION LICENCES

Each supply side and drought permit/order option was reviewed to determine if any of UU's existing operational abstraction licences may have the potential to act cumulatively with the drought option, as described in Section 3.4. Mapping of location of drought options, surface water catchments and groundwater catchments has been used to inform these assessments. Where a licence has been subject to the Environment Agency Review of Consents, the information provided has been used to inform this assessment (noting that the Review of Consents was carried out on existing abstraction licence conditions and not drought permit/order conditions).

Cumulative impacts of UU's operational abstractions with sources that have been identified as supply side drought options (see **Table 1.1**) have been assessed in Section 5.3, but are also included here for completeness. Those licences which are also supply side drought options are identified in **Table 5.1** with an asterisk.

For drought permit/order options which constitute a modification to an existing abstraction licence, the cumulative impacts of the drought option with the existing licence are intrinsic in the primary assessment of the drought permit/order options (as presented in Section 4.5), and are not considered further here.

Figure 5.1 sets out the legend against which the findings of the cumulative assessments of UU's drought options with UU's existing licences are based, as set out in **Table 5.1**.

Figure 5.1 Legend for colour coding the cumulative assessments of UU's drought options with UU's existing abstraction licences

Legend

	No cumulative effects identified
	Groundwater schemes: Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated
	Groundwater schemes: Both options abstract from the same groundwater catchment, with adverse impacts anticipated
	Options with potential for groundwater-surface water interactions
	Surface water schemes: Both options affect the same surface water resource but with no adverse impact anticipated
	Surface water schemes: Both options affect the same surface water resource with adverse impact anticipated
	Surface water schemes: Both options affect the same surface water resource and are sequential
	Uncertain – insufficient information available to undertake assessment

Table 5.1 Summary of potential cumulative effects of supply side and drought permit/order options and existing UU abstraction licences (options marked with # are also drought options).

Drought option	Existing licences within zone of influence	Potential for cumulative effects	Assessment summary
Supply Side options			
Integrated Resource Zone			
Belle Vale	Netherley Boreholes#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Pex Hill#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Stocks Well#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Water Lane#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Croft Boreholes	Bank Heath	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Forest Farm	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Houghton Green	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Kenyon	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Landside#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Lightshaw	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Makerfield	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Park Road South	Both options abstract from the same	

Drought option	Existing licences within zone of influence	Potential for cumulative effects	Assessment summary
		groundwater catchment, but with no adverse impacts anticipated	
	Pocket Nook No 1 and No 2	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Slag Lane	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Winwick	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Daresbury Borehole	Walton#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Appleton Reservoir	No cumulative impacts identified	
Eaton Boreholes	Cotebrook No 1 and No 2	No cumulative impacts identified	
	Delamere	No cumulative impacts identified	
	Eddisbury	No cumulative impacts identified	
	Organsdale	No cumulative impacts identified	
	Sandiford	No cumulative impacts identified	
Gorstons Borehole	None identified	-	-
Helsby Boreholes	Ashton#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Five Crosses	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Manley Common	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Manley Quarry	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Mouldsworth	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Newton Hollows#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Landside Borehole	Bank Heath	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Croft#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Forest Farm	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Houghton Green	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Kenyon	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Lightshaw	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Makerfield	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	

Drought option	Existing licences within zone of influence	Potential for cumulative effects	Assessment summary
	Park Road South#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Pocket Nook No 1 and No 2	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Slag Lane	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Winwick	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Netherley Boreholes	Belle Vale#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Pex Hill#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Stocks Well#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Water Lane#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Pex Hill Boreholes	Belle Valle#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Netherley#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Stocks Well#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Water Lane#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Stocks Well Boreholes	Belle Vale#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Netherley Boreholes#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Pex Hill#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Water Lane#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Water Lane Boreholes	Belle Valle#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Netherley#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Pex Hill#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Stocks Well #	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	

Drought option	Existing licences within zone of influence	Potential for cumulative effects	Assessment summary
Walton Boreholes	Appleton Reservoir	No cumulative impacts identified	
	Daresbury#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Worsthorne Borehole	Cant Clough Reservoir	No evidence that impacts on flows to surface water bodies would be observed as groundwater storage from the aquifer will be utilised first during abstraction	
	Hurstwood Reservoir	No evidence that impacts on flows to surface water bodies would be observed as groundwater storage from the aquifer will be utilised first during abstraction	
	Swinden Reservoir	No evidence that impacts on flows to surface water bodies would be observed as groundwater storage from the aquifer will be utilised first during abstraction	
West Cumbria Resource Zone			
Tankering to support Ennerdale Water	Haweswater Reservoir	No cumulative impacts identified	
Carlisle Resource Zone			
Castle Carrock Reservoir, dead water storage	None identified	-	-
North Eden Resource Zone			
None	-	-	-
Drought Order/Permit Options			
Integrated Resource Zone			
Longdendale Reservoirs	Arnfield Reservoir	No cumulative impacts identified	
	Dovestone Reservoir#	The compensation flows from both reservoirs eventually enter the River Mersey with adverse impact anticipated	
	Hollingworth Reservoir	No cumulative impacts identified	
	Rhodeswood Reservoir	No cumulative impacts identified	
	Swineshaw Reservoir	No cumulative impacts identified	
	Torside Goyt	No cumulative impacts identified	
	Torside Reservoir	No cumulative impacts identified	
	Woodhead Reservoir	No cumulative impacts identified	
Rivington Reservoirs – White Coppice	Rivington Reservoirs – Brinscall Brook#	Both White Coppice and Brinscall Brook flow in to the River Yarrow with adverse impact anticipated	
Rivington Reservoirs – Brinscall Brook	Rivington Reservoirs – White Coppice#	Both White Coppice and Brinscall Brook flow in to the River Yarrow with adverse impact anticipated	
Jumbles Reservoir	Delph Reservoir#	Delph Reservoir compensation flow enters Delph Brook and then Eagley Brook. Jumbles reservoir compensation flow enters Bradshaw Brook. Bradshaw Brook and Eagley Brook join to form the River Croal. Adverse impacts are anticipated	
Delph Reservoir	Dingle Reservoir	No cumulative impacts identified	
	Jumbles Reservoir#	Delph Reservoir compensation flow enters Delph Brook and then Eagley Brook. Jumbles reservoir compensation	

Drought option	Existing licences within zone of influence	Potential for cumulative effects	Assessment summary
		flow enters Bradshaw Brook. Bradshaw Brook and Eagley Brook join to form the River Croal. Adverse impacts are anticipated	
	Longworth Clough, Turton	No cumulative impacts identified	
	Springs Reservoir	No cumulative impacts identified	
Dovestone Reservoir	Longdendale Reservoir#	The compensation flows from both reservoirs eventually enter the River Mersey, with adverse impact anticipated	
	Yeoman Hey Reservoir	No cumulative impacts identified	
Lake Vyrnwy	None identified	-	-
River Lune LCUS abstraction	River Lune at Caton	UU's Caton abstraction is upstream of the LCUS abstraction. The River Lune LCUS drought option relates to reducing the hands-off flow at Skerton Weir, which is downstream of both abstractions. Therefore, although both schemes abstract from the same resource, no adverse cumulative effects have been identified	
	River Lune at Lower Halton Weir	This source is downstream of the LCUS abstraction however this abstraction has never been utilised by UU and is unlikely to be in the future. Therefore, no cumulative effects have been identified	
Lake Windermere – Scenario 1	None identified	-	-
Lake Windermere – Scenario 2	None identified	-	-
Ullswater	None identified	-	-
Swineshaw Boreholes	Higher Swineshaw Reservoir	No cumulative impacts identified	
	Lower Swineshaw Reservoir	No cumulative impacts identified	
	Arnfield Reservoir	No cumulative impacts identified	
	Brushes Reservoir	No cumulative impacts identified	
	Hollingworth Reservoir	No cumulative impacts identified	
	Walker Wood Reservoir	No cumulative impacts identified	
	Woodhead Reservoir	No cumulative impacts identified	
West Cumbria Resource Zone			
Scales boreholes	None identified	-	-
Ennerdale Water – Lake drawdown to 2.5m	None identified	-	-
Crummock Water –Lake drawdown to 1.5m below weir crest	Sail Beck, Buttermere	No cumulative impacts identified	
Carlisle Resource Zone			
None	-	-	-
North Eden Resource Zone			
Bowscar Boreholes	Beacon Edge Borehole	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Cliburn Boreholes	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Eden Hall Boreholes	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Fairhill Boreholes	Both options abstract from the same	

Drought option	Existing licences within zone of influence	Potential for cumulative effects	Assessment summary
		groundwater catchment, but with no adverse impacts anticipated	
	Tarn Wood Boreholes#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
Gamblesby Boreholes	None identified	-	-
Tarn Wood Boreholes	Bowscar Boreholes#	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	
	Cliburn Boreholes	Both options abstract from the same groundwater catchment, but with no adverse impacts anticipated	

5.3 CUMULATIVE EFFECTS BETWEEN DROUGHT OPTIONS (INTRA-ZONE)

Cumulative effects of each drought option with each other drought option on a one-on-one basis within each resource zone have been assessed and are summarised in the text and matrices in Sections 5.3.1 to 5.3.4. These assessments have been informed by the Drought Plan drought management option forms prepared by UU and mapping of locations of drought options, surface water and groundwater catchments. Where a licence has been subject to the Environment Agency Review of Consents, the information provided has been used to inform the assessment, noting, however, that the Review of Consents was carried out on those options in line with normal licensed operating conditions, and that drought permit/order options constitute a modification to an existing licence which was not assessed by the Review of Consents.

5.3.1 Integrated Resource Zone

The matrix presented in **Figure 5.2** illustrates incompatible supply side and drought permit/order drought options and drought options with potential cumulative impacts in the Integrated Resource Zone.

Supply side options

Several groundwater supply side options are located within the same groundwater catchment (as illustrated on Environment Agency groundwater catchment boundary maps), however, no adverse impacts of operating the options concurrently have been identified.

Drought permit/order options

Cumulative impacts of drought order/permit options were identified in Environmental Assessment Reports that have been prepared for each of the drought permit/order options (see Section 1.5). These include cumulative impacts resulting from concurrent

implementation of:

- *Rivington Reservoirs – White Coppice and Rivington Reservoirs – Brinscall Brook*. The Environmental Report concluded that the impacts of the options when implemented concurrently on hydrodynamics in the River Yarrow are anticipated to be of minor adverse magnitude, and stated that the predicted changes may just be noticeable.
- *Longdendale Reservoirs and Dovestone Reservoir*. The Environmental Report concluded that the impacts of the options when implemented concurrently on hydrodynamics in the River Mersey (immediately downstream of the confluence between the River Goyt and the River Tame) are anticipated to be of minor adverse magnitude, and stated that the predicted changes may just be noticeable.
- *Jumbles Reservoir and Delph Reservoir*. The Environmental Report concluded that the impacts of the options when implemented concurrently on hydrodynamics in the River Croal and River Irwell (immediately downstream of its confluence with the River Croal) are anticipated to be of minor adverse magnitude, and stated that the predicted changes may just be noticeable.

The drought management option forms in the Revised Draft Drought Plan 2017 state that the use of certain borehole supply side options would be considered prior to certain drought permit/order options. This is because use of the boreholes could alleviate the need for the drought permit/order options to be implemented i.e. these options are associated. This applies to the use of the Swineshaw Borehole supply side option prior to the Dovestone Reservoir drought permit option. However, as the borehole supply side option in question is associated with Drought Trigger 3, the use would only be considered at this point, so it may not be operational and in use by the time of a drought permit application.

Windermere Scenario 1 and Windermere Scenario 2 drought options are sequential i.e. Scenario 2 would only be progressed if the prevailing drought conditions resulted in implementation of Scenario 1 alone being insufficient to safeguard water supplies.

Figure 5.2 Cumulative impacts matrix: Integrated Resource Zone

		Belle Vale Boreholes	Croft Boreholes	Daresbury Borehole	Landside Borehole	Netherley Boreholes	Pex Hill Boreholes	Stocks Well Borehole	Water Lane Borehole	Walton Boreholes	Worsthorne Borehole	Swineshaw Boreholes	Longdendale Reservoirs	Rivington Reservoirs – White Coppice	Rivington Reservoirs – Brinscall	Jumbles Reservoir	Delph Reservoir	Dovestone Reservoir	Lake Vyrnwy	River Lune LCUS abstraction	Lake Windermere: Scenario 1	Lake Windermere: Scenario 2
Supply Side options	Daresbury Borehole																					
	Croft Boreholes																					
	Netherley Boreholes																					
	Landside Borehole																					
	Pex Hill Boreholes																					
	Stocks Well Borehole																					
	Water Lane Borehole																					
	Walton Boreholes																					
	Worsthorne Borehole																					
Drought permit/order options	Swineshaw Boreholes																					
	Longdendale Reservoirs																					
	Rivington Reservoirs-White Coppice																					
	Rivington Reservoirs-Brinscall Brook																					
	Jumbles Reservoir																					
	Delph Reservoir																					
	Dovestone Reservoir																					
	Lake Vyrnwy																					
	River Lune LCUS abstraction																					
	Lake Windermere: Scenario 1																					
	Lake Windermere: Scenario 2																					
	Ullswater																					

Legend:

	No cumulative effects identified
	Groundwater schemes: Both options abstract from the same resource, but with no adverse impacts anticipated
	Groundwater schemes: Both options abstract from the same resource, with adverse impacts anticipated
	Options with potential for groundwater-surface water interactions
	Surface water schemes: Both options affect the same resource but with no adverse impact anticipated
	Surface water schemes: Both options affect the same resource with adverse impact anticipated
	Surface water schemes: Both options effect the same resource and are sequential
	Groundwater-surface water schemes which are associated; if implemented, the groundwater option would alleviate pressure on the surface water option
	Uncertain – insufficient information available to undertake assessment

5.3.2 West Cumbria Resource Zone

The matrix presented in **Figure 5.3** illustrates incompatible supply side and drought permit/order drought options and drought options with potential cumulative impacts in the West Cumbria Resource Zone.

There is only one supply side option for this zone; limited tankering of treated water from the Integrated Resource Zone to support Ennerdale Water. Tankering of water will serve to reduce the volume of water abstracted from Ennerdale Water, however, the volumes to be tankered are relatively small in comparison to the abstraction from Ennerdale under a drought order (i.e. the volume of both the abstraction for drinking water and the compensation flow release to the river). Therefore, the cumulative impact of tankering with the Ennerdale Water drought order has been assessed as negligible.

It is noted that there is connectivity in the water distribution network (i.e. treated water) between Ennerdale Water and Crummock Water. In the event of a drought permit/order being sought at either of these sites, the operation of any links in the distribution network would be reviewed to ensure that risks are balanced across the resource zone and as such, any changes to operations would depend on the relative health of the water sources in question. The links between the sources in the zones are within the treated water distribution network and changes have to be carefully planned (e.g. due to the risk of discoloured water and the complexity of altering the network configuration).

Figure 5.3 Cumulative impacts matrix: West Cumbria Resource Zone

Ennerdale Water – Lake drawdown to 2.5m			
Crummock Water - Lake drawdown to 1.5m			
Tankering to support Ennerdale Water			
Supply Side and Drought Permit/Order Options	Scales boreholes	Ennerdale Water– lake drawdown to 2.5m	Crummock Water - Lake drawdown to 1.5m

Legend:

	No cumulative effects identified
	Groundwater schemes: Both options abstract from the same resource, but with no adverse impacts anticipated
	Groundwater schemes: Both options abstract from the same resource, with adverse impacts anticipated
	Options with potential for groundwater-surface water interactions
	Surface water schemes: Both options affect the same resource but with no adverse impact anticipated
	Surface water schemes: Both options affect the same resource with adverse impact anticipated
	Surface water schemes: Both options affect the same resource and are sequential
	Groundwater-surface water schemes which are associated; if implemented, the groundwater option would alleviate pressure on the surface water option
	Uncertain – insufficient information available to undertake assessment

5.3.3 Carlisle Resource Zone

There is only one drought option in the Carlisle Resource Zone (Castle Carrock Reservoir, dead water storage), therefore, there are no intra-zone cumulative effects.

5.3.4 North Eden Resource Zone

The matrix presented in **Figure 5.4** illustrates incompatible supply side and drought permit/order drought options and drought options with potential cumulative impacts in the North Eden Resource Zone.

The Environmental Assessment Report for the Eden Valley Boreholes drought permits concluded that cumulative hydrological impacts of all of the Eden Valley Boreholes drought options are insignificant.

Figure 5.4 Cumulative impacts matrix: North Eden Resource Zone

Gamblesby boreholes		
Tarn Wood boreholes		
Supply Side and Drought Permit/Order Options	Bowscar boreholes	Gamblesby boreholes

Legend:

	No cumulative effects identified
	Groundwater schemes: Both options abstract from the same resource, but with no adverse impacts anticipated
	Groundwater schemes: Both options abstract from the same resource, with adverse impacts anticipated
	Options with potential for groundwater-surface water interactions
	Surface water schemes: Both options affect the same resource but with no adverse impact anticipated
	Surface water schemes: Both options affect the same resource with adverse impact anticipated
	Surface water schemes: Both options affect the same resource and are sequential
	Groundwater-surface water schemes which are associated; if implemented, the groundwater option would alleviate pressure on the surface water option
	Uncertain – insufficient information available to undertake assessment

5.4 INTER-ZONE CUMULATIVE EFFECTS BETWEEN DROUGHT OPTIONS

Assessment of the potential for cumulative impacts of supply side and drought permit/order options between water resource zones has been undertaken. Each supply side and drought permit/order option has been assessed for the potential for cumulative effects with each other supply side and drought permit/order option in other resource zones. These assessments have been informed by the Drought Plan drought management option forms prepared by UU and mapping of locations of drought options, surface water and groundwater catchments. Where a licence has been subject to the Environment Agency Review of Consents, the information provided has been used to inform the assessment.

No cumulative inter-zone impacts were identified between drought options.

The potential for cumulative effects between the drought option at Ullswater (which is in the Eden catchment) and the Eden Valley Boreholes (Bowscar, Gamblesby and Tarn Wood Boreholes) was considered. The Environmental Assessment Report for the Eden Valley Boreholes drought permits concluded that cumulative hydrological impacts of all of the Eden Valley Boreholes drought options with the drought option at Ullswater are insignificant; therefore, no cumulative effects between these drought options are anticipated.

5.5 DEMAND MANAGEMENT

5.5.1 Cumulative effects of demand management schemes

The matrix in **Figure 5.5** illustrates potential incompatibility and cumulative impacts between demand management schemes. An application for an ordinary drought order (non-essential use ban) would follow the implementation of water use restrictions (both voluntary and statutory).

Figure 5.5 Cumulative impacts matrix: demand management measures

Increased leakage detection and repair activity			
Water Use Restriction			
Ordinary Drought Order (Non-Essential Use Ban)			
Demand Management Options	Drought publicity	Increased leakage detection and repair activity	Water Use Restriction

Legend:

	No cumulative effects identified or beneficial cumulative impacts anticipated
	Adverse impacts anticipated
	Options are sequential
	Uncertain – Insufficient information available to undertake assessment

5.5.2 Cumulative effects with supply side and drought permit/order options

Demand management options are consistent across the whole of UU's water supply region i.e. are not water resource zone specific. Demand management measures serve to reduce pressure on water resources and will have a positive influence on both supply side and drought permit/order options within each water resource zone by reducing customer demand for water, and therefore reducing the abstraction at source.

5.6 RIVER EDEN SCHEMES

The following combination of drought options which have the potential to impact on the River Eden SAC has been assessed cumulatively at the request of the Environment

Agency[74]:

- Eden Valley boreholes (Bowscar, Gamblesby, Tarn Wood)
- Ullswater drought permit
- Castle Carrock Reservoir dead water[75].

The Environmental Assessment Report for the Eden Valley Boreholes drought permits concluded that cumulative hydrological impacts of all of the Eden Valley Boreholes drought options with the drought option at Ullswater are insignificant. As the Castle Carrock Reservoir dead water option does not include any changes to abstraction from the River Gelt or River Eden (option relates to utilisation of the dead water storage held within the reservoir itself only), no cumulative effects of this option with any other options are anticipated.

Overall, no cumulative effects of implementing all of the River Eden schemes concurrently are anticipated.

5.7 UU'S WRMP SCHEMES

There are no supply schemes identified within UU's WRMP that are due to be operational within the time period of the Drought Plan (until 2021).

The Thirlmere Transfer scheme, to link UU's West Cumbria Resource Zone to the Integrated Zone (see Section 1.3.3) will be operational in 2022, which is outside the period covered by the Revised Draft Drought Plan 2017. The application for Planning Permission for the scheme has been submitted. Assuming that Planning Permission is granted, the construction phase of the scheme will take place between 2016 and 2022, which will include the time period encompassed by the Revised Draft Drought Plan 2017. An Environmental Impact Assessment, HRA Screening and statement of 'Information to Inform an Appropriate Assessment' (IIAA) have been prepared and submitted in support of the Planning Application. HRA Screening and the IIAA assessed the potential impacts of the construction and operation phases of the scheme on Clints Quarry SAC, The River Derwent and Bassenthwaite Lake SAC, the River Eden SAC and the River Ehen SAC. The assessments concluded that assuming that all mitigation measures were implemented, then there would be no significant effects, either alone or in combination, on the Conservation Objectives or the qualifying features of the sites and thus no significant effect on site integrity. Therefore, no significant effects are anticipated in–combination with the drought options included in UU's Revised Draft Drought Plan 2017.

There is also a suite of leakage, water efficiency and metering actions being

[74] Olivier Barthélémy, Environment and Business Advisor - Water Resources, Environment Agency, *pers. comm.*

[75] Note the Environment Agency also requested consideration of any scheme with an impact on the River Gelt within this cumulative assessment, but no such scheme has been included as a drought option in UU's revised draft Drought Plan.

implemented, particularly in the West Cumbria Resource Zone. The demand management actions have potentially positive effects, as they will ultimately result in reduced abstraction at source, across all resource zones.

5.8 ENVIRONMENT AGENCY DROUGHT PLANS

Assessment of the potential for cumulative impacts of supply side and drought permit/order options with drought options listed in Environment Agency drought plans has been undertaken.

The information used to carry out these assessments is considered to be the most up to date information available at time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to Environment Agency drought plans have been made in the intervening period, and that the assessment, therefore, remains valid.

The following Environment Agency / Natural Resources Wales Drought Plans were reviewed:

- Drought Response: Our Framework for England (June 2015)
- Managing Drought in the North West (June 2014)
- Midlands Region Drought Plan (January 2012)
- Environment Agency Wales (now Natural Resources Wales) Drought Plan (January 2012).
- Cumbria and Lancashire Drought Plan (2015)
- Greater Manchester, Merseyside and Cheshire Drought Plan (2015)

Drought actions and triggers are given in the Environment Agency Drought Plans. Actions described in the Plans include communications (internal and external), monitoring and drought orders. Of these actions, those which are applicable for cumulative assessment with UU's drought options are external communications and drought orders. The other actions in the Plans relate to drought planning and monitoring and are not direct actions which would physically result in cumulative effects.

The Environment Agency[76] have advised that SEA of Environment Agency Drought Plans has not been undertaken, as these Plans do not meet the legal requirements for SEA because of their voluntary status. However, the Environment Agency advise that when developing their plans they consider the principles behind SEA to help understand, assess and, where possible, mitigate the impacts of their drought management actions on the environment. Likewise, the Environment Agency have

[76] Mike Stokes, Environment Agency email to Kat Liney, Cascade Consulting, 7 September 2011.

advised that their Drought Plans do not contain actions / operations that could impact on a European site so have not undertaken HRA for their plans.

External communications (one of the actions in the Environment Agency's Drought Plans) may have positive cumulative effects with UU's drought publicity demand side option, as drought communication messages may reinforce each other, thereby resulting in increased demand savings.

Environment Agency drought order actions have the potential to have cumulative impacts with UU's drought options. The Environment Agency / Natural Resources Wales can apply to the Secretary of State / Welsh Ministers for drought orders for environmental reasons, e.g. if low flow is posing a risk to the aquatic environment. Environmental drought orders can be used to vary the compensation flow discharged from reservoirs in to the receiving rivers, provide measures to lower the controlled flow to conserve resources, or provide measures to reduce abstractions to ease demand on rivers and minimise the environmental effect of reduced support to river flow.

The Environment Agency / Natural Resources Wales can apply for an environmental drought order only if the environment is suffering serious damage as the result of abstraction during a drought. The Environment Agency North West Region Plan (Managing Drought in the North West,2014) states that the Environment Agency do not expect this to happen and as a result it is hard to predict the location of all environmental drought orders in advance.

A lesson learnt from the 2010 drought event was the need to clarify who (UU or the Environment Agency) is responsible for applying for drought powers to reduce compensation flows from reservoirs whose only purpose is to provide such compensation flows to protect reservoir storage and hence, future compensation flow releases (i.e. they are not used for abstraction by UU although the reservoirs are owned by UU). It has been decided that the Environment Agency will be responsible for any such future applications. Two potential sites are identified in the North West Region Drought Plan; Hollingworth Lake and Walverden Reservoir. No cumulative impacts with UU's drought options have been identified.

The Midlands Region Drought Plan states that the Environment Agency may in an exceptional drought situation apply to the Secretary of State for an environmental drought order on the River Severn to protect the freshwater flow in the river. Modification of the Vyrnwy compensation release is not listed in the Midlands Region Drought Plan as a condition of a potential River Severn drought order, however, it is noted that the Vyrnwy overdraft (waterbank) may be used to support the estuary, subject to other needs. The compensation flow and the Vyrnwy waterbank operate independently, and therefore, no cumulative effects of a potential UU drought permit at Vyrnwy and an Environment Agency River Severn environmental drought order are

considered to be likely. Note that UU's Environmental Report for the Vyrnwy Drought Permit concluded no impact on the Severn Estuary SAC, and minor adverse hydrological impacts in the hydrological zone of influence of the scheme (to Llanymynech gauging station which is 200km upstream from the Severn Estuary SAC).

The Environment Agency Wales (now Natural Resources Wales) Drought Plan for North Wales states that there are no sites identified for environmental drought orders within the area and that the Environment Agency (now Natural Resources Wales) will apply for environmental drought orders if they prove necessary. The Plan notes that an environmental drought order was granted during the drought of 1995/6 to reduce the compensation discharge from Llyn Celyn reservoir. Since then the Dee General Directions have been revised and reissued (most recently in April 2009) to accommodate this. Note that UU does not have any drought options that result in modifications to abstractions on the River Dee, although several supply side drought options are groundwater sources which are in the vicinity of the River Dee. No impacts of these options on the River Dee have been identified and as such, no cumulative impacts of these groundwater sources are anticipated with any future potential environmental drought orders at Llyn Celyn.

In summary, no cumulative impacts of options in Environment Agency / Natural Resources Wales Drought Plans and UU's drought options are anticipated, however, due to the uncertainties of potential locations, and potential revisions to the Environment Agency / Natural Resources Wales Drought Plans this should be considered further at the time of any potential application for drought permits/orders by UU and the Environment Agency / Natural Resources Wales.

5.9 OTHER WATER COMPANY DROUGHT PLANS

Assessment of the potential for cumulative impacts of supply side and drought permit/order options with drought options listed in neighbouring water companies' drought plans has been undertaken.

It should be noted that all water company Drought Plans are subject to review on timescales that may not be aligned with the timescale of UU's Drought Plan revision. The information used to carry out these assessments is considered to be the most up to date information at available at time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to the neighbouring water company drought options has been made in the intervening period, and that the assessment, therefore, remains valid.

The assessments have been informed by Drought Plan drought management option forms prepared by UU and mapping of locations of drought options, surface water and groundwater catchments. As stated above, the assessment has used the most recent information available on neighbouring water company Drought Plans.

Dŵr Cymru Welsh Water

No cumulative impacts between drought options in UU's Drought Plan with Dŵr Cymru Welsh Water's Drought Plan (July 2015) which would have potential for impact on European sites have been identified , UU's only drought option in Wales is Lake Vyrnwy and an Environmental Report has been prepared for this drought option which did not identify cumulative impacts with any other water company abstraction licence (however, it is noted that the Environmental Report did not include other water company drought options *per se*).

Severn Trent

Severn Trent Water's Drought Plan (January 2014) notes that agreement would need to be reached with UU and the Environment Agency as to any changes to the use of the "water bank" releases from Lake Vyrnwy Reservoir. An Environmental Report has been prepared for UU's Lake Vyrnwy drought option and concluded that the hydrological influence of the drought option extends to Llanymynech gauging station on the Afon Vyrnwy (i.e. upstream of the confluence of the Afon Vyrnwy with the River Severn and 200km upstream from the Severn Estuary SAC). None of Severn Trent's drought options have been identified to affect the areas within the hydrological zone of influence of the Lake Vyrnwy drought option, and therefore, no in-combination impacts of Severn Trent's drought options with UU's drought option on European sites (including the Severn Estuary SAC) have been identified.

Yorkshire Water

No cumulative impacts between drought options in UU's Drought Plan with Yorkshire Water's Drought Plan (July 2013) which would have potential for impact on European sites have been identified.

Northumbrian Water

No drought permit/order options were included in Northumbrian Water's Drought Plan (January 2013). All supply side options would be within existing licensed limits. No cumulative impacts between drought options in UU's Drought Plan with Northumbrian Water's Drought Plan which would have potential for impact on European sites have been identified.

Scottish Water

In England, the water companies have a statutory duty under the Water Act 2003 for the production of drought plans. Scottish Water currently has a duty under the Water (Scotland) Act 1980 to promote the conservation and effective use of the water resources of Scotland and they are presently in the process of producing drought plans for their strategic sources which they will subsequently agree with the Scottish

Environmental Protection Agency and Scottish Natural Heritage.

Dee Valley Water

No drought permit/order options were included in Dee Valley Water's Drought Plan (July 2015). All supply side options would be within existing licensed limits. No cumulative impacts between drought options in UU's Drought Plan with Dee Valley Water's Drought Plan which would have potential for impact on European sites have been identified.

5.10 NATIONAL POLICY STATEMENTS

National Policy Statement for Wastewater[77]; states the policy of reducing demand for wastewater infrastructure by reducing domestic and industrial wastewater production and by implementation of Sustainable Urban Drainage Systems. Only two major infrastructure projects are put forward, both in the south east of the UK. No cumulative effects with UU's drought options have been identified.

National Policy Statement for Renewable Energy Infrastructure[78]**;** covers the following types of nationally significant renewable energy infrastructure; energy from biomass and/or waste (>50 megawatts (MW), offshore wind (>100MW) and onshore wind (>50MW)). Other types of energy generation including hydropower are not included. No cumulative effects with UU's drought options have been identified.

[77] Defra (2012) *National Policy Statement for Wastewater*. March 2012.
[78] Department of Energy and Climate Change (2011) *National Policy Statement for Renewable Energy Infrastructure (EN-3).* July 2011.

6 MITIGATION AND MONITORING

6.1 OVERVIEW

Key stages of the SEA process comprise Task B5: *Mitigating adverse effects*, Task B6: *Proposing measures to monitor the environmental effects of plan or programme implementation* and Stage E: *Monitoring the significant effects of the plan or programme on the environment* (see Section 1.6, **Table 1.6**). The sections below describe how these tasks have been addressed and how UU intend to ensure that mitigation measures are implemented for any adverse effects that are identified and the means by which the environmental performance of the Drought Plan can be assessed.

6.2 MITIGATION

Mitigation may be defined as a measure to limit the effect of an identified significant impact or, through the most successful application, avoid the adverse impact altogether, the latter being the preferred option.

Consideration of mitigation measures has been an integral part of the SEA process. The methodology for the assessment of the drought options is provided in Section 3. The SEA appraisals have been based on residual impacts, i.e. those impacts likely to remain after the implementation of reasonable mitigation. Certain assumptions have been made regarding this:

- Where suitable mitigation measures are known and identified (e.g. as informed through environmental assessment reports, where available (see Section 1.5) or UU's drought management option forms, within the Drought Plan, these have been taken into account, such that the resultant residual impact has been determined.
- In line with recommendations made in the UKWIR SEA Guidance[79], the SEA appraisals have assumed the implementation of reasonable mitigation, such as the use of good construction practice. This is particularly applicable to stood down supply-side options which are currently non-commissioned and which do not operate as 'business as usual', and would require recommissioning in the event of use as a drought option.
- Mitigation is an implicit component of abstraction licences which are issued and reviewed by the Environment Agency based on an assessment of the potential impacts on the environment. This is applicable to all supply-side options which are actions within existing abstraction licence limits which have been subject to the Environment Agency's Review of Consents process.

[79] UKWIR (2012) *Strategic Environmental Assessment and Habitats Regulations Assessment of Drought Plans* (UKWIR Project WR/02/A). Prepared by Cascade Consulting.

As described in Section 6.3, during implementation of a specific drought option, appropriate monitoring will be undertaken to track any potential environmental effects which will in turn trigger deployment of suitable and practicable mitigation measures.

6.3 MONITORING

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

As described in Section 1.2.3, Drought Plans encompass a basket of measures that will only be implemented if and when required because of the unpredictable occurrence of a drought event, and thus the actual impact of the plan over its life is subject to very significant uncertainties.

UU's Revised Draft Drought Plan 2017 includes a range of possible measures to allow UU to respond to a particular drought in the most appropriate way. It is impossible to predict in advance which and how many of the measures will be required, and in which order of priority, to respond to each particular drought event. Correspondingly, it is therefore difficult to prescribe monitoring for the effects of the Drought Plan as a whole, and more appropriate to consider monitoring for drought options with significant environmental effects should these options be implemented during an actual drought.

Environmental Reports have been prepared for all of UU's drought permit/order options (see Section 1.5). These reports include an Environmental Monitoring Plan. It should be noted, as discussed in Section 1.5, that during the consultation process for the drought permit/order environmental assessments, the Environment Agency and Natural England raised issues regarding the findings of various assessments and certain outstanding issues remain which are to be resolved through further discussion and agreement between UU, the Environment Agency and Natural England, including monitoring of specific features. Discussions between UU, the Environment Agency, Natural England and Natural Resources Wales have been held to agree the baseline, in-drought and post-drought monitoring required at each drought permit/order site (based on the Environmental Monitoring Plans contained within the environmental reports). EMPs for all sites are shared with the EA annually.

As described in the Revised Draft Drought Plan 2017, in the event of a drought requiring the implementation of drought option(s), UU will review the requirement for environmental monitoring in consultation with the Environment Agency, Natural England and Natural Resources Wales (as appropriate).

7 SUMMARY

Introduction

SEA of UU's Revised Draft Drought Plan 2017 has been undertaken. The Drought Plan provides a comprehensive statement of the actions UU will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact.

Drought Plans encompass a number of drought options that will only be implemented if and when required. Each drought is different in terms of its severity, season, location and duration and each combination of these factors may require a bespoke reaction in terms of measures. In the context of drought planning, individual drought options are taken to constitute alternatives. UU's Revised Draft Drought Plan 2017 comprises a total of 34 drought options (12 supply side options, 4 demand options and 17 drought permit/order sites).

The purpose of SEA is to provide high level and strategic protection of the environment by incorporating environmental considerations into the preparation of plans and policy. The SEA assists in the identification of the likely significant environmental effects of UU's drought options and determines how any adverse impacts might be mitigated. The SEA also provides information on the relative environmental performance of alternatives, and is intended to make the decision-making process more transparent. The SEA can, therefore, be used to support the timing and implementation of drought options within the Drought Plan.

SEA Screening confirmed that UU's Revised Draft Drought Plan 2017 required both SEA and HRA. The HRA of UU's Revised Draft Drought Plan 2017 has been undertaken in parallel with the SEA and is reported separately in the HRA Screening Report. The HRA screening process identifies whether each drought option in the drought plan (either alone, in combination or with other plans or projects) is likely to have significant effects on European designated sites, i.e. sites of international conservation importance. The findings of both the SEA and HRA have fed into the revision of the Drought Plan in an iterative process.

The SEA and HRA have been guided by a Project Steering Group of representatives from Natural England, the Environment Agency, Historic England, Natural Resources Wales and Cadw. A SEA Scoping Report was issued in March 2016, and provided an opportunity for the statutory consultees to provide views on the proposed scope and level of detail of this SEA Environmental Report. Issues raised by consultees have been considered in preparing this report.

The findings of the SEA are presented within this Environmental Report, which accompanies UU's submission of the Revised Draft Drought Plan 2017 to Defra and

the Welsh Government and has been subject to public consultation.

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; and inter-relationships. The overall findings of the SEA describe the extent to which objectives for each topic are met by each of the drought options.

The outputs of the assessment are a completed appraisal framework table for each drought option, and a colour coded summary matrix (ranging from major beneficial impacts to major adverse impacts) which provides a comparative assessment of the residual environmental effects of implementing each drought option (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 likely significant effects of each of the drought options in combination with each other (both intra- and inter- water resource zone) and in combination with the implementation of other relevant plans and programmes.

Findings of the Assessments

The findings of the SEA of each drought option is set out in **Table 7.1** and is summarised below.

Table 7.1 Visual evaluation matrix summary of SEA of UU's drought options.

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
SUPPLY SIDE OPTIONS											
Integrated Resource Zone											
Belle Vale Boreholes	Beneficial impact due to continued supply of drinking water										
Croft Boreholes	Beneficial impact due to continued supply of drinking water										
Daresbury Borehole	Beneficial impact due to continued supply of drinking water										
Landside Borehole	Beneficial impact due to continued supply of drinking water										
Netherley Boreholes	Beneficial impact due to continued supply of drinking water										
Pex Hill Boreholes	Beneficial impact due to continued supply of drinking water										
Stocks Well Boreholes	Beneficial impact due to continued supply of drinking water										
Water Lane Boreholes	Beneficial impact due to continued supply of drinking water										
Walton Boreholes	Beneficial impact due to continued supply of drinking water										
Worsthorne Borehole	Beneficial impact due to continued supply of drinking water										
West Cumbria Resource Zone											
Tankering to support Ennerdale Water	Beneficial impact due to continued supply of drinking water										
Carlisle Resource Zone											
Castle Carrock Reservoir, dead water storage	Impacts of reservoir drawdown on biodiversity, flora and fauna, geomorphology and landscape										Option is located within North Pennines AONB

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
North Eden Resource Zone											
None	-	-	-	-	-	-	-	-	-	-	-
DEMAND SIDE OPTIONS											
Drought Publicity	Drought publicity will result in water savings which will contribute towards improving the security of supply of water										
Increased leakage detection and repair activity	Small scale construction activities and vehicle movements associated with repair activities										
Water use restriction	Restrictions will benefit security of water supply										Includes both voluntary and statutory water use restrictions
Ordinary Drought Order (Non-Essential Use Ban)	Restrictions will benefit security of water supply										
DROUGHT PERMIT/ORDER OPTIONS											
Integrated Resource Zone											
Longdendale Reservoirs	Impacts of riverine flow reduction on water quality, fish populations and landscape and visual amenity										
Rivington Reservoirs – White Coppice	Impact of hydrodynamics and water quality on riverine fish populations										
Rivington Reservoirs – Brinscall Brook	Impact of hydrodynamics and water quality on riverine fish populations										
Jumbles Reservoir	Impacts of hydrodynamics and water quality on biodiversity and landscape										
Delph Reservoir	Impacts of hydrodynamics and water quality on biodiversity										
Dovestone Reservoir	Impacts of hydrodynamics and water quality on biodiversity										

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
Lake Vyrnwy	Impacts of hydrodynamics and water quality on biodiversity										
River Lune LCUS abstraction	Impacts of hydrodynamics on biodiversity, recreation, navigation and landscape										
Lake Windermere – Scenario 1	Impacts of resource use due to increase pumped abstraction										
Lake Windermere – Scenario 2 (includes lake drawdown to 0.5m)	Impacts on lake level, recreation (navigation) and landscape and visual amenity										
Ullswater	Flow mediated impacts on biodiversity, noting the potential benefits resulting from augmented flows										
Swineshaw Boreholes	Impact on flow reductions are predicted to be negligible										
West Cumbria Resource Zone											
Scales boreholes	Impacts of hydrodynamics on biodiversity and landscape										
Ennerdale Water - (includes lake drawdown to 2.5m below weir crest)	Impacts of lake level on ecological features and landscape and visual amenity. River flow impacts on biodiversity										.
Crummock Water – (includes pumping of abstraction and compensation flow, and lake drawdown from 0.97m to 1.5m below weir crest).	Impacts of lake level on lake landscape and visual amenity)										
Carlisle Resource Zone											
None	-	-	-	-	-	-	-	-	-	-	-
North Eden Resource Zone											

Drought option	Summary of potential impacts	SEA Topic									Comments
		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	Inter-relationships	
Bowscar boreholes	Impact on flow reductions are predicted to be negligible										
Gamblesby boreholes	Impact on flow reductions are predicted to be negligible										
Tarn Wood boreholes	Impact on flow reductions are predicted to be negligible										

Legend:

Major Beneficial
Moderate Beneficial
Minor Beneficial
Negligible
Minor Adverse
Moderate Adverse
Major Adverse
NOT APPLICABLE
Uncertain - Insufficient data available to undertake assessment

Supply side options

The majority of UU's supply side options are groundwater sources. In all cases, minor construction works are required to bring these sources back into operation and few residual environmental effects are anticipated. Operationally, all of the supply side options are within existing licensed abstraction limits and it is assumed that the existing abstraction licences would not have been granted if these options resulted in unsustainable abstraction. The supply side option for the West Cumbria Resource Zone involves tankering of treated water from the Integrated Resource Zone to support Ennerdale Water. Overall, most of the impacts of implementing these options are anticipated to be negligible or minor adverse, with minor to major beneficial impacts associated with benefits to security of public water supply.

Demand side options

Demand side measures serve to reduce pressure on water resources by reducing customer demand for water, and therefore reducing the abstraction at source. This will in turn contribute to reducing the amount of energy needed for water abstraction, treatment and distribution. Overall, impacts for these drought options are considered to be negligible to minor beneficial.

Drought permit/order options

The magnitude of impacts on SEA objectives for drought permit/order options (i.e. where there is modification to the conditions of an existing abstraction licence) varies between and within the options, ranging from major beneficial for the SEA objective for population and human health, to major adverse for the SEA objective for biodiversity, flora and fauna. The latter were associated with adverse changes to surface water levels and flows. Those options which have the potential to adversely impact designated conservation sites had a higher magnitude of impacts on the SEA objectives for biodiversity, flora and fauna.

Cumulative impacts

The cumulative, or in-combination, assessment identified the potential for adverse impacts if two drought options were to be implemented at the same time, either intra- or inter- water resource zone. In the majority of combinations, no impacts are considered likely, however, in some cases, impacts have been identified where, for example, both options draw on the same water resource (e.g. same groundwater catchment or same river). Due to the uncertainty of timing of implementation of drought options, assessments of each drought option with each other drought option have been undertaken with the intention that in the event of a drought, the findings of the SEA be reviewed and a cumulative assessment made of the options proposed for implementation at that time, based on the findings of the one-on-one assessments.

Assessment of UU's Revised Draft Drought Plan 2017 with other plans and programmes, including UU's WRMP, Environment Agency / Natural Resources Wales Drought Plans, other water company Drought Plans and National Policy Statements, concluded that no significant cumulative, or in-combination, effects are anticipated.

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, i.e. those impacts likely to remain after the implementation of reasonable mitigation.

During implementation of one or more drought options, 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, UU will review the specific requirements for environmental monitoring in consultation with the Environment Agency, Natural England and the Natural Resources Wales.

Going Forward

The Draft Drought Plan and the SEA Environmental Report have been issued for public consultation. Comments received through this consultation have led to a Revised Draft Drought Plan, and, where appropriate to do so, these changes have been assessed using the approach to SEA set out in this report. The Revised Draft Drought Plan 2017 will subsequently be published as a Final Drought Plan and an SEA post-adoption statement prepared. When the Drought Plan is implemented during an actual drought event, UU will monitor its effects on the environment, helping to ensure that the potential impacts identified in the SEA are considered in practice.

APPENDIX A

SUMMARY OF CONSTRUCTION ACTIVITIES REQUIRED FOR SUPPLY-SIDE DROUGHT OPTIONS

INTRODUCTION

This Appendix provides a summary of the construction activities required in order to bring each of the supply side drought options into operation.

This Appendix consists of two tables.

Table A1 outlines the key work elements required for each drought option, including an 'Activity Reference'.

Table A2 provides construction details relating to each 'Activity Reference', including plant and vehicle movements and the basic materials required.

Table A1 Summary of Construction Activities for Supply Side Options

Site	Scope	New borehole pumps /rising main	New mechanical and electrical works	Disinfection plant	UV plant	Acid dosing	Filter plant	Temporary pumping station	Existing WTW refurbishment	New Pipeline	Slipline maintainance	Activity Ref (see Table A2)
Integrated Resource Zone												
Belle Vale	Diversion to Netherly borehole (option 1).		X									2
	New process treatment plant (option 2)						X					7
Croft Boreholes	New treatment line, new filtration (6Ml/d) and chlorination equipment for 6Ml/d	X		X			X					1, 3, 7
Daresbury Borehole	New chlorination equipment for 5 Ml/d, UV rig for 5 Ml/d			X	X							4
Landside Borehole	New borehole pump and 75m rising main for 5 Ml/d capacity	X										1
Netherley Boreholes	UV rig to treat 12 Ml/d, chlorination for 12 Ml/d			X	X							5
Pex Hill Boreholes	Chlorination for 6 Ml/d, no M&E equipment needed			X								3
Stocks Well Boreholes	Slipline maintenance (option 1)								X			9
Swineshaw Boreholes Drought Order	3No. borehole pumps rated at 1 Ml/d each, 150m total of borehole rising main, new M&E starter panel equipment for 3 borehole pumps	X	X									1,2

Site	Scope	New borehole pumps /rising main	New mechanical and electrical works	Disinfection plant	UV plant	Acid dosing	Filter plant	Temporary pumping station	Existing WTW refurbishment	New Pipeline	Slipline maintainance	Activity Ref (see Table A2)
Walton Boreholes	New chlorination equipment for 4 Ml/d, UV rig for 4 Ml/d			**X**	**X**							**4**
Water Lane Boreholes	Minor testing and remedial works including new domestic supply feed to Pex Hill.									**X**		**11**
Worsthorne Borehole	Asset manager progressing solution (acid dosing)					**X**						**6**
West Cumbria Resource Zone												
Tankering to support Ennerdale Water	Temporary construction works on existing UU sites with the introduction of new infrastructure including pipework modifications and possible short temporary overland pipework.								**X**	**X**		**9,10**
Carlisle Resource Zone												
Castle Carrock Reservoir dead water storage	Install temporary pumping equipment into reservoir in order to utilise dead storage (170 Ml) below Trigger 4, new pumps and rising main, modifications to include a temporary filter plant at the front of the works						**X**	**X**				**7,8**

Table A2 Construction Activities

Activity Ref	Activity	Scope	Traffic	Materials
1	**New borehole pumps /rising main**	Removal of existing borehole pump and rising main and replacement/renewal as needed. Use of mobile crane.	General construction (e.g. transit pick-up truck): 4 trips per day for 1 week Mobile crane: on-site for 1 week Pipe delivery: 1 HGV visit Pump delivery: 1 HGV visit	Pipes: length of rising main, assume 150mm diameter PE Borehole pump(s)
2	**New mechanical and electrical works**	Replacement or relocation of power supply/starter panel.	General construction (e.g. transit pick-up truck): 4 trips per day for 2 days Panel delivery: 1 HGV visit	Starter panel
3	**Disinfection only plant > 5 Ml/d**	Construction of concrete base and temporary building (~6mx4m) including access track. Installation of disinfection rig including tapping into existing pipework.	General construction (e.g. transit pick-up truck): 4 trips per day for 3 weeks Excavator (e.g. JCB): on site 2 week Sub-base delivery: 2 HGV visits Concrete delivery: 2 HGV visits Building/Rig delivery: 1 HGV visit Mobile crane: on-site for 1 week	Hardcore: ~ 20t Concrete: ~10m^3 Temporary building (6mx4m) Disinfection rig including control equipment Hypochlorite storage
4	**Disinfection and UV plant Up to 5 Ml/d**	Construction of concrete base and temporary building (~3mx4m) including access track. Installation of disinfection/UV rigs including tapping into existing pipework.	General construction (e.g. transit pick-up truck): 4 trips per day for 3 weeks Excavator (e.g. JCB): on site 2 weeks Sub-base delivery: 2 HGV visits Concrete delivery: 2 HGV visits Building/Rig delivery: 2 HGV visits Mobile crane: on-site for 1 week	Hardcore: ~ 15t Concrete: ~10m^3 Temporary building (3mx4m) Disinfection/UV rigs including control equipment Hypochlorite storage
5	**Disinfection and UV plant > 5 Ml/d**	Construction of concrete base and temporary building (~6mx4m) including access track. Installation of disinfection and UV rigs including tapping into existing pipework.	General construction (e.g. transit pick-up truck): 4 trips per day for 4 weeks Excavator (e.g. JCB): on site 2 week Sub-base delivery: 3 HGV visits Concrete delivery: 3 HGV visits Building/Rig delivery: 2 HGV visits Mobile crane: on-site for 2 weeks	Hardcore: ~ 25t Concrete: ~12m^3 Temporary building (6mx4m) Disinfection/UV rigs including control equipment Hypochlorite storage
6	**Acid dosing**	Construction of concrete base for dosing rig/M&E and building (~3mx4m) including access track. Installation of acid rig including tapping into existing pipework.	General construction (e.g. transit pick-up truck): 4 trips per day for 2 weeks Excavator (e.g. JCB): on site 2 weeks Sub-base delivery: 2 HGV visits Concrete delivery: 2 HGV visits Building/Rig delivery: 2 HGV visit Mobile crane: on-site for 1 week	Hardcore: ~ 20t Concrete: ~10m^3 Temporary building (3mx4m) Disinfection rig including control equipment Chemical storage

Activity Ref	Activity	Scope	Traffic	Materials
7	**Filter plant**	Construction of concrete base for pre-fabricated filtration plant and M&E building (~3mx4m) including access track. Installation of acid rig including tapping into existing pipework.	General construction (e.g. transit pick-up truck): 4 trips per day for 4 weeks Excavator (e.g. JCB): on site 3 weeks Sub-base delivery: 4 HGV visits Concrete delivery: 4 HGV visits Building/Rig delivery: 10 HGV visit Mobile crane: on-site for 1 week	Hardcore: ~ 30t Concrete: ~10m^3 Temporary building (3mx4m) Filtration plant including control equipment Chemical storage
8	**Temporary Pumping Station**	Construction of concrete base and temporary building (~3mx4m) including access track. Installation of pump-sets/M&E including tapping into existing pipework.	General construction (e.g. transit pick-up truck): 4 trips per day for 2 weeks Excavator (e.g. JCB): on site 1 week Sub-base delivery: 3 HGV visit Concrete delivery: 1 HGV visit Building/Pump/Generator delivery: 3 HGV visit Mobile crane: on-site for 1 week	Hardcore: ~ 30t Concrete: ~5m^3 Temporary building (3mx4m) Generator Pumps
9	**Existing water treatment works refurbishment**	Refurbish slipline/ filters/media/chemical dosing at existing works.	General construction (e.g. transit pick-up truck): 4 trips per day for 6 weeks General materials delivery: 12 HGV visits Mobile crane: on-site for 3 weeks	Filter media Pipework/dosing equipment
10	**Temporary pipeline and pumping station**	Installation and removal of temporary overland PE pipeline (3km 180mm PE). Temporary diesel pumps.	General construction (e.g. transit pick-up truck): 4 trips per day for 6 weeks Excavator (e.g. JCB): on site 3 weeks Sub-base delivery: 10 HGV visits Concrete delivery: 4 HGV visits Pump/fittings delivery: 2 HGV visits Pipe/fittings delivery/removal: 30 visits Mobile crane: on-site for 1 week	3km 180mm diameter PE80 pipe Diesel pumps 30 l/s @ 77m head Temporary fencing: 250m Sub-base material: ~ 50t Concrete: ~ 20m3
11	**New Main**	Construction of new supply pipeline.	General construction (e.g. transit pick-up truck): 4 trips per day for 6 weeks Excavator (e.g. JCB): on site 6 weeks Pipe surround deliveries/removal: 100 HGV visits Concrete delivery: 6 HGV visits Pipe/fittings delivery: 12 visits	

APPENDIX B

ENVIRONMENT AGENCY DROUGHT OPTION FORMS

Environment Agency Drought Plan Guideline: Demand-side drought management options

Option Name		
Trigger(s) (or preceding actions)		
Demand Saving Ml/day unless stated otherwise		
Demand Saving Percentage reduction on peak week demand		
Location Area affected or whole supply zone		
Implementation timetable Preparation time, time of year effective, duration		
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals		
Risks associated with option		

Environment Agency Drought Plan Guideline Supply-side drought management options

Option Implementation Assessment	**Option Name**		
	Trigger(s) (or preceding actions)		
	Deployable Output of action Ml/day unless stated otherwise		
	Location Area affected or whole supply zone		
	Implementation timetable Preparation time, time of year effective, duration		
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals		
	Risks associated with option		
Enviromental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)		
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites		
	Baseline information used		
	Summary of additional baseline monitoring requirements		
	Mitigation measures		
	Impact on other activities e.g. public, industry etc		

APPENDIX C

STATUTORY CONSULTEE RESPONSES TO THE 2016 SEA SCOPING REPORT

Comments on the SEA Scoping Report produced 4 March 2016, from the **Environment Agency**, received from Mike Stokes on 21 March 2016, have been listed below with responses in italics. No comments were received from Natural England, Natural Resources Wales, Historic England or Cadw.

Comments from Environment Agency (Mike Stokes)		**UU Response**
C.1	I'd like to understand the value that the SEA will bring to the drought plan.	*Specific issues relating to each drought option (including potential for impacts on designated sites) will be discussed in the "Assessment of Options" chapter of the SEA Environmental Report which aims to assess the significant environmental effects of each drought option within UU's draft Drought Plan. This will inform the specific selection of drought options by UU at a time of drought, to ensure environmental impacts are minimised.*
C.2	We need to recognise the great work that has been done recently to revoke and change some of UU's abstraction/impoundment licences (driven by Habs Directive for example), as well as the programme set out in our Phase 5 NEP and the links to UU's Business Plan / ODI's.	*Noted.*
C.3	https://www.gov.uk/government/publications/defras-strategy-to-2020-creating-a-great-place-for-living - will be another key national report to reference and consider as the plan / assessments take shape	*Report has now been included in the Review of Plans and Policy section*
C.4	You need to ensure a clear, consistent approach to assessment from the WB / abstraction point scale up to zones/catchments then regional/company-wide picture.	*Given the strategic nature of the SEA, the Environmental Report seeks to summarise the specific risks and issues derived from the outcomes and more detailed evidence presented elsewhere (e.g within EARs). The Environmental Report draws out the major risks from the overall assessment of options and which frame the overall strategic level assessment of the Drought Plan.*
C.5	It would be good to understand the criteria that are going to be used to assign impacts in the Visual Evaluation matrix and what might happen if one or more consultees disagrees with UU/Cascade assessment.	*Consultee comments regarding specific option assessments will be considered during finalisation of the Environmental Report.*
C.6	We are promoting stronger and more transparent links between water company drought plans and WRMP's. It would be good to discuss how this links to SEA/HRA for UU's drought plan.	*The links to the WRMP are discussed in the Environmental report – see Section 1.3.2*
C.7	Phil Merrin from UU came to talk to me and some of my EA colleagues last Friday about the review of unused/contingency sources that UU is undertaking right now. It would be good to understand how Phil's work links with drought plan / SEA/HRA development.	*The review of unused/contingency sources has informed the selection of supply side options in the Draft Drought Plan 2016.*
C.8	What are the timescales for producing the UU drought plan HRA and when do you expect to need input/involvement from environmental regulators?	*The draft HRA Screening report was submitted for consultation with the statutory consultees on the 10/06/2016.*

		Comments to be received by 24/06/2016. The final version will be submitted to Defra and the Welsh Government alongside the Draft Drought Plan
C.9	Some colours in the proposed Visual Evaluation quite similar to each other (minor/moderate adverse for example)	*Noted, colour scheme amended.*

APPENDIX D

REVIEW OF PLANS AND PROGRAMMES

Appendix D Review of Policy, Plans and Programmes

The findings of the review of policy, plans and programmes are set out in **Table D.1**. The purpose of the review and the key findings are set out in Section 2.2 of this SEA. This table sets out the purpose and objectives of the policy, plans and programmes, their potential relationship with UU's Drought Plan and the potential implications of the plan objectives for the objectives of the SEA.

Table D.1 Summary of the Policy, Plans and Programmes reviewed and their link to the Strategic Environmental Assessment

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
International	
Bern Convention (1979), The Convention on the Conservation of European Wildlife and Natural Habitats	
The Convention is intended to promote cooperation between the signatory States in order to conserve wild flora and fauna and their natural habitats and to protect endangered migratory species.	The SEA should seek to promote the protection and enhancement of biodiversity.
Bonn Convention (1979), The Convention on the Conservation of Migratory Species of Wild Animals	
The convention aims to conserve terrestrial, marine and avian migratory species by protecting endangered, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger such species.	The implementation of the DP may influence biodiversity in the north west and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.
The Cancun Agreement (2011) & Kyoto Agreement (1997)	
The agreement represent key steps forward in capturing plans to reduce greenhouse gas emissions and to help developing nations protect themselves from climate impacts and build their own sustainable futures. It includes a shared vision to keep global temperature rise to below two degrees Celsius.	The SEA should seek to promote a reduction in greenhouse gas emissions.
Council of Europe (2006), *European Landscape Convention*	
The European Landscape Convention is an international convention focusing specifically on landscape. The UK Government signed the European Landscape Convention in 2006 and it became binding from March 2007.	The SEA should take landscape quality into account and include water quality in the assessment framework.
Council of Europe (2003) European Soils Charter	
Sets out common principles for protecting soils across the EU and will help.	The SEA should seek to ensure that the quality of the regions land, including soils, is protected or enhanced.
European Commission *(2006) Thematic Strategy for Soil Protection*	
The Thematic Strategy for Soil Protection consists of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment.	The SEA assessment framework should include soils.
European Commission, *Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)*	
The Directive establishes: • Animal health requirements for the placing on the market, importation and transit of aquaculture animals and their products; • Minimum measures to prevent diseases in aquaculture animals; • Minimum measures to be taken in response to suspected or established cases of certain diseases in aquatic animals.	The implementation of the DP may influence biodiversity in the north west and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.
European Commission, *Birds Directive (2009/147/EC)*	

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State (in the UK delivery is via several different statutes).	The SEA should seek to protect and conserve important Bird habitats.
European Commission, *Drinking Water Directive (1998/83/EC)*	
The objective of the Drinking Water Directive is to protect the health of the consumers in the European Union and to make sure the water is clean and of good quality. To make sure drinking water everywhere in the EU is healthy, clean and tasty, the Drinking Water Directive sets standards for the most common substances (so-called parameters) that can be found in drinking water. A total of 48 microbiological and chemical parameters must be monitored and tested regularly.	The SEA should seek to ensure that objectives address water quality in the region, particularly drinking water quality.
European Commission, *Environmental Liability Directive* (2004/35/EC)	
The Directive establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage. The principle of liability applies to environmental damage and imminent threat of damage resulting from occupational activities, where it is possible to establish a causal link between the damage and the activity in question.	The SEA should seek to ensure protection of the natural environment and prevent any damage that could harm designated sites, important species and habitats, water quality and other environmental assets.
European Commission, *Floods Directive (2007/60/EC)*	
The Directive's aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive shall be carried out in coordination with the Water Framework Directive, notably by flood risk management plans and river basin management plans being coordinated, and through coordination of the public participation procedures in the preparation of these plans.	The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the DP and that water supplies across the region are maintained.
European Commission, *Habitats Directive (1992/43/EC)*	
The aim of the Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance.	The impacts of the DP options on internationally designated sites and species must be considered as part of the SEA.
European Commission, *Marine Strategy Framework Directive (2008/56/EC)*	
The aim of the European Union's ambitious Marine Strategy Framework Directive (adopted in June 2008) is to protect more effectively the marine environment across Europe. It aims to achieve good environmental status of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend.	The SEA should seek to protect important coastal marine waters in the regions, particularly any designated sites.
European Commission, *The Water Framework Directive (2000/60/EC)*	
This Directive establishes a framework for the protection of inland surface waters, transitional waters, coastal water and groundwater. It also encourages the sustainable use of water resources. Key objectives are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water.	The SEA should seek to promote the protection and enhancement of all water resources.
European Commission, *Urban Waste Water Treatment Directive (1991/271/EC)*	
The Directive's objective is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and	The SEA should seek to maintain, protect and improve water quality across the region.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
concerns the collection, treatment and discharge of domestic waste water, mixture of waste water and waste water from certain industrial sectors.	
European Commission *Ambient Air Quality and Cleaner Air for Europe (2008) (Directive 2008/50/EC)*	
The Directive helps to establish objectives for ambient air quality to avoid, prevent or reduce harmful effects on human health and the environment as a whole and promotes increased cooperation in reducing air pollution.	The SEA should seek to help meet regional air quality targets.
European Union Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of effects of certain plans and programmes on the environment	
This provides the legislative framework for SEAs and is also known as the SEA Directive.	The SEA must be in accordance with the SEA Directive.
Ramsar Convention (1971), The Convention on Wetlands of International Importance	
Intergovernmental treaty that outlines the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the sustainable use of all of the wetlands in their territories. It provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.	The SEA should seek to ensure protection of all wetland areas that have the potential to be impacted by options within UU's Draft 2016 Drought Plan.
The Environment Noise Directive (Directive 2002/49/EC)	
The END aims to −define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to the exposure to environmental noise. It also aims to provide the basis for developing EU measures to reduce noise emitted by major sources, in particular road and rail vehicles and infrastructure, aircraft, outdoor and industrial equipment and mobile machinery.	The SEA assessment framework should include for the protection against excessive noise.
United Nations (2002), *Commitments arising from the World Summit on Sustainable Development, Johannesburg*	
The World Summit on Sustainable Development proposed broad-scale principles which should underlie sustainable development and growth. It included objectives such as: • Greater resource efficiency • Work on waste and producer responsibility • New technology development • Push on energy efficiency • Integrated water management plans needed • Minimise significant adverse effects on human health and the environment from chemicals by 2020.	These commitments are the highest level definitions of sustainable development. The DP should be influenced strongly by all of these themes and should seek to take its aims into account. The SEA should seek to promote the achievement of the sustainable development objectives outlined in this plan.
European Commission (2007) Addressing the challenge of water scarcity and droughts in the European Union: *Communication from the Commission to the European Parliament and the Council(COM/2007/0414) & A Resource-Efficient Europe – Flagship Initiative Under the Europe 2020 Strategy (policy review 2012)*	
This Communication builds upon an in-depth assessment of water scarcity and droughts in the EU and presents an initial set of policy options to increase water efficiency and water savings. The policy options are underpinned by a set of more detailed actions/targets to be implemented at the EU and national level which have been the subject of subsequent annual reviews. The main building blocks of the water scarcity and drought policy review are: water efficiency, better planning and adequate implementation instruments. A policy review was undertaken in 2012.	The SEA assessment framework should include objectives, indicators and targets that relate to water resources and drought.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
United Nations (1992), *Convention on Biological Diversity (CBD)*	
The main objectives are: • Conservation of biological diversity • Sustainable use of its components • Fair and equitable sharing of benefits arising from genetic resources	The commitment to conserving biological diversity must be considered in any DP options and the SEA should seek to promote the protection and enhancement of biodiversity.
United Nations Economic Commission for Europe (1998), *Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*	
The Convention: • Links environmental rights and human rights • Acknowledges that we owe an obligation to future generations • Establishes that sustainable development can be achieved only through the involvement of all stakeholders • Links government accountability and environmental protection • Focuses on interactions between the public and public authorities in a democratic context.	Stakeholder and publication consultation is an important part of the SEA process and should be undertaken at the relevant stages of the SEA. SEA should ensure that enough time is provided for consultation on the SEA documents in line with the Aarhus convention of establishing and maintaining a transparent clear framework.
European Union, The Seventh Community Environment Action Programme to 2020	
This sets out a vision by 2050. The three key objectives are: • to protect, conserve and enhance the Union's natural capital • to turn the Union into a resource-efficient, green, and competitive low carbon economy • to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing	The SEA assessment framework should include protection of natural capital, contribution to resource efficient economy and reduce environmental pressures such as air pollution and risks to health and wellbeing.
UN Millennium Declaration (2000) & UN Millennium Development Goals (2002)	
The Millennium Development Goals (MDGs) were developed out of the eight chapters of the United Nations Millennium Declaration, signed in September 2000. There are eight time-bound goals including environmental sustainability, which as two targets – integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources and reduce by half the proportion of people without sustainable access to safe drinking water.	The SEA assessment framework should include sustainable access to safe drinking water.
National	
Ancient Monuments and Archaeological Areas Act 1979	
This act addresses the protection of scheduled monuments including the control of works affecting scheduled monuments. It also addresses archaeological areas.	The DP and SEA should take account of the need to protect scheduled monuments and archaeological areas.
Cabinet Office (2001), National Strategy for Neighbourhood Renewal	
The vision is that, within 10 to 20 years, no-one should be seriously disadvantaged by where they live. People on low incomes should not have to suffer conditions and services that are failing, and so different from what the rest of the population receives. The strategy aims to narrow the gap between the most deprived neighbourhoods and the rest of the country.	The implementation of the DP may have some linkages with this plan, as the continued availability of water is likely to have an impact upon communities across the region. The SEA should seek to address the potential effects of the DP implementation upon communities in the region.
Cadw, CCW and ICOMOS (UK)(International Council on Monuments and Sites) (2001), *Register of Landscapes of Historic Importance*	
Two-volume Register of Landscapes of Historic Interest in Wales. This advisory and non-statutory document highlights what are considered to be the best examples of	The DP and SEA should consider and take account of any potential impacts to heritage landscapes and assets.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
different types of historic landscape in Wales and was the first step towards raising the profile of historic landscapes in Wales.	
National Planning Policy Framework	
Presumption in favour of sustainable development. Core planning principles include taking account of the development needs of an area; contribute to conserving and enhancing the environment; re-use of previously developed land; conserve heritage assets; deliver sufficient community facilities to meet local needs. Delivering sustainable development includes: • Building a strong competitive economy; • Supporting a prosperous rural economy; • Promoting sustainable transport; Requiring good design; • Promoting healthy communities; Protecting green belt land; • Meeting the challenge of climate change, flooding and coastal change; • Conserving and enhancing the natural environment; • Conserving and enhancing the historic environment; • Facilitating the sustainable use of minerals.	The DP and SEA should take account of the key components of sustainable development.
Conservation of Habitats and Species Regulations 2010 (as amended by the Conservation of Habitats and Species (Amendment) Regulations 2011 and 2012)	
The Habitats Regulations are the principal means by which the Habitats Directive is transposed in England and Wales as such its main objective is to promote the maintenance of biodiversity.	The impacts of the DP options species diversity must be considered as part of the SEA.
Countryside Council for Wales (CCW) (2003), *Priority Habitats of Wales*	
Gives information about Wales' priority habitats, as identified by UK Biodiversity Action Plans.	The DP and SEA objectives will need to consider the protection of priority habitats.
DECC (2010) *CRC Energy Efficiency Scheme*	
The CRC Energy Efficiency Scheme is a Government backed legislative carbon emissions trading scheme and will cover large business and public sector organisations. CRC is intended to have a significant impact on reducing UK carbon emissions and offers the potential to save money through energy efficiency. It is designed to drive changes in behaviour and infrastructure, generate corporate awareness of the detrimental impacts of carbon emissions, and improve energy management practice.	The CRC Energy Efficiency Scheme is a new Government backed legislative carbon emissions trading scheme and will cover large business and public sector organisations. CRC is intended to have a significant impact on reducing UK carbon emissions and offers the potential to save money through energy efficiency. It is designed to drive changes in behaviour and infrastructure, generate corporate awareness of the detrimental impacts of carbon emissions, and improve energy management practice.
Environment Agency (2015) *CRC Energy Efficiency Scheme Guide for Participants Phase 2 (2014-2015 to 2018-2019)*	
The CRC Energy Efficiency Scheme is a mandatory scheme aimed at improving energy efficiency and cutting carbon dioxide emissions in large public and private sector organisations. The scheme is designed to drive changes in behaviour and infrastructure, generate corporate awareness of the detrimental impacts of carbon emissions, and improve energy management practice.	The SEA should cover topics that will help to ensure that carbon emissions are reduced.
DECC (2011) *National Policy Statements for Energy Infrastructure*	
The energy National Policy Statements (NPSs) set out national policy against which proposals for major energy projects will be assessed and decided on by the Infrastructure Planning Commission. The purpose of the NPSs is to develop a clear, long-term policy framework which facilitates investment in the necessary new infrastructure (by the private sector) and in energy efficiency. It highlights that the construction, operation and decommissioning of infrastructure can lead to increased demand for water, involve discharges to water	The SEA should consider the cumulative effects of the DP and any major energy proposals which may affect the availability of water in the United Utilities supply area.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
and cause adverse ecological effects resulting from physical modifications to the water environment.	
Defra (2007), *Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt*	
The guiding principles described in this document summarise current thinking on how to reduce the impacts of climate change on biodiversity and how to adapt existing plans and projects in the light of climate change. The guidance is intended to inform implementation of the UK Biodiversity Action Plan, taking account of climate change is relevant to the fulfilment of many international agreements and obligations affecting the UK.	The SEA must consider the impacts on biodiversity whilst also taking into account the potential for future climate change.
Defra 2011 UK National Ecosystem Assessment and Defra, 2014, UK National Ecosystems Assessment Follow on, Synthesis of Key Findings	
Ecosystems services from natural capital contribute to the economic performance of the nation. Information and tools to enable decision makers to understand the wider value of ecosystems and their associated services.	For the purposes of the readership integrating an ecosystems services approach into the SEA is not being undertaken. However, it is realised that through the 'Objective-led' approach, many of the services relevant to the DP can be considered through the objectives and key questions for example: • Provisioning Services: Freshwater • Provisioning Services: Biodiversity • Regulating Services: Water Regulation • Cultural services: Recreation and ecotourism • Cultural services: Cultural heritage values • Cultural services: Aesthetic The SEA should ensure the DP affects the related provisioning services in the least damaging way through informing the DP formulation and selection of DP options during times of Drought. In the event of further guidance being issued on incorporating ESA into SEA, the anticipated approach is sufficiently flexible that it should be able to accommodate this (subject to timing).
Defra (2010), *Eel Management Plans for the United Kingdom*: Dee River Basin District; Eel Management Plans for the United Kingdom: Northwest River Basin District	
These plans aim to achieve an escapement of silver eel to the spawning population that equals or exceeds a target set at 40 per cent of the potential biomass that would be produced under conditions with no anthropogenic disturbance due to fishing, water quality or barriers to migration. The aim of each Eel Management Plan is to describe the nature of the eel population and fishery in the RBD, to assess whether the stock is meeting its 40 per cent escapement target, and to present management actions that will ensure the long-term viability of the eel population.	The SEA should consider the potential impacts of the DP on eel populations and escapement targets.
Defra (2008), *England Biodiversity Strategy –climate change adaptation principles*	
Government strategy presenting five principles that are fundamental to conserving biodiversity during climate change. The precautionary principle underlies all the principles.	The SEA must consider the impacts on biodiversity whilst also taking into account the potential for future climate change.
Defra (2008), *Future Water: the Government's water strategy for England*	
This strategy is the high level Government document which outlines how the Government wants the water sector to look by 2030, considering issues of water demand, water supply, water quality in the natural environment, surface water drainage, river and coastal flooding, greenhouse gas emissions and charging.	The SEA should seek to ensure that the themes included in the strategy objectives are also reflected in the SEA objectives, particularly around water quality in the region, the quality of aquatic ecology, drinking water quality, flood risk, resource use, energy use and greenhouse gas emissions, and adaptation to climate change.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
that "by 2030 at the latest, we have: • Improved the quality of our water environment and the ecology which it supports, and continued to provide high levels of drinking water quality from our taps • Sustainably managed risks from flooding and coastal erosion, with greater understanding and more effective management of surface water • Ensured a sustainable use of water resources, and implemented fair, affordable and cost-reflective charges.	
Defra (2015) The Great Britain Invasive Non-native Species Strategy	
The Strategy is intended to provide a strategic framework, updated from the 2008 framework, within which the actions of government departments, their related bodies and key stakeholders can be better co-ordinated. Its overall aim is to minimise the risks posed, and reduce the negative impacts caused, by invasive non-native species in Great Britain.	The implementation of the DP may influence biodiversity in the north west and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.
Defra (2010), *Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network*	
This independent review of England's wildlife sites and the connections between them sets objectives and recommendations to help achieve a healthy natural environment that will allow our plants and animals to thrive.	The SEA should seek to maintain or enhance the quality of habitats and biodiversity.
Defra (2005), *Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England*	
The strategy outlines how to manage the risks from flooding and coastal erosion in the UK. The strategy aims to reduce the threat of flooding to people and their property, and to deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.	The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the DP.
Defra (2006) *Shoreline Management Plan Guidance*	
A shoreline management plan (SMP) is a coastal defence management tool. It is a large-scale assessment of the risks associated with coastal processes and helps to reduce these risks to people and the developed, historic and natural environment. This guidance document sets out Defra's and the Welsh Government's strategy for managing flooding and coastal erosion.	The SEA should take into account the effects of the DP on areas with a SMP.
Defra (2000) *Waterways for Tomorrow*	
The key objective of this document is the promotion of waterways, encouraging their use and development whilst maximising the opportunities the waterways offer for leisure and recreation as a catalyst for urban and rural regeneration and for freight transport. The strategy also encourages the innovative use of waterways such as water transfer	The implementation of certain DP options may have an effect upon waterways and leisure/recreation. The SEA should seek to ensure that the quality of the regions waterways are maintained or enhanced.
Defra (2004), *Rural Strategy*	
The strategy sets out rural and countryside policy, and draws upon from lessons learnt following the rural white paper. Objectives include supporting economic and social regeneration across rural England and enhance the value of the countryside and protect the natural environment for this and future generations.	The implementation of certain DP options may have an effect upon rural communities and the countryside. The SEA should also seek to ensure that the quality of the regions landscapes, natural resources and biodiversity are maintained or enhanced.
Defra (2005), *Securing the Future: Delivering UK Sustainable Development Strategy*	
The strategy for sustainable development aims to enable all people to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. The strategy places a focus on protecting natural resources and enhancing the environment.	The SEA must seek to ensure that objectives relating to sustainable development, sustainable resource use and protecting the natural environment, are considered when assessing the potential impacts of the DP.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
Defra (2004), *The First Soil Action Plan for England*	
This plan is a comprehensive statement on the state of the UK's soils and how Government and other partners were working together to improve them. Ensure that England's 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.	The SEA should seek to ensure that the quality of the regions land, including soils, is protected or enhanced.
Defra (2002), *The Strategy for Sustainable Farming and Food – facing the future*	
This strategy sets out how industry, Government and consumers could work together to secure a sustainable future for our farming and food industries. The strategy's objectives are to support the viability and diversity of rural and urban economies and communities, respect and operate within the biological limits of natural resources (especially soil, water and biodiversity) and achieve consistently high standards of environmental performance by reducing energy consumption, by minimising resource inputs, and use renewable energy wherever possible.	The implementation of the DP may have some indirect links with the food industry, through ensuring the availability of water for food based activities. The SEA should also seek to promote the most effective use of the regions natural resources, including soil, biodiversity and energy resources.
Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*	
The Air Quality Strategy sets out air quality objectives and policy options to further improve air quality in the UK to benefit public health, quality of life and help to protect our environment.	The DP should take account of air quality objectives in the strategy. The SEA should include guide questions relating to the effects of options on human health and the environment.
Defra (2009*) The Groundwater (England and Wales) Regulations 2009*	
The Groundwater Regulations are designed to implement a daughter directive to the European Water Framework Directive and prevent or limit the inputs of polluting substances into groundwater.	The SEA should include an objective relating to the effects of options on groundwater quality.
Defra (2009) *Safeguarding our Soils – A Strategy for England*	
The objective of the strategy is to improve the quality of England's soils and safeguard their ability to provide essential services for future generations.	The SEA should include an objective relating to the effects of options on soils.
Defra (2012) *National Policy Statement for Waste Water*	
National Policy Statement (NPS) sets out Government policy for the provision of major waste water infrastructure. It will be used by the Infrastructure Planning Commission (IPC) to guide its decision making on development consent applications for waste water developments that fall within the definition of Nationally Significant Infrastructure Project (NSIP) as defined in the Planning Act 2008.	The SEA should seek to ensure the DP considers any unforeseen NSIP proposals that come forward prior to adoption which may affect water resources in the United Utilities area.
Defra (2002), *Working with the grain of nature: a biodiversity strategy for England*	
The Strategy seeks to embed biodiversity considerations into public policy and sets out a programme for the next five years to make the changes necessary to conserve and enhance biodiversity. The strategy sets out a number of indicators for biodiversity which are to be monitored by Defra, including the condition of Sites of Special Scientific Interest, populations of wild birds and progress with implementing biodiversity action plans (BAPs).	The implementation of the DP may influence biodiversity in the north west and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regards of priority species identified in BAPs.
Defra, 2011, Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services	
The objective for the next decade is: 'to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.' Four action areas are:	The SEA must consider impacts on biodiversity. The implementation of the DP may influence biodiversity in the area and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take account of priority species. Also, people are at the heart of biodiversity policy.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
• A more integrated large-scale approach to conservation on land and at sea • Putting people at the heart of biodiversity policy • Reducing environmental pressures • Improving our knowledge.	
Defra (2015) The government's response to the Natural Capital Committee's third State of Natural Capital report	
This provides a number of recommendations such as: • Agreement for the development of a 25 year plan for a healthy natural economy. This includes helping organisations understand the economic, social and cultural value the impact their actions have on it and how to use the knowledge for better decisions; identify most important and threatened environmental assets; protection of designated areas; address outstanding monitoring and data issues to enable better decisions about strategic investments in natural capital. • Assigning institutional responsibility for monitoring the state of natural capital. • Organisations that manage land and water assets should create a register of natural capital for which they are responsible.	Outputs from the SEA process will help to inform any future potential development by United Utilities of Natural Capital Accounting (NCA) approaches to assessing environmental asset performance. Government (led by HM Treasury and Defra) is increasingly using NCA to support future environmental policy and decision-making, and there may be future expectations on water companies to follow suit.
Defra (2016) Creating a great place for living: Defra's Strategy to 2020	
In 2016 Defra produced a report that set out objects to great a great place for living, The objectives are related to the following topics: • Environment – a cleaner, healthier environment, benefiting people and the economy; • Food and farming – a world-leading food and farming industry; • Rural – a thriving rural economy, contributing to national prosperity and wellbeing; • Protection – a nation better protected against floods, animal and plant diseases and other hazards, with strong response and recovery capabilities; • Excellent Delivery – Excellent delivery, on time and to budget with outstanding value for money; • An outstanding organisation – an organisation striving to be the best, focused on outcomes and constantly challenging itself.	The SEA must take into account impacts of the drought options (construction and operation) on the environment, as well as the population and human health and land use (which will impact on the food and farming and rural objectives).
Defra and Environment Agency (2015) How to Write and Publish a Drought Plan	
This sets out how to assess the environmental effects of actions to maintain supply and how to mitigate. An environmental assessment must include details of changes as a result of actions to: • Water flow or level regimes • Water quality • Ecology (sensitive features, habitats and species) • Designated sites (habitats and species) • Fish populations (in particular migratory fish) Additionally an assessment must include effects on WFD status and consider effects on river basin management plans.	The SEA must take into account the approach to environmental assessment and what needs to be done to mitigate or reduce adverse effects and provide compensation for effects that remain following mitigation.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
Assessments should also take into account the Handbook for Scoping Projects: Environmental Assessment and the EcIA Guidelines. For SEAs of a drought plan, guidance should be followed in the DCLG (2005) Practical Guide to the Strategic Environmental Assessment Directive and UKWIR (2012) Strategic Environmental Assessment and Habitats Regulations Assessment: Water Resources Management Plans and Drought Plans. Need to identify what needs to be done to mitigate or reduce adverse effects and provide compensation for effects that remain following mitigation. This includes the identification of pre-drought, in-drought and post drought mitigation actions.	
Department for Culture, Media and Sport (2001), *The Historic Environment – A Force for the Future*	
This strategy outlines the Governments policy regarding the historic environment. The strategy has key aims and objectives that demonstrate the contribution the historic environment makes to the country's economic and social well being.	The implementation of the DP may have an influence on the heritage of the region, particular if options include changes to land use. The SEA should seek to ensure any adverse effects to heritage are minimised or avoided altogether.
Department of Trade and Industry (2003), *Energy White Paper. Our Energy Future: Creating a Low Carbon Economy*	
The long-term the aim of the white paper is to cut the UK's carbon dioxide emissions by 60% by the year 2050. Key objectives include maintaining the reliability of energy supplies, promoting competitive markets to help sustainable economic growth and improved productivity and ensuring that every home is adequately and affordably heated.	The implementation of the DP may have an influence upon United Utilities' total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy.
Department of energy and climate change, Planning our electric future: a White Paper for secure, affordable and low carbon electricity (2011)	
This white paper outlines a package of reforms so that by 2030 there will be a flexible, smart and responsive electricity system, powered by a range of low carbon sources of electricity. This includes engaging with consumers on energy use. Decarbonsiation is important in meeting the 2050 targets.	The implementation of the DP may have an influence upon United Utilities total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.
English Heritage (2008), *Climate Change and the Historic Environment*	
Sets out the current thinking on the implications of climate change for the historic environment. It is intended both for the heritage sector and also for those involved in the wider scientific and technical aspects of climate change; in the development of strategies and plans relating to the impact of climate change; or in projects relating to risk assessment, adaptation and mitigation.	The SEA should seek to assess the implications of the DP in combination with climate change and the potential impacts on heritage and the historic environment.
English Heritage (2010), *Heritage at Risk*	
Heritage at Risk is a national project that aims to identify the endangered sites (historic buildings and places with increased risks of neglect and decay) and then help secure them for the future. Heritage at Risk Registers were most recently published in 2015.	The SEA should seek to protect and enhance heritage and landscape.
Environment Act, 1995	
The Environment Act set up the EA to manage resources and protect the environment in England and Wales	The SEA should seek to promote the protection and enhancement of all water resources without having negative effects on other aspects of the Environment.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
Environment Agency (2004), *Catchment Flood Management Plans: Guidelines – Volume 1 Policy*	
These guidelines support the EA's strategy for flood risk management and work towards achieving the government's strategy for flood and coastal erosion flood risk management. The aims of Catchment Flood Management Planning is: • To promote sustainable flood risk management measures • To reduce the sources of flooding and harm to people, and the natural, built and historic environment caused by floods • To support the delivery of the Government's and others' policies and targets, and the Environment Agency's environmental vision.	The DP links to this plan where it affects flood risk or land management, for example through changes in abstraction or water storage. The SEA should consider how the DP may affect flood risk across the region.
Environment Agency (2014) Corporate Plan 2014 - 2016	
The strategy sets out the EA's priorities for the environment between 2014 and 2016. Priority areas include: • A changing climate • Increasing the resilience of people, property and businesses to the risks of flooding and coastal erosion • Protecting and improving water, land and biodiversity	The SEA should seek to ensure that priorities are also reflected in the SEA objectives particularly regarding the protection and improvement of water, land and biodiversity.
Environment Agency (2013), *Managing Water Abstraction*	
This sets out how the EA manages water resources in England and Wales.	The SEA should consider the range of impacts that changes to abstractions could have on the environment, including water bodies, biodiversity, and water users.
Environment Agency (1999), *Restoring Sustainable Abstraction Programme*	
Investigative programme to identify sites at risk of environmental damage from abstraction licences. The RSA programme is a way of prioritising and progressively examining and resolving these concerns. EA investigation of designated sites (Natura2000, Sites of Special Scientific Interest (SSSI), Local Nature Reserves (LNR)) potentially at risk – leading to proposals for licence amendment for sustainable abstraction.	The SEA should take into account those sites that have been identified by the RSA as being at risk from environmental damage from abstraction licences and assess the implications of the DP.
Environment Agency (2009), *Water for People and the Environment - Water Resources Strategy for England and Wales*	
This is the national EA strategy for water resource management in the long term. It looks to 2050 and considers the impacts of climate change, the water environment, water resource and valuing water. Aims and objectives include: • Ensure water is used efficiently in homes and buildings, and by industry and agriculture • Provide greater incentives for water companies and individuals to manage demand • Share existing water resources more effectively	The SEA should seek to ensure that strategy objectives are also reflected in the SEA objectives, particularly around water resource use and availability in the region.
Environment Agency, *WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation. EA, undated*	
This paper describes the method used to assess the likelihood of river water bodies achieving the relevant WFD objectives as a result of artificial influences on low river flows.	Implementation of the DP may impact river water quality. The SEA should seek to promote the protection and enhancement of biodiversity and river water quality across the region.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
Environment Agency, *Shoreline Management Plans*	
A large-scale assessment of the risks associated with coastal processes with the aim to help reduce these risks to people and the developed, historic and natural environments. Coastal processes include tidal patterns, wave height, wave direction and the movement of beach and seabed materials. The second generation of Shoreline Management Plans (SMPs) are in production, covering the entire 6000 kilometres of coast in England and Wales. This generation of plans aim to incorporate sea level rise resulting from climate change and current defences with limited life and improvement requirements.	The SEA should seek to promote a reduction of the risks identified in the Shoreline Management Plans.
Environment Agency *(2007), Soil: A Precious Resource*	
The soil strategy identifies the Environment Agency's priorities, sets out their role and says what action is to be taken to protect, manage and restore soil. Damaged soil structure can lead to flooding, water pollution and can affect the landscape and archaeological features. The strategy also outlines the part managing soils can play in mitigating climate change.	The DP should ensure the sustainable management of soil resources. SEA objectives should reflect and consider relevant priorities from the Soil: A Precious Resource publication.
Environment Agency Wales, *Salmon Action Plans*	
The Environment Agency Wales has prepared a series of action plans, based on river catchments, setting out what needs to be done to support and restore salmon populations. A total of 63 plans were being prepared for salmon rivers in England and Wales by 2002 as part of the Agency's National Salmon Management Strategy. The Plans identify and cost a series of actions designed to help safeguard and improve Salmon populations. A revised approach for the protection of wild salmon has been determined by Natural Resources Wales and an action plan is being developed.	The SEA should seek to maintain or enhance the quality of habitats and biodiversity particularly those of Salmon identified in the Action Plans. The SEA will cover fish passage as an element of at least one sustainability objective.
Environment Agency Wales (2009), *Water Resources Action Plan*	
This action plan for Wales includes the actions the Environment Agency will take to progress towards delivering the aims and objectives of the Water Resource Strategy for Wales. The action plan sets out the initial steps to take towards securing the long-term future of water resources in Wales.	The SEA should seek to ensure that water supplies and resources are maintained or enhanced in line with the Water Resources Strategy for Wales.
Environment Agency (2010), *Water Resources Action Plan for England and Wales*	
The strategy has four main aims: • Adaptation to and mitigation of climate change; • A better water environment; • Sustainable planning and management of water resources; • People valuing water and the water environment.	The SEA should seek to ensure that strategy objectives are also reflected in the SEA objectives particularly regarding the sustainable management of water resources and protecting the environment.
Environment Agency (2005) *Cleaner Coasts, Healthier Seas: EA Marine Strategy*	
This strategy aims to create cleaner coasts and healthier seas by promoting sustainable development; integrating management between land and sea; providing efficient regulation of our coasts and coastal waters and ensuring that we all value our coastal and marine environment.	The SEA should note if the options have specific effects on the coastal or marine environment.
Environment Agency (2003) Chemical Strategy	
This sets out how the EA will prioritise its work to reduce chemical risks to health and also the environment.	The SEA should take this account as chemicals may be used for water quality.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
HM Government, (2012) Marine Strategy	
The Marine Strategy Framework Directive requires member states to put in place measures to achieve Good Environmental Status (GES) in their marine waters by 2020. The strategy includes GES targets and indicators.	The SEA should note if the options have specific effects on the coastal or marine environment.
Environment Agency (2008) *Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021*	
The strategy has the goal of more sea trout and more salmon in more rivers bringing more benefit. There are three broad targets for the strategy relating to 1) self-sustaining sea trout and salmon in abundance in more rivers, economic and social benefits optimised for sea trout and salmon fisheries and 3) widespread and positive partnerships, producing benefits	The DP and SEA should take the strategy into account where the option may have an effect on salmon and trout e.g. where an option may involve inserting or removing a barrier to fish.
Environment Agency (2009), *Water Resources Strategy for England and Wales*	
Launched on 30 March 2009, covering the actions that the Environment Agency believes need to be taken to ensure that there is enough water for people and wildlife in the face of future pressures. These include: • climate change • population growth • diffuse pollution • water for wildlife and wetlands The strategy looks at resource management for Wales to 2050 and beyond.	The SEA should seek to ensure that water supplies and resources are maintained or enhanced.
Environment Agency Wales Salmon Action Plans	
Salmon stock performance in specific rivers.	The DP and SEA should ensure salmon are not affected.
Environment (Wales) Bill 2015 (currently anticipated to receive Royal Assent by Spring 2016)	
This introduces new legislation for the environment and other commitments such as positioning Wales as a low carbon, green economy. Key parts of the bill include: • Sustainable management of natural resources. • For climate change, powers to put in place statutory emission reduction targets and carbon budgeting. • Improvements to waste management processes. • Fisheries, shellfish and marine licensing. • Clarifications regarding flood risk management and land drainage.	The SEA should seek to ensure that this emerging legislation is reflected in the SEA objectives particularly regarding the sustainable management of natural resources.
Flood and Water Management Act, 2010, as amended	
The Flood and Water Management Act 2010 aims to provide better, more comprehensive management of flood risk for people, homes and businesses. It aims improve efficiency in the water industry, improve the affordability of water bills for certain groups and individuals, and help ensure continuity of water supplies to the consumer.	The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the DP and that water supplies across the region are maintained.
Historic England (2013) Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment	
Guidance for addressing the historic environment in Strategic Environmental Assessment or Sustainability Appraisal. It identifies the recommended list of plans, programmes and policies for review, approach to baseline review, potential sustainability issues.	The SEA should consider the potential effects of the DP on the historic environment, particularly designated assets and their settings, and to important wetland areas with potential for paleo-environmental deposits. Sustainability issues, objectives and indicators identified in this document should be taken into account in the SEA.
HM Treasury Infrastructure UK (2014) *National Infrastructure Plan*	
The Plan focuses on economic infrastructure: the networks and systems in energy, transport, digital communication, flood protection, water and waste	The DP could result in the production of additional waste. The SEA should seek to reduce the production of waste and ensure it is treated in line with the widely

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
management. These are all critical to support economic growth through the expansion of private sector businesses across all regions and industries, to enable competiveness and to improve the quality of life of everyone in the UK. The objectives for the water sector are 'to secure a fair deal for customers while enabling water companies to continue to attract low-cost investment needed to provide the high quality, resilient water services customers want.'	adopted 'waste hierarchy' and not sent to landfill. The DP can contribute to the providing resilient water services.
Natural Environment and Rural Communities Act, 2006	
This Act makes provision about bodies concerned with the natural environment and rural communities in connection with wildlife, sites of special scientific interest, National Parks and the Broads. The Natural Environment and Rural Communities Act is designed to help achieve a rich and diverse natural environment and thriving rural communities.	The SEA should seek to maintain or enhance the quality of habitats and biodiversity. The impacts of the DP on any designated features, as highlighted in the Natural Environment and Rural Communities Act, should be addressed.
ODPM (2003), *Sustainable Communities Plan – Building for the future*	
The Plan sets out a long-term programme of action for delivering sustainable communities in both urban and rural areas. Key objectives include: • Ensuring all communities have a clean, safe and attractive environment in which people can take pride • Land, countryside and rural communities - ensure that in tackling housing shortages the countryside is protected and enhanced rather than creating urban sprawl • Address housing needs of rural communities who are often the guardians of the countryside.	The implementation of the DP may have an effect upon local communities, either through its role in maintaining supplies of water or through changes in land use and this should be considered during the SEA.
ODPM (2000), *Urban white paper: our towns and cities*	
The urban white paper sets out a vision for towns, cities and suburbs which offer a high quality of life and opportunity for all. The white paper sets out a vision with: • Good design and planning which makes it practical to live in a more environmentally sustainable way, with less noise, pollution and traffic congestion • Good quality services health, education, housing, transport, finance, shopping, leisure and protection from crime that meet the needs of people and businesses wherever they are.	The implementation of the DP may have some linkages with this plan, as the continued availability of water is likely to have an impact upon the residents of towns and cities across the region. The SEA should seek to address the potential effects upon the local communities, promote the use of sustainable water management and seek to ensure equality and prosperity for all, across the region.
Planning (Listed Buildings and Conservation Areas) Act 1990	
This addresses listed buildings including prevention of deterioration and damage and preservation and enhancement of conservation areas.	The DP and SEA should take account of the need to protect listed buildings and conservation areas.
Salmon and Freshwater Fisheries Act, 1975	
The Act lays down the present basic legal framework within which salmon and freshwater fisheries in England are regulated. Proposals have been made to extend the legislation to apply to more fish species e.g. coarse fish, eel and lamprey species. These proposals are currently under review. The Act covers legislation on fishing methods and related offences, obstructions to fish passage, salmon and freshwater fisheries administration and law enforcement. Proposed extensions to the legislation (under review) include the provision of fish passes and screening of water abstraction and discharge points for coarse fish, eel and lamprey species.	The Act provides statutory requirements for maintaining fish passage. The SEA will cover fish passage as an element of at least one sustainability objective. The SEA should seek to address any potential issues or effects on existing measures to address fish passage.

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Well-being and Future Generations (Wales) Act 2015	
This makes provision for sustainable development and a well-being duty on public bodies.	Well being objectives need to be taken into account in the SEA.
The Countryside and Rights of Way (CROW) Act, 2000	
The Act provides for increased public access to the countryside and strengthens protection for wildlife. The main provisions of the Act are as follows: • Extends the public's ability to enjoy the countryside whilst also providing safeguards for landowners and occupiers • Creates new statutory right of access to open country and registered common Land Use Consultants • Modernises Right of Way system • Gives greater protection to SSSIs • Provides better management arrangements for AONBs • Strengthens wildlife enforcement legislation.	The DP may have an effect on public access to the countryside and a significant proportion of UU water supply area is designated as AONB. The SEA should include objectives that take into account public access, protection of SSSIs and the management of relevant AONBs.
The Eels (England and Wales) Regulations 2009	
Implement European Council Regulations 1100/2007 establishing measures for the recovery of the stock of European eel. The Regulations will help implement delivery Eel Management Plans. They address eel records and re-stocking, close season and reduction of fishing effort, passage of eels and entrainment. Stocks of the European eel (*Anguilla anguilla*) is outside safe biological limits across European waters. Measures need to be introduced to reduce the exploitation of all life stages of the eel and restore their habitats. Council Regulation No 1100/2007, to establish measures for the recovery of the stock of European eel, was agreed to enable cohesive measures to be taken by all Member States. The key objective is to ensure that at least 40% of the potential production of silver eels returns to the sea to spawn. This will be achieved by reducing exploitation of all life-stages of the eel and restoration of their habitats.	The SEA should seek to should seek to maintain or enhance the quality of habitats and biodiversity, and take regard of protected species identified. This should include migratory fish species and their migratory passage.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015	
This amends the 2009 regulations which brought into force rules to force polluters to prevent and repair damage to water systems, land quality, species and their habitats and protected sites. The polluter does not need to be prosecuted first, so remedying the damage will be faster. Applies to the most serious categories of environmental damage, including: • Contamination of land that results in a significant risk of adverse effects on human health • Adverse effects on surface water or groundwater consistent with a deterioration in the water's status • Adverse effects on the integrity of a Site of Special Scientific Interest (SSSI) or on the conservation status of species and habitats protected by EU legislation outside SSSIs.	The SEA should seek to ensure that the guidance provided by the plan is considered when assessing the DP.
The Water Resources Management Plan Regulations 2007	
This provides the legislation for the preparation of water resources management plans.	The DP should take account of these requirements.

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The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010	
Directions to the Environment Agency for implementation of Article 8 of the WFD. The Directions stipulate how the Environment Agency should classify surface water and groundwater bodies, and how monitoring of status should be undertaken.	The SEA should seek to ensure that the guidance provided by the plan are considered when assessing the DP and any aspects in it that may influence or involve surface waters or groundwater. The guidance could contribute to the formulation of any criteria for assessing significance of effects.
The Water Act, 2003	
The Water Act 2003 is in three Parts, relating to water resources, regulation of the water industry and other provisions. The four broad aims of the Act are: • The sustainable use of water resources • Strengthening the voice of consumers • A measured increase in competition • The promotion of water conservation.	The implementation of the DP may have an effect through its role in maintaining supplies of water. The SEA should seek to promote sustainable use of water resources.
The Water Environment (WFD) (England and Wales) Regulations, 2003	
These Regulations make provision for the purpose of implementing in river basin districts within England and Wales The Water Framework Directive (2000/60/EC) of the European Parliament. The Regulations require a new strategic planning process to be established for the purposes of managing, protecting and improving the quality of water resources.	The SEA should seek to promote the protection and enhancement of all water resources. The SEA should seek to maintain, protect and improve water quality across the region and ensure efficient use of resources.
UK Climate Projections UKCP09. UKCIP, 2009	
The UKCP09 Projections provide a basis for studies of impacts and vulnerability and decisions on adaptation to climate change in the UK over the 21st century. Projections are given of changes to climate, and of changes in the marine and coastal environment; recent trends in observed climate are also discussed. The methodology gives a measure of the uncertainty in the range of possible outcomes; a major advance beyond previous national scenarios The Projections will allow planners and decision-makers to make adaptations to climate change. In order to do so they need as much good information as possible on how climate change will evolve. They are one part of a UK government programme of work to put in place a new statutory framework on, and provide practical support for, adaptation.	The DP does take account of UKCP09 projections as its formulation through the WRMP process which takes account of climate change in its supply and demand projections. The SEA should also use UKCP09 projections in the broader assessment of climate change effects and any potential cumulative effects. For example the ecological requirements of aquatic habitats that may be affected by the DP will also be influenced by climate change.
UKTAG: Phase 3 Review of Environmental Standards	
UKTAG prepares technical guidance designed to facilitate consistent implementation of the WFD in the UK. This report identifies standards for certain chemicals known as specific pollutants, developments in assessments of risk to groundwater, non-native species, standards for flows in rivers, standards for levels in lakes, standards for acidity in rivers and standards in intermittent discharges.	The SEA should seek to ensure that the guidance provided by the plan are considered when assessing the DP, especially with respect to objectives relating to ecology, water quality and water quantity. The SEA should also ensure the guidance in the plan is used in relation to other related regulations for example the Habitats Directive. The guidance could contribute to the formulation of any criteria for assessing significance of effects.
UK Marine and Coastal Access Act, 2009	
The purpose of the Act is to improve and simplify arrangements for managing marine development and protecting the marine environment and biodiversity, including a new planning system for the marine area, and provide greater recreational access to the English coast. The Act includes elements that aim to:	There may be a link with the DP through management measures for migratory fish species. The SEA should seek to ensure migratory fish species and management measures for their passage are adequately covered in the assessment.

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Strengthen and modernise the licensing and management of marine, migratory, freshwater and shellfish fisheries, including creating new Inshore Fisheries and Conservation Authorities and introducing a scheme to manage live fish movement Streamline and modernise enforcement powers for fisheries and nature conservation, providing a civil sanctions scheme for licensing and nature conservation offences and an administrative penalty scheme for domestic fisheries offences.	
Urban Waste Water Treatment Regulations 1994, as amended 2003	
These Regulations transcribing the Urban Waste Water Treatment Directive (1991/271/EC) into law in England & Wales.	The SEA should seek to maintain, protect and improve water quality across the region.
Water Resources Act, 1991 (Amendment) (England and Wales) Regulations 2009 SI3104	
Amends Water Resources Act 1991 by extending the use of Water Protection Zones and Works Notices, in particular to deal with harm to aquatic ecosystems caused by the physical characteristics of a water course or lake, such as quantity, structure and substrate of river/lake bed. Aligns the Water Resources Act with the hydromorphological requirements of the WFD	The SEA should include objectives that cover hydromorphological aspects and seek to ensure that hydropmorphological features within the plan are maintained or enhanced. The guidance could contribute to the formulation of any criteria for assessing significance of effects.
Wales Biodiversity Partnership Section 42 Species and Habitats of Principle Importance to Wales	
This is the definitive list of habitats and species of principal importance in Wales.	The SEA should seek to protect these species and habitats.
Welsh Assembly Government (2014) National Strategy for Flood and Coastal Erosion Risk Management	
The objectives are: • Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion. • Raising awareness of and engaging people on flood and coastal erosion risk. • Providing an effective and sustained response to flood and coastal erosion events • Prioritising investment in the most at risk categories.	The SEA should seek to ensure that flood risk and coastal erosion in the region is not adversely affected by the implementation of the DP and that water supplies across the region are maintained.
Welsh Assembly Government (consultation document 2012), Sustaining a *Living Wales: a* green paper on a new approach to natural resource management.	
This consultation document sought views on proposed changes to the governance and delivery of the management and regulation of the environment in Wales based on the ecosystem approach.	The SEA must consider the impacts of the DP on potential water resources. SEA objectives must address issues of biodiversity and nature conservation.
Welsh Assembly Government (2012), State of the Environment Report – Wales	
This bulletin presents an overview of progress against the Welsh Assembly Government's Environment Strategy. It summarises the latest information on the indicators monitoring the progress. The results for individual indicators are presented in a series of electronic reports.	The DP must support the commitment to sustainable use of water resources, minimisation of pollution and impact on the environment. The SEA must include targets that will allow the DP to be assessed against those set out in the Environment Strategy for Wales.
Welsh Assembly Government (1997), *Technical Advice Note 13: Tourism*	
The Technical Advice Note (Wales) (TAN) should be read in coniunction with Planning Guidance (Wales): Planning Policy. Planning Guidance. This TAN provides advice on: • Hotel development; Holiday and touring caravans; • Seasonal and holiday occupancy conditions.	The SEA must consider relevant planning policy and planning guidance and consider the impacts of the DP on potential water resources that are used to provide tourist facilities across the region.

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Welsh Assembly Government (2004), *Technical Advice Note 15: Development and Flood Risk*	
Technical Advice Note (TAN) 15 provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding. Advice is given on: • Development advice maps • Nature of development or land use • Justifying the location of built development • Assessing flooding consequences • Surface water run-off from new development • Action through Development Plans • Development Control	The SEA must consider any development or construction that may be required in order to facilitate certain options within the DP and any potential changes to flood risk that may occur as a result.
Welsh Assembly Government (2006), *Environment Strategy for Wales*	
Provides a framework within which to achieve an environment which is clean, healthy, biologically diverse and valued by the people of Wales. Key environmental topics that are addressed include: • Climate change • Biodiversity, landscapes and seascapes • The local environment • Environmental hazards	The DP must support the commitment to sustainable use of water resources, minimisation of pollution and impact on the environment. The SEA must include targets that will allow the DP to be assessed against those set out in the Environment Strategy for Wales.
Welsh Assembly Government (2008) *Fisheries Strategy*	
In 2008, the Welsh Assembly Government launched the Wales Fisheries Strategy, which aims to 'support the development of viable and sustainable fisheries in Wales as an integral part of coherent policies for safeguarding the environment'. To achieve the goals of the Strategy, the Welsh Assembly Government and the Commercial Fisheries, Aquaculture, Recreational Sea Angling and Inland Fisheries sectors, in partnership with fisheries management and nature conservation representatives, have developed an Implementation Plan.	The SEA must consider the impacts of the DP on fish habitats in order to support the aim of Welsh Assembly Government to support the development of sustainable fisheries.
Welsh Assembly Government (2013) Wales Marine and Fisheries Strategic Action Plan	
This plan aims to provide a framework for clean, healthy, safe, productive and biologically diverse areas.	The SEA must consider the impacts of the DP on the marine environment and on fish habitats in order to support the aim of Welsh Assembly Government to support the development of sustainable fisheries.
Welsh Assembly Government (2008*), People, Places, Futures: The Wales Spatial Plan 2008 Update*	
The Wales Spatial Plan (2006) has been updated to provide the framework for future collaborative action between the Welsh Assembly Government and its partners to achieve sustainable economic growth across the whole of Wales. The plan emphasises the need for coordinated action at national, regional and local levels. The Spatial plan sets out a range of objectives under five headings: • Building sustainable communities • Promoting a sustainable economy • Valuing our environment • Achieving sustainable accessibility • Respecting distinctiveness	The DP should ensure the sustainable management of water resources. SEA objectives should reflect and consider relevant objectives from the Wales Spatial Plan.

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Welsh Assembly Government (2009), *One Wales: One Planet – a new sustainable development scheme for Wales*	
One Wales One Planet sets out proposals to promote sustainable development and how WAG will make sustainable development a reality for people in Wales, and outlines the benefits that people will see from this, particularly in less well-off communities.	The DP should consider effects of options on sustainable development in Wales. The SEA should include objectives relating to improving resource efficiency, reducing waste, and encouraging sustainability.
Welsh Assembly Government (2009), *Technical Advice Note 5: Nature Conservation and Planning*	
Technical Advice Note (TAN) 5 provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation.	The DP must recognise relevant nature conservation and planning policies and the procedures to be followed where actions arising from the DP may impact upon protected sites and species. SEA objectives must address issues of biodiversity and nature conservation.
Welsh Assembly Government (2009), *Technical Advice Note 16: Sport, Recreation and Open Space*	
This revised TAN provides advice for communities, developers and local planning authorities in Wales preparing local development plans and taking decisions about planning applications. The Note contains advice about: • Preparing Open Space Assessments • Keeping existing facilities • The provision of new facilities • Topics related to water based recreation, off- road recreational vehicles, allotments and spaces for children's and young people's play.	The SEA must consider the impacts of the DP on potential water resources that are used to provide water based recreational facilities across the region.
Welsh Assembly Government (2010), *Climate Change Strategy for Wales and First Annual Progress Report (2012*	
The Climate Change Strategy for Wales sets out the Welsh Government's policy intentions in relation. to climate change and expands on the commitments set out in One Wales Climate Change Strategy and associated Delivery Plans confirm WAG's commitment to tackling issues of future climate change. Strategy addresses: • The vision for 2050, and how this Strategy supports our Sustainable Development Scheme, One Wales: One Planet. • Key target to cut greenhouse gas emissions by 3% per year in areas of devolved competence • Climate change impacts for Wales. • How to tackle Wales's climate vulnerability.	The DP does take account of the Climate Change Strategy and its targets as its formulation through the WRMP process takes account of climate change in its supply and demand projections. The SEA should also use the targets in the broader assessment of climate change effects and any potential cumulative effects. For example the ecological requirements of aquatic habitats that may be affected by the DP will also be influenced by climate change.
Welsh Assembly Government (2010), *Low Carbon Revolution – The Welsh Assembly Government Energy Policy Statement*	
This statement explains what WAG will do and what they want others to do to make the ambition for low carbon energy a reality. Aim will be to renewably generate up to twice as much electricity annually by 2025 as we use today. By 2050, at the latest, we want to meet almost all of our local energy needs, whether for heat, electrical power or vehicle transport, by low carbon electricity production.	The SEA should include consideration and assessment of the additional energy demands and consumption associated with the DP during both construction, from vehicle movements and equipment, and operation, from potential increased pumping.
Welsh Assembly Government (2010), *Technical Advice Note 6: Planning for Sustainable Rural Communities*	
Technical Advice Note (TAN) 6 supports national planning policy on sustainable rural communities. This guidance provides advice on: • Sustainable rural communities • Sustainable rural economies • Rural affordable housing • Rural enterprise dwellings • One Planet Developments	The DP must consider the sustainable provision of water and SEA objectives must address issues of sustainability.

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• Sustainable rural services • Sustainable agriculture	
Welsh Assembly Government (2011), *Strategic Policy Position Statement on Water*	
In March 2009, the first Strategic Policy Position Statement on Water was published. The Policy Statement outlined WAG priorities for water. The Statement contained key issues and actions to be taken. This revised Statement updates the current position. It reflects developments that have happened and highlights future priorities in relation to water policy in Wales.	The SEA should seek to promote the protection and enhancement of all water resources. The SEA should seek to maintain, protect and improve water quality across the region and ensure efficient use of resources.
Welsh Assembly Government Planning Policy Wales (2016) Edition 8	
National land use policies for local authorities to take into account when compiling their LDPs. Chapter 12 Infrastructure and Services addresses water supply. Objectives include: To protect and improve water resources through increased efficiency and demand management of water, particularly in those areas where additional water resources may not be available.	The SEA should take into account the objectives relating to water supply.
Wildlife and Countryside Act, 1981	
The Act is the principle mechanism for providing legislative protection of wildlife in Great Britain. Species listed in Schedule 5 of the Act are protected from disturbance, injury, intentional destruction or sale. Other provisions outlaw certain methods of taking or killing listed species. This Act is brought up to date regularly to ensure the most endangered animals are on the schedule. The Act also improved protection for the most important wildlife habitats.	Some aspects of the DP may have effects on habitats and species in the UU supply area and beyond. The SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regard of protected species and habitats.
Regional	
Dee Valley Water (2015), *Drought Plan*	
This looks at the management of water resources to maintain service to customers during drought in the Dee Valley. The plan includes: • Water resource planning • Water resource management and monitoring • Communication during drought • Drought management actions	Assessment of the potential for cumulative impacts of supply side and drought permit/order options with drought options listed in neighbouring water companies' drought plans has been undertaken. The assessments should be reviewed at the time of drought option implementation to ensure that no changes to the neighbouring water company drought option has been made in the intervening period, and that the assessment, therefore, remains valid.
Environment Agency *(2010), Blue Horizons 2010-2015*	
In 2010 the Environment Agency produced a report into developing and improving water related recreation in North West England from 2010 to 2015. The report identifies priorities and initiatives which will help to address gaps in information or activity provision in the North West.	The SEA must consider relevant planning policy and planning guidance and consider the impacts of the DP on potential water resources that are used to provide recreational facilities across the region.
Environment Agency (2015) Cumbria and Lancashire Drought Plan	
In 2015 the Environment Agency produced a drought plan for Cumbria and Lancashire. The report sets out: • The areas drought management structure; • The drought monitoring to be undertaken in the area; • The drought management options and the trigger for these actions; and	The supply of water resources in the region may be affected by future drought, therefore this plan is linked closely with the DP. The SEA should seek to address the causes of drought, and include objectives which seek to address the causes

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
• How the area deals with drought permits and drought order applications and site specific details.	of drought, and where possible ensure that the symptoms of droughts are minimised.
Environment Agency (2015) Greater Manchester, Merseyside and Cheshire Drought Plan	
In 2015 the Environment Agency produced a drought plan for Greater Manchester, Merseyside and Cheshire. The report sets out: • The areas drought management structure; • The drought monitoring to be undertaken in the area; • The drought management options and the trigger for these actions; and How the area deals with drought permits and drought order applications and site specific details.	The supply of water resources in the region may be affected by future drought, therefore this plan is linked closely with the DP. The SEA should seek to address the causes of drought, and include objectives which seek to address the causes of drought, and where possible ensure that the symptoms of droughts are minimised.
Environment Agency (undated), Managing Drought in the North West	
The document sets out the measures that the North West Region drought team will take to plan for and manage droughts. The drought plan's main aims are to: • Give a structured and flexible framework to deal with droughts of different type (for example, groundwater or surface-water) and severity; and • Set out a system of monitoring and reporting to identify and track the onset and progress of drought.	The supply of water resources in the region may be affected by future drought, therefore this plan is linked closely with the DP. The SEA should seek to address the causes of drought, and include objectives which seek to address the causes of drought, and where possible ensure that the symptoms of droughts are minimised.
Environment Agency (January 2012), *Midlands Region Drought Plan*	
This document sets out the measures that the Midlands Region drought team will take to plan for and manage droughts. It covers the Severn and Trent catchments from the Humber to the Severn Estuary including; Birmingham, Nottingham, Derby, Leicester, Stoke-on-Trent, Coventry, Shrewsbury, Stratford-on-Avon, Worcester and Gloucester. The drought plan's main aims are to: • Give a structured and flexible framework to deal with droughts of different type (for example, groundwater or surface-water) and severity; and • Set out a system of monitoring and reporting to identify and track the onset and progress of drought.	The supply of water resources in the region may be affected by future drought, therefore this plan is linked closely with the DP. The SEA should seek to address the causes of drought, and include objectives which seek to address the causes of drought, and where possible ensure that the symptoms of droughts are minimised.
Natural Resources Wales, *Drought Plan*	
Natural Resources Wales produces a drought plan – it describes indicators used to classify different stages of a drought.	The supply of water resources in the region may be affected by future drought, therefore this plan is linked closely with the DP. The SEA should seek to address the causes of drought, and include objectives which seek to address the causes of drought, and where possible ensure that the symptoms of droughts are minimised.
Environment Agency, *North West Region Catchment Abstraction Management Strategies Environment*	
CAMS was developed following the government's decision to apply more control on how much water is taken from our water sources (rivers, reservoirs, lakes and so on). CAMS:	The SEA should consider the range of impacts that abstraction could have on the environment, including water bodies, biodiversity, and water users.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
• assesses how much water is reliably available on a catchment by catchment basis; • Introduces time-limited licences. This means we can periodically review them to determine whether to replace them or not and if so, what conditions we should apply to them. CAMS purpose is to help safeguard water resources despite increasing pressures on water availability from climate change and population growth. It intends to integrate catchment management so that impacts on water resources and the water environment are managed together. The North West Region has individual CAMS for all catchments.	
Environment Agency (2015) North West River Basin District River Basin Management Plan (2015 proposed update)	
Provides a framework for protecting and enhancing the benefits provided by the water environment. It provides baseline classification of waterbodies, statutory objectives for protected areas and for water bodies and a programme of measures to achieve statutory objectives.	The DP will need to ensure that it is consistent with the principles of the River Basin Management Plan and that it does not adversely affect the issues identified as significant water management issues.
Environment Agency (2009), *River Basin Management Plan Dee River Basin District*	
This plan is about the pressures facing the water environment in the Dee River Basin District, and the actions that will address them. It has been prepared under the Water Framework Directive, and is the first of a series of six-year cycles of planning and action. The first cycle will end in 2015 and following further planning and consultation will be updated and reissued. This plan focuses on the protection, improvement and sustainable use of the water environment.	The DP will need to ensure that it is consistent with the principles of the Dee River Basin Management Plan and that it does not adversely affect the issues identified as significant water management issues.
Defra and Welsh Government (2014) River Basin Planning Guidance	
This sets out the principles of river basin management planning.	The DP will need to ensure that it is consistent with the principles of river basin management plans and that it does not adversely affect the issues identified as significant water management issues.
Environment Agency and Natural Resources Wales (2015) Severn river basin district River basin management plan (2015 proposed update)	
Provides a framework for protecting and enhancing the benefits provided by the water environment. It provides baseline classification of waterbodies, statutory objectives for protected areas and for water bodies and a programme of measures to achieve statutory objectives.	The DP will need to ensure that it is consistent with the principles of the River Basin Management Plan and that it does not adversely affect the issues identified as significant water management issues.
Environment Agency, (2009) *River Severn Catchment Flood Management Plan*	
This document will produce policies for Managing flood risk in the catchment over the next 50 to 100 years. The plan will take into consideration the existing conditions across the area, as well as potential future changes to conditions in the catchment such as: • climate change; • changes to the way land is used; • changes to the rural landscape and the way agricultural land is managed; • increased pressure from urban development. The catchment flood management plan to will be used to steer future investment in flood risk management.	The DP links to this plan where it affects flood risk or land management in the River Severn Basin District, for example through changes in abstraction or water storage. The SEA should consider how the DP may affect flood risk across the region.
Environment Agency Wales (2010) River Dee Catchment Flood Management Plan	
Catchment flood management plans establish flood risk management policies to deliver sustainable flood risk management in the long term.	The DP links to this plan where it affects flood risk or land management in the Dee Valley Basin District, for example through changes in abstraction or water

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
	storage. The SEA should consider how the DP may affect flood risk across the region.
Environment Agency, *Severn Uplands (2005)/ Corridor (2003) Catchment Abstraction Management Strategies (CAMS)*	
CAMS was developed following the government's decision to apply more control on how much water is taken from our water sources (rivers, reservoirs, lakes and so on). CAMS: • assesses how much water is reliably available on a catchment by catchment basis; • introduces time-limited licences. This means we can periodically review them to determine whether to replace them or not and if so, what conditions we should apply to them. CAMS purpose is to help safeguard water resources despite increasing pressures on water availability from climate change and population growth. It intends to integrate catchment management so that impacts on water resources and the water environment are managed together. The Severn Uplands and Corridor Catchments are a part of the Midland region.	The SEA should consider the range of impacts that abstraction could have on the environment, including water bodies, biodiversity, and water users.
Environment Agency (2001), *Water Resources for the Future – a strategy for the northwest*	
The objectives of the strategy are to ensure there is enough water for human uses, as well as providing an improved water environment. The strategy shows that: • Water is a vital and integral part of the environment, landscape and heritage of North West England. Sustainable management of this resource is central to the strategy; • To maintain a reliable public water supply, we foresee a need to increase availability by up to 40 Ml/d over the next 25 years. This can be achieved by improvement of existing schemes, further integration and the development of some new resources, primarily to meet local needs in Cumbria; • Increased water efficiency and water use organization should be an important aspect of resource management over the next 25 years. We therefore include a number of recommendations to encourage the efficient use of water in the home, in commercial premises, by industry and by agriculture; • In recent years significant progress has been made in reducing leakage. It is vital that this continues; • Working together will be the key to delivering the sustainable development of water resources. We will continue to explore and develop opportunities for co-operation with a wide range of organisations in the region.	This DP and this plan are strongly linked. The SEA should seek to ensure that water supplies and resources are maintained or enhanced.
Environment Agency (2015) Draft Water Resources Planning Guidelines	
This consultation document provides a technical framework for water companies to follow whilst developing their water resources management plans. It includes guidance on how to assess climate change.	The DP should take account of this draft guidance. The SEA should take account of the guidance on climate change in particular.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
Environment Agency (2009), *Water Resources Strategy Regional Action Plan for North West Region*	
The strategy shows how the EA propose to implement the actions within the Water resources strategy for North West Region. **Top priorities in the North West Region are:** 1 Responding to climate change and population growth by ensuring the resilience of water supply in the future 2 Enhancing and promoting our understanding of the links between water usage and associated energy use and carbon emissions 3 Ensuring sustainable levels of abstraction in all catchments 4 Meeting the objectives of the WFD and ensuring all water bodies achieve the required 'good' status/potential. The following areas of work will be focussed on to address the top priorities. Understanding the effects of climate change on water resources: • interpreting the implications of the United Kingdom Climate Impacts Programme 2009 (UKCP09); • promoting the link between reduced water usage and associated energy savings and lower carbon emissions; • communicate our findings with other organisations and abstractors. Engaging with regional and sub-regional planning authorities: • raising awareness of the current and future pressures on water resources across the region; • ensuring water resources are considered at an early stage in all new developments. Promote water efficiency initiatives: • using a variety of methods to communicate with different groups of water users (household, businesses, agriculture); • in a targeted and prioritised way. Improving the status of catchments: • working with others to implement the relevant RBMP measures; • continue with our RSA programme of work.	The DP and this plan are very strongly linked. The SEA should seek to fulfil the direct link of drought planning and monitoring with that of this plan without compromising the other priorities involved.
Environment Agency (2009), *River Basin Management Plan Severn River Basin District*	
This plan is about the pressures facing the water environment in the Severn River Basin District, and the actions that will address them. It has been prepared under the Water Framework Directive, and is the first of a series of six-year cycles of planning and action. The first cycle will end in 2015 and following further planning and consultation will be updated and reissued. This plan focuses on the protection, improvement and sustainable use of the water environment.	The DP will need to ensure that it is consistent with the principles of Severn River Basin Management Plan and that it does not adversely affect the issues identified as significant water management issues.
Northumbrian Water (2013), *Drought Plan*	
The report presents actions and measures which Northumbrian Water intend to deploy during various stages of drought. Northumbrian Water will use the resources available from Kielder reservoir and operating within the control rules set out in the Kielder Water Resources Control Manual will maintain an adequate	Assessment of the potential for cumulative impacts of supply side and drought permit/order options with drought options listed in neighbouring water companies' drought plans has been undertaken.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
supply of raw water to our treatment works. The plan also sets out the drought triggers, demand side actions, supply side actions, environmental impacts and management and communications strategy.	The assessments should be reviewed at the time of drought option implementation to ensure that no changes to the neighbouring water company drought option has been made in the intervening period, and that the assessment, therefore, remains valid.
North West Biodiversity Forum (1999), *'Wild about the North West' Biodiversity Audit of North West England*	
This is an audit of biodiversity across the North West that was collated in 1999, and details species and habitats listed by local authority and natural area. Objectives: This audit outlines the current situation in the Northwest with regards priority species and habitats and provides a regional context for conservation needs and priorities for biodiversity conservation. It also draws together the priorities set out in the numerous Local Biodiversity Action Plans in the north west region. Targets: No formal targets or indicators	The implementation of the DP is likely to influence biodiversity in the north west. The SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regards of priority species identified in local Biodiversity Action Plans.
North West Development Agency (2006), North West Sustainable Energy Strategy	
The North West Sustainable Energy Strategy sets out clearly the energy challenge that faces the North West. It demonstrates how different sectors across the region can act to address this challenge head on, whilst also achieving wider economic, social and environmental objectives.	The implementation of the DP may have an influence upon United Utilities' total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy.
Northwest Regional Forestry Framework Partnership (2005), *Agenda for Growth: The North West Regional Forestry Framework*	
This framework is intended to help shape the woodland and forestry sector in the region for the next twenty years. There are two main policy aims that it builds upon: • the sustainable management of our existing woods and forests; and • a continued, steady expansion of our woodland area to provide more benefits for society and our environment. The framework sets out 26 action points under the following 6 priority areas: **Enterprise and Industry** - Developing and supporting our woodland and forestry businesses **Regional Image** - Using woodlands and forestry to promote and improve the image of the region **Biodiversity and Landscape** - Maximising the benefits that trees and woodland bring to our region's biodiversity and landscape **Health, Well being and quality of life** - Using woodlands to improve our health, well-being and quality of life. **Climate Change and Energy** - The role of trees and woodlands in adapting to the impact of climate change **Supporting and Resourcing the Sector** - Supporting and resourcing the woodlands of England's Northwest to deliver a more sustainable region	The DP may affect forestry if it has significant impacts on flows in water bodies or land use. The SEA should check that the DP does not jeopardise objectives in the forestry framework.
Ofwat (2008) *Water Supply and Demand Policy*	
Summarised the key areas of water supply and demand, focusing on water efficiency, leakage, metering, and climate change.	The SEA should consider the socio-economic and environmental impact of any demand and supply policies.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
Powys County Council (2004), *Powys Unitary Development Plan*	
In order to safeguard the natural heritage of Powys, development proposals will be expected to take account of the need to protect, conserve and wherever possible enhance sites and features of importance for their aesthetic, amenity, biodiversity, ecological, geological, nature conservation, physio-graphical and scientific value.	The SEA should incorporate the aims of the UDP and assess impacts of the DP on biodiversity and nature conservation.
Powys County Council (in preparation), *Local Development Plan*	
The Planning & Compulsory Purchase Act 2004 requires Powys County Council as the Local Planning Authority to prepare a Local Development Plan (LDP) for Powys (excluding the Brecon Beacons National Park) which, once adopted, will replace the Powys Unitary Development Plan. The Council is currently consulting on Focussed Changes to the LDP. The topic paper on Utilities and Infrastructure addresses water supply.	The SEA should incorporate the aims of the draft LDP and consider any future objectives in the LDP as it progresses that may be relevant to the DP. The SEA should take into account the objectives relating to water supply.
Rural Partnerships (2006), *North West Regional Rural Delivery Framework*	
The North West's Regional Rural Delivery Framework (RDF) will ensure strengthened joint working at the regional, sub-regional and local level to deliver national level rural policy, in line with broader Government policy objectives in the region. Objectives: It is intended that the RDF will act as a driver for change across the whole range of issues that affect rural communities in the North West. It will influence mainstream policies, programmes, strategies and activities at regional, sub-regional and local level. The headline rural priorities for the North West are: • Maximising the economic potential of the region's rural areas; • Supporting sustainable farming and food; • Improving access to affordable rural housing; • Ensuring fair access to services for rural communities; • Empowering rural communities and addressing rural social exclusion; and • Enhancing the value of our rural environmental inheritance	The implementation of the DP may have an effect upon rural communities. The DP should seek to take into account the needs of rural communities. The SEA should include objectives that take into account the needs of communities across the north west, which should include rural communities.
Severn Trent (2014),*Drought Plan Our plan for managing water supply and demand during drought*	
This plan is an update for 2010 plan. This includes updated drought management actions informed by the dry weather experiences during 2011 and 2012.	Assessment of the potential for cumulative impacts of supply side and drought permit/order options with drought options listed in neighbouring water companies' drought plans has been undertaken. The assessments should be reviewed at the time of drought option implementation to ensure that no changes to the neighbouring water company drought option has been made in the intervening period, and that the assessment, therefore, remains valid.
Wales Biodiversity Partnership (2002), *Powys Local Biodiversity Action Plan*	
The Powys Local Biodiversity Action Plan is an important tool in identifying opportunities to protect the county's wildlife and biodiversity. Within the Powys LBAP there are 16 Habitat Action Plans and Twenty-eight Species	The SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regards of priority species identified in local Biodiversity Action Plans.

Objectives identified in the Policy, Plan or Programme	**Influences on the Drought Plan and the SEA objectives**
Action Plans. Various UK BAP Priority species include: Allis Shad, Twaite Shad, Skylark, Bittern, White-Clawed Crayfish, Nightjar, Woodlark, Great Crested Newt, Water Vole and Dormouse. Within Powys many of the UK BAP Priority species and Species of Conservation Concern can be found.	
Yorkshire Water (2013), *Drought Plan*	
This plan was devised from the extensive drought contingency planning experience gained in Yorkshire over recent years. It looks at the management of water resources to maintain service to customers during drought. The plan includes water resource planning and water resource management.	Assessment of the potential for cumulative impacts of supply side and drought permit/order options with drought options listed in neighbouring water companies' drought plans has been undertaken. The assessments should be reviewed at the time of drought option implementation to ensure that no changes to the neighbouring water company drought option has been made in the intervening period, and that the assessment, therefore, remains valid.
United Utilities (2015) Water Resources Management Plan	
This describes the assessment of the available water supplies and demand for water in the area from 2015 to 2040.	The DP is closely aligned to the WRMP process and should be taken into account.
Sub-regional	
AONB Management Units (various) *AONB Management Plans*	
The following AONBs are present in the United Utilities area: Anrnside and Silverdale; Forest of Bowland; North Pennines and the Solway Coast. The management plans for AONBs contain actions to ensure the protection and enhancement of the landscape.	The SEA should consider the effects of options on landscapes, including designated landscapes.
Greater Manchester Combined Authority (2013), Stronger Together: *Greater Manchester Strategy*	
The strategy identifies priorities that will drive sustainable economic growth including: • Delivering targeted investment based on market needs. • Revitalising Greater Manchester's town centres. • Improving both integration of infrastructure planning and connectivity. • Supporting business growth; improving international competitiveness	There could be some social, economic and environment effects associated with the implementation of the DP that may have effect with a particular focus upon a number of social, health and infrastructure related issues in the Manchester area. The SEA should seek to address the potential effects upon the local economy.
Cumbria Strategic Partnership (2004), *Sustainable Cumbria - A sub-regional strategy for Cumbria*	
This Strategy sets out a sustainable approach to securing economic growth, social progress and environmental protection and enhancement in Cumbria over the next 20 years. **Objectives**: Sustainable Cumbria will be a County that: • Celebrates its diversity, creativity and heritage; • Engages everyone in the mainstream of community life; • Retains and attracts the skilled and talented; • Participates to the full as a competitive sub-region; • Strengthens its infrastructure; • Makes a positive contribution to the wealth of the North West; and • Marries economic growth with social progress and environmental protection and enhancement.	There may be some social, economic and environment effects associated with the implementation of the DP that may have effect upon the sustainable development and regeneration of the Cumbria sub-region. The SEA should seek to address the potential effects upon the local economy.

Objectives identified in the Policy, Plan or Programme	**Influences on the Drought Plan and the SEA objectives**
The strategy also includes 9 priority areas, 4 of these are town/area specific topics, the remaining 6 are: • Sustainable communities and well-being; • High quality tourism; • Strategic communications through improvements to the road, rail and air transport infrastructure; • Creating wealth and a diversified economy; • Rural regeneration; and • Addressing housing market failure and lack of affordable housing.	
Hadrian's Wall Partnership Board (2015), *Hadrian's Wall Management Plan 2015-2019*	
Objectives include: • Informed management of the world heritage site; • Maintaining boundaries of the world heritage site. • Protect the outstanding universal value (OUV) of the site using appropriate legislation, planning policy, guidance and management measures. • To maintain effective protection and management of the undesignated remains. • To pre-empt where possible direct and indirect threats to the OUV. • To manage the archaeological remains in the world heritage site. • To achieve a sustainable balance whereby the OUV can be conserved within current and future land use.	The SEA should ensure that there are no negative direct or indirect impacts, for example during construction, on the world heritage site.
Lake District National Park Authority (2006), *A Vision for 2030*	
This vision will guide the review of the National Park Management Plan and development policies and plans within the Local Development Framework. **Vision and objectives:** The Lake District National Park will be an inspirational example of sustainable development in action. A place where its prosperous economy, world class visitor experiences and vibrant communities come together to sustain the spectacular landscape, its wildlife and cultural heritage. Local people, visitors, and the many organisations working in the National Park or have a contribution to make to it, must be united in achieving this. The 4 key elements of the National Park plan are: **A Prosperous Economy** – Businesses will locate in the National Park because they value the quality of opportunity, environment and lifestyle it offers – many will draw on a strong connection to the landscape. Entrepreneurial spirit will be nurtured across all sectors and traditional industries maintained to ensure a diverse economy; **World Class Visitor Experiences** –High quality and unique experiences for visitors within a stunning and globally significant landscape. Experiences that compete with the best in the international market; **Vibrant Communities** –People successfully living, working and relaxing within upland, valley and lakeside places where distinctive local character is maintained and celebrate; and **A Spectacular Landscape** – A landscape which provides an irreplaceable source of inspiration, whose benefits to people and wildlife are valued and improved. A	The DP could help to ensure resources required to achieve the visions for local communities and economic development. The SEA should ensure that there are no negative impacts, for example during construction, on heritage sites.

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
landscape whose natural and cultural resources are assets to be managed and used wisely for future generations.	
Lake District National Park Authority (2008) *Landscape Character Assessment and Guidelines*	
The Assessment seeks to provide a framework for developing a shared understanding of the current character of the Lake District's landscapes and its future management needs. The specific aims and objectives for the two elements of the Assessment are: ***Character Assessment*** *Aims* • To improve the knowledge and understanding of the Lake District landscape to help conserve and enhance the overall characteristics, qualities and diversity of landscape character, its sense of place and local distinctiveness; • To identify and understand factors influencing landscape change; and • To provide baseline data to facilitate future monitoring. *Objectives* • To highlight and describe the character of the physical, cultural, historical, ecological, visual and sensory landscape; • To identify past, present and future forces for change and describe their impacts; and • To assess the sensitivity to and capacity for change, for each defined landscape character unit. ***Guidelines*** *Aims* • To support a holistic approach to managing change and encourage the sustainable planning and management of the Lake District landscape including the conservation and enhancement of the historic environment and the enrichment of biological diversity. *Objectives* • To provide planning, management and design guidelines, integrated with the Local Development Framework and the National Park Management Plan, for each landscape character type and area of distinctive character; and • To suggest indicators for monitoring landscape change.	The DP should recognise the importance of effective management of water resources as an issue for natural landscapes. The DP may also have an effect on access to the national park and recreational opportunities for local communities and visitors. The SEA should seek to protect the landscapes of the Lake District National Park; including the conservation and enhancement of the historic environment and the enrichment of biological diversity.
Lake District National Park Partnership - *The Partnership's Plan – The Management Plan for the Lake District National Park 2015-2020*	
The Plan's purpose includes to define how the OUV will be protected through conserving the attributes and Special Qualities of the Lake District OUV.	The DP should recognise the importance of effective management of water resources as an issue for natural landscapes. The DP may also have an effect on access to the national park and recreational opportunities for local communities and visitors. The SEA should seek to protect the landscapes and environment of the Lake District National Park.
Lake District National Park Authority (2010) Core Strategy	
This document sets out how the strategic vision for the National Park will be delivered by 2025. Other local plan documents include Allocations of Land and Minerals Safeguarding Areas.	The DP could help to ensure resources required to achieve the visions for local communities and economic development. The DP should recognise the importance of effective management of water resources as an issue for natural landscapes. The DP may also have an effect on access to

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
	the national park and recreational opportunities for local communities and visitors. The SEA should seek to protect the landscapes and environment of the Lake District National Park.
Lancashire West Partnership (2004), *Lancashire West Matters*	
The Partnership's sole purpose is to articulate the current and future needs and wants of Lancashire West's people, communities and businesses. This plan outlined how this will be achieved over the next decade. **Objectives**: By 2012, Lancashire West will be a prosperous and attractive place in which to live, work and enjoy, recognised nationally for: • Its skilful & entrepreneurial people; • Its ambitious, competitive & responsible businesses; • Its strong & enterprising communities; and • Its quality of life and active leisure. There are 5 strategic ambitions set out to achieve this vision, these are: • Business with Attitude – The creation of competitive, innovative and aggressive businesses as part of a strong, resilient and inclusive economy; • The active leisure economy; • Rural renaissance; • Investing in communities and social capital; and • 21st Century Skills and Learning.	There may be some economic effects associated with the implementation of the DP and the future management of water resources in the north west. The DP may also have some effects upon recreational and leisure opportunities. This may have an impact upon some of the strategic ambitions set out in the plan. The SEA should seek to address the potential effects upon the local economy.
Local Planning Authority (various) *Land Use Plans*	
The United Utilities area covers a large number of Local Planning Authorities. Additionally, Local Development Plans prepared by local authorities in Wales may also be relevant to the DP and SEA. The main objectives of the existing and emerging Land Use Plans in these areas are related to the sustainable development of the area.	SEA should seek to ensure the DP options should be consistent with the Land Use Plans of those local authorities that will be affected by the option.
Outline Water Cycle Studies (various)	
Water cycle studies identify tensions between growth proposals, particularly housing development, and environmental requirements, and identify potential solutions to addressing them. Outline Water Cycle Studies have been prepared for Mid Mersey (Warrington Borough Council, Halton Borough Council and St. Helens Council), Cheshire West and Chester and Central Lancaster and Blackpool Councils have jointly prepared an Outline Water Cycle Study. The strategic objectives for Outline Water Cycle Studies are to: • Identify whether environmental resources can cope with further development, with particular reference to Water Framework Directive targets and UKCP09 climate change projections (i.e.can growth be accommodated without breaching water quality and abstraction limits); • Identify any potential impacts of development on the specially designated conservation sites and watercourses in the specified areas and other sites or features of significant nature conservation importance resulting from additional abstraction and wastewater discharge;	The DP should take into account any water cycle studies completed for identified growth areas (Mid Mersey, Cheshire West and Chester, Central Lancashire and Blackpool). The SEA assessment framework should include an objective relating to the efficient management of water.
Peak District National Park Authority (2012), *Peak District National Park Management Plan 2012-2017*	

Objectives identified in the Policy, Plan or Programme	Influences on the Drought Plan and the SEA objectives
This plan sets out a vision and set of actions for the management of the Peak District National Park. The themes of a sustainable economy and thriving communities are given greater prominence in this plan compared to the previous 2006 plan.	Effective management of water resources is vital for continued economic, cultural and sustainable development. The DP should recognise the importance of climate change as an issue for the north west's natural landscapes. The DP may also have an effect upon on the theme of promoting a sustainable economy and thriving communities and access to the national park and recreational opportunities for local communities and visitor The SEA should seek to protect the landscapes of the national park; encourage continued development of the local economy and cultural heritage; and the protection of natural resources and biodiversity. The SEA should also include objectives relating to health and well-being, in particular how recreational opportunities may influence this and those relating to sustainable economy and thriving communities.
Snowdonia National Park Authority, *Snowdonia National Park Management Plan 2010-2015*	
Provides the strategic policy framework for the entire National Park and includes a specific Action Plan to be implemented.	The SEA should ensure that there are no negative impacts on the Snowdonia National Park.
Cheshire and Warrington Enterprise Partnership (2014) Cheshire and Warrington Matters, A Strategic and Economic Plan for Cheshire and Warrington	
This strategy supports growth and economic development over the next decade. It includes the deployment of funding for additional homes and new jobs.	The implementation of the DP and the future availability of water resources may have an effect upon community cohesion, well being and continued prosperity within a sustainable environment. The SEA should seek to maintain and improve welfare and community infrastructure and maximise positive social impacts.
Yorkshire Dales National Park Authority (2013), *Yorkshire Dales National Park Management Plan 2013-18*	
This sets out how the national park will be managed over the next five to ten years. The objectives include those associated with the following: • A distinctive, living, working cultural landscape that tells the ongoing story of generations of people interacting with their environment. • A friendly, open and welcoming place with outstanding opportunities to enjoy its special qualities. • Home to the finest variety of wildlife in England. • Resilient and responsive to the impacts of climate change, storing more carbon each year than it produces. • Providing an outstanding range of benefits for the nation based on its natural resources, landscape and cultural heritage, which underpin a flourishing economy. • Home to strong, self-reliant and balanced communities with good access to the services they need.	Effective management of water resources is vital for continued economic, cultural and sustainable development. The DP may also have an effect upon providing services for communities, access to the national park and recreational opportunities for local communities and visitors and the protection of biodiversity. The SEA should seek to protect the landscapes of the national park; encourage continued development of the local economy and cultural heritage; and the protection of natural resources and biodiversity. The SEA should also include objectives relating to providing access to services for communities and for health and well-being, in particular how recreational opportunities may influence this.

APPENDIX E

SEA APPRAISAL TABLES

Appendix E SEA Appraisal Tables

This appendix comprises the completed SEA appraisal tables for all of the drought options in UU's Revised Draft Drought Plan 2017. This appendix is made of three sections, E1, E2 and E3 for supply side options, demand side options and drought permit/order options respectively. The contents or each section, and the table numbers for each of the assessments are provided in the tables below.

E1 SUPPLY SIDE OPTIONS

Table Number	Drought Option
Integrated Resource Zone	
E1.1	Belle Vale Boreholes
E1.2	Croft Boreholes
E1.3	Daresbury Borehole
E1.4	Landside Borehole
E1.5	Netherley Boreholes
E1.6	Pex Hill Boreholes
E1.7	Stocks Well Boreholes
E1.8	Walton Boreholes
E1.9	Water Lane Borehole
E1.10	Worsthorne Borehole
West Cumbria Resource Zone	
E.11	Tankering of treated water from the Integrated Resource Zone
Carlisle Resource Zone	
E1.12	Castle Carrock reservoir, dead water storage
North Eden Resource Zone	
	None

E2 DEMAND SIDE OPTIONS

Table Number	Measure
E2.1	Drought Publicity
E2.2	Increased leakage detection and repair activity
E2.3	Water use restriction
E2.4	Ordinary Drought Order (Non-Essential Use Ban)

E3 DROUGHT PERMIT/ORDER OPTIONS

Table Number	Water Source	Potential Drought Permits/Orders
Integrated Resource Zone		
E3.1	Longdendale Reservoirs	Reduce compensation flow from 45.5 to 22.5 or 15.0 Ml/d
E3.2	Rivington Reservoirs – White Coppice	Reduce compensation flow from 4.9 to 2.0 Ml/d
E3.3	Rivington Reservoirs – Brinscall Brook	Reduce compensation flow from 3.9 to 2.0 Ml/d
E3.4	Jumbles Reservoir	Reduce compensation flow from 19.9 to 12.0 or 6.0 Ml/d
E3.5	Delph Reservoir	Reduce compensation flow from 3.7 to 1.0 Ml/d
E3.6	Dovestone Reservoir	Reduce compensation flow from 15.9 to 10.0 or 5.0 Ml/d
E3.7	Lake Vyrnwy	Reduce compensation flow from 45.0 to 25.0 Ml/d
E3.8	River Lune LCUS abstraction	Reduce prescribed flow from 365.0 to a minimum of 200 Ml/d
E3.9a	Lake Windermere – Scenario 1	Reduce hands-off flow conditions to a minimum of 95 Ml/d Relax 12-month rolling abstraction licence limit
E3.9b	Lake Windermere – Scenario 2	Relax 12-month rolling abstraction licence limit Permit drawdown of lake level (up to a maximum of 0.5 m below weir crest)
E3.10	Ullswater	Reduce hands-off flow conditions to a minimum of 95 Ml/d Relax 12-month rolling abstraction licence limit
E3.11	Swineshaw Boreholes	Allow abstraction of up to 4Ml/d from Swineshaw Boreholes 2 and 3.
West Cumbria Resource Zone		
E3.12	Scales boreholes	Increase annual licence limit from 365 Ml/yr to between 438 and 621 Ml/yr to enable continuation of a higher daily abstraction rate (up to licence limit of 6 Ml/d)
E3.13	Ennerdale Water	Allow drawdown of the lake to 2.5m below weir crest
E3.14	Crummock Water	Allow pumping of abstraction and compensation flows at lake levels below 0.97m below weir crest level to 1.5m below weir crest level
Carlisle Resource Zone		
	None	-
North Eden Resource Zone		
E3.15a	Bowscar boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction
E3.15b	Gamblesby boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction
E3.15c	Tarn Wood boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction

E1 SUPPLY SIDE OPTIONS

Table E1.1 Belle Vale Borehole

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor works will be required to bring this option online, and water could be diverted to Netherley borehole using existing infrastructure for treatment. Alternatively a new treatment plant could be constructed, which would take 12 months and require construction of a new building on land owned by UU. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from designated sites (>5km to nearest European designated sites; >5km to nearest SSSI), construction impacts are considered unlikely. Construction activities may result in disruption to local habitats and species during the works. This disturbance will be temporary, reversible and of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall, the impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets		**Construction**	

and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. **Operation** Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the boreholes will be within existing licence limits. This source is included in the Environment Agency Lower Mersey Basin model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. Overall, the impact of the operation of this option on water has been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, but these are within the existing UU site. Construction activity may cause some localised disturbance to sediment but this is likely to be minimal and temporary and, therefore, the impact has been assessed as negligible. **Operation** No operational impacts on soil, land use and geology are anticipated. Overall, the impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction of option 2 (a new plant) will require delivery of plant and materials to site. It is assumed that materials will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions. **Operation** Minor changes to energy use and, therefore, CO_2 emissions are envisaged due to the increased pumping of groundwater. Overall, the impacts on air and climate have been assessed as negligible.	
Archaeology and	To conserve and enhance the historic	**Construction**	

cultural heritage	environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. The nearest scheduled ancient monument is 2.9km away, which are six monoliths decorated with rock art (The Calderstones), and no impacts of construction on this site are anticipated. Construction impacts on archaeology and cultural heritage are anticipated to be negligible.	
		Operation Abstraction from the boreholes is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The Scheduled Ancient Monument, the Calderstones site are six monoliths decorated with rock art, and is located 2.9km from the drought option. The option is not anticipated to impact any other sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage have been summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore, impacts to landscape and visual amenity from the construction phase have been assessed as negligible.	
		Operation Operation of the drought option is within existing licenced limits. Overall, the drought option is not anticipated to have any impacts on landscape and visual amenity. The new building is relatively small in size and within the existing site area. Overall impacts have been summarised as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the construction phase.	

Table E1.2 Croft Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** To bring this option online minor construction work is required; a new treatment line and first stage filtration and disinfection will need to be constructed, additionally new borehole pumps are required. This will take 6 months. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from designated sites (3km or more) impacts from the construction phase on designated features are considered unlikely. Construction activities may result in disruption to local habitats and species during the works. This disturbance will be temporary, reversible and of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation Connectivity to the SAC sites identified is unlikely because sandstone is isolated from overlying Mercia Mudstone group on which the SAC sites are located. No licence modifications were made as part of the Review of Consents for Manchester Mosses SAC and Rixton Clay Pits SAC, therefore, it is concluded that there will be no impacts of any abstraction licences on these sites (either alone or in combination with other consents). No operational impacts on designated or undesignated habitats or species have been identified. Overall impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without the implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation have been identified. Overall, impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	

Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period and the relatively small number of vehicle movements required, any impacts are considered to be short term and of negligible impact.	
		Operation Minor changes to energy use are envisaged due to the increased pumping of groundwater. Overall impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible.	
		Operation Abstraction from the boreholes is within existing licence limits. This option was included within the EA Lower Mersey Estuary Basin Model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes were made to the licence as part of the Review of Consents. Impacts on water from operation of the drought option have been assessed as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with the construction phase of this option, however, these are within the existing UU site. This impact has been assessed as negligible. No geologically important sites have been identified within close proximity of the drought option that could be impacted by construction activity. The impact has been assessed as negligible.	
		Operation No impacts on soil, land use and geology are anticipated. Overall impacts have been assessed as negligible	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will involve the delivery of materials and equipment to the site. It is assumed that materials will be sourced locally to minimise transport requirements, and therefore CO_2 emissions. This impact has been assessed as negligible.	
		Operation Minor changes to energy use are envisaged due to the increased pumping of groundwater. Overall impacts on air and climate have been assessed as negligible.	
Archaeology and	To conserve and enhance the historic	**Construction**	

cultural heritage	environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. There are no Scheduled Ancient Monuments in close proximity to the drought option. Construction impacts on archaeology and cultural heritage are anticipated to be negligible.	
		Operation Abstraction from the boreholes is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The option is not anticipated to impact any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall impacts on archaeology and cultural heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a slight impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore impacts to landscape and visual amenity from the construction phase have been assessed as negligible.	
		Operation Operation of the drought option is within existing licenced limits. Overall the drought option is not anticipated to have any impacts on landscape and visual amenity. The new buildings are relatively small in size and within the existing site area. Overall impacts have been summarised as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the operational phase.	

Table E1.3 Daresbury Borehole

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring the borehole online as a drought source option. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from designated sites (>7km to nearest European designated sites; 1km to nearest SSSI), construction impacts are considered unlikely. Construction activities may result in disruption to local habitats and species during the works. This disturbance will be temporary, reversible and of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall, the impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without the implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered,	**Construction** It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period and the relatively small number of vehicle movements required, any impacts are considered to be short term and of negligible impact.	
		Operation Minor changes to energy use are envisaged due to the increased pumping of groundwater. Overall, the impacts on material assets and resource use have been	

	whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the borehole is within existing licence limits. This option was included in the Mersey Basin EA groundwater model. No changes were made to the licence as part of the Review of Consents. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. Appleton Reservoir is geographically close to the drought option, but is sited on Mercia Mudstone and is therefore geologically isolated from the option and no impacts on flows into the reservoir are anticipated. Impacts on water are assessed as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** Construction activity may cause come localised disturbance to sediment and there would be minor land use changes within the existing UU site. The impact has been assessed as negligible. **Operation** Red Brow Cutting SSSI is a geologically important site approximately 1km from the location of the drought option. This site shows a section of the Tarporley Siltstone Formation (Mercia Mudstone Group). Given the predominant geology of the SSSI is Mercia Mudstone, which is isolated from the Sherwood sandstone aquifer on which the drought option is located, operation of the drought option is unlikely to have an impact on this SSSI. No other impacts to soil, geology and land use have been identified, and overall impacts have been summarised as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that pumps and materials will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions. This impact has been assessed as negligible. **Operation** Minor changes to energy use are envisaged due to the increased pumping of groundwater. Overall, the impacts on air and climate have been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. The nearest Scheduled Ancient Monument is >5 km away from the	

	To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	Drought Option; this is related to the remains of sailing barge named the Daresbury, no impacts of construction on this site are anticipated. It has been assumed that all public rights of way and access to archaeological features will be maintained during construction. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Abstraction from the borehole is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The option is not anticipated to impact any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a slight impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore, impacts to landscape and visual amenity from the construction phase have been assessed as negligible. **Operation** Operation of the drought option is within existing licenced limits. No impacts to levels in Appleton Reservoir have been identified. The new building will be small and within the existing site area. Overall, the impacts have been summarised as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase. **Operation** No significant inter-relationships have been identified during the operational phase.	

Table E1.4 Landside Borehole

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring the borehole online as a drought source option. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from European designated sites (>3km) and SSSIs (>2km), construction impacts are considered unlikely. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** During the construction phase, there will be no impact on security of supplies or quality of drinking water. It is assumed that public rights of way will be maintained during the construction phase. Construction impacts are likely to be of a short term and temporary nature. Overall the impacts have been summarised as negligible.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered,	**Construction** It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period and the relatively small number of vehicle movements required, any impacts are considered to be short term and negligible.	
		Operation Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall impacts on material assets and resource use have been	

	whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the borehole will be within existing licence limits. This option is included in the Environment Agency Lower Mersey Basin groundwater model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. As such no impacts of the abstraction on surface water flows or levels are anticipated. Overall impacts on water have been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, but these are within the existing UU site. Construction activity may cause some localised disturbance to sediment but this is likely to be minimal and temporary and therefore the impact has been assessed as negligible. **Operation** No operational impacts on soil, land use and geology are anticipated. Overall impacts have been assessed as negligible	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that materials will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions. **Operation** Minor changes to energy use are envisaged due to the increased pumping of groundwater. Overall impacts on air and climate have been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Abstraction from the borehole is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The option is not anticipated to impact any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall impacts on archaeology and cultural	

		heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore impacts to landscape and visual amenity from the construction phase have been assessed as negligible.	
		Operation Operation of the drought option is within existing licenced limits. Overall the drought option is not anticipated to have any impacts on landscape and visual amenity. Overall impacts have been summarised as negligible	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the operational phase.	

Table E1.5 Netherley Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring the borehole online as a drought source option. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and the distance from designated sites (Mersey Estuary Ramsar, SPA and SSSI) is ~6km. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term,	

	To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water. **Operation** Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as major beneficial based on continued supply of drinking water, and the large deployable output of this option.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period and the relatively small number of vehicle movements required, any impacts are considered to be short term and negligible. **Operation** Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the borehole will be within existing licence limits. This source is included in the Environment Agency Lower Mersey Basin model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. As such no impacts of the abstraction on surface water flows or levels are anticipated. Overall, the impacts on water have been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, but these are within the existing UU site. Construction activity may cause some localised disturbance to sediment but this is likely to be minimal and temporary and therefore	

		the impact has been assessed as negligible. **Operation** No operational impacts on soil, land use and geology are anticipated. Overall impacts have been assessed as negligible	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that materials will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions. **Operation** Minor changes to energy use and therefore CO_2 emissions are envisaged due to the increased pumping of groundwater. Overall, the impacts on air and climate have been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Abstraction from the borehole is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The option is not anticipated to impact any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore, impacts to landscape and visual amenity from the construction phase have been assessed as negligible. **Operation** Operation of the drought option is within existing licenced limits. Overall, the drought option is not anticipated to have any impacts on landscape and visual amenity. The new building is relatively small in size and within the existing site area. Overall, the impacts have been summarised as negligible	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase. **Operation** No significant inter-relationships have been identified during the operational phase.	

Table E1.6 Pex Hill Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring the boreholes online as a drought source option. The Mersey Estuary Ramsar and SPA site (5 km) and SSSI (5 km) are the only European and non-European designated sites within 10 km. There will be no loss of designated habitat due to the scheme, as the construction footprint does not overlap any designated sites. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall, the impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered,	**Construction** It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period and the relatively small number of vehicle movements required, any impacts are considered to be short term and negligible.	
		Operation Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been	

	whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the boreholes will be within existing licence limits. This source is included in the Environment Agency Lower Mersey Basin model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. Overall, the impact of the operation of this option on water has been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, but these are within the existing UU site. Construction activity may cause some localised disturbance to sediment but this is likely to be minimal and temporary and, therefore, the impact has been assessed as negligible. **Operation** No operational impacts on soil, land use and geology are anticipated. Overall, the impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that materials will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions. **Operation** Minor changes to energy use and, therefore, CO_2 emissions are envisaged due to the increased pumping of groundwater. Overall, the impacts on air and climate have been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. The nearest scheduled ancient monument is >1.7km away, this is Cranshaw Hall moated site, and no impacts of construction on this site are anticipated. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Abstraction from the boreholes is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The Scheduled	

		Ancient Monument Cranshaw Hall moated site is a medieval moated site surviving as an earthwork, and is located >1.7 km from the drought option. As this site survives as an earthwork, no water dependant features have been identified, and no impacts of the drought option on this site are anticipated. The option is not anticipated to impact any other sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage have been summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore, impacts to landscape and visual amenity from the construction phase have been assessed as negligible.	
		Operation Operation of the drought option is within existing licenced limits. Overall, the drought option is not anticipated to have any impacts on landscape and visual amenity. The new building is relatively small in size and within the existing site area. Overall impacts have been summarised as negligible	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the operational phase.	

Table E1.7 Stocks Well Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring this option online. This requires minimal intrusion with no new mains needed. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from designated sites (4.7km to nearest European designated sites; 4.7km to nearest SSSI), construction impacts are considered unlikely. Construction activities may result in disruption to local habitats and species during the works. This disturbance will be temporary, reversible and of negligible impact.	

		Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible. **Operation** No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall, the impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of very short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water. **Operation** Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that materials and equipment required during construction and checking the slipline pipework will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period associated with the option of choice and the relatively small number of vehicle movements required, any impacts are considered to be short term and negligible. **Operation** Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation**	

		Abstraction from the boreholes will be within existing licence limits. This source is included in the Environment Agency Lower Mersey Basin model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. Overall, the impact of the operation of this option on water has been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be very minor land use changes associated with this option, but these are within the existing UU site. Construction activity associated with checking the slipline are minimal but may cause some localised disturbance to sediment but this is likely to be minimal and temporary and, therefore, the impact has been assessed as negligible.	
		Operation No operational impacts on soil, land use and geology are anticipated. Overall, the impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Minimal construction is associated with this option, it is assumed that any materials needed will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions.	
		Operation Minor changes to energy use and, therefore, CO_2 emissions are envisaged due to the increased pumping of groundwater. Overall, the impacts on air and climate have been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. The nearest scheduled ancient monument is 2.7km away, which is a moated site and pond, and no impacts of construction on this site are anticipated as the monument survives as earthworks. Construction impacts on archaeology and cultural heritage are anticipated to be negligible.	
		Operation Abstraction from the boreholes is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The Scheduled Ancient Monument, which is a moated site and fishpond (Lovel's Hall), and is located 2.7km from the drought option and survives as earthworks, and is therefore not dependent on water. The option is not anticipated to impact any other sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage have been summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access	

		to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore, impacts to landscape and visual amenity from the construction phase have been assessed as negligible.	
		Operation Operation of the drought option is within existing licenced limits. Overall, the drought option is not anticipated to have any impacts on landscape and visual amenity. The new building is relatively small in size and within the existing site area. Overall impacts have been summarised as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the construction phase.	

Table E1.8 Walton Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring the boreholes online as a drought source option. A kiosk may be required to be constructed. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from European designated sites (>9 km) and SSSIs (>4 km), construction impacts are considered unlikely. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option are anticipated on European sites. The Review of Consents concluded no effects of the abstraction licence on European designated sites. Appleton Reservoir is geographically close to this drought option, but is geologically isolated (see Water). No operational impacts on SSSIs, undesignated habitats or species have been identified. Impacts on biodiversity, flora and fauna are considered to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementing this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy.	**Construction** It is assumed that any materials required would be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning, it has been assumed that materials will be recycled appropriately.	
		Operation Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been	

	To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible.	
		Operation Abstraction from the boreholes is within existing licence limits. Appleton Reservoir is geographically close to the option, but the reservoir is sites on Mercia Mudstone sequence isolated from the Sherwood Sandstone aquifer. This option is included in the Environment Agency's Lower Mersey basin groundwater model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. This source was last used in the 1995/6 drought. Impacts on water have been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, however, these are within the existing UU site. This impact has been assessed as negligible.	
		Operation No impacts on soil, land use and geology are anticipated. Overall, the impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that pumps and materials will be sourced locally to minimise transport requirements. This impact has been assessed as negligible.	
		Operation Minor changes to energy use and therefore CO_2 emissions are envisaged due to pumping of water from the borehole. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are anticipated to be negligible.	
		Operation Abstraction from the boreholes is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The option is not	

	To protect archaeologically important sites.	anticipated to impact any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as negligible.	
		Operation Operation of the drought option is within existing licenced limits. Overall, the drought option is not anticipated to have any impacts on landscape and visual amenity. The new building is relatively small in size and within the existing site area. Overall impacts have been summarised as negligible	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the operation phase.	

Table 1.9 Water Lane Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** This option could be brought online with minor testing and remedial work - a new domestic supply feed needs to be constructed to direct water from Pex Hill. The construction work will take 4 months. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from designated sites (7.1km to nearest European designated sites; 7.1km to nearest SSSI), construction impacts are considered unlikely. Construction activities may result in disruption to local habitats and species during the works. This disturbance will be temporary, reversible and of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall, the impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and		**Construction**	

human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water. **Operation** Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that materials and equipment required during construction will be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning it has been assumed that materials will be recycled appropriately. Due to the short construction period and the relatively small number of vehicle movements required, any impacts are considered to be short term and negligible. **Operation** Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the boreholes will be within existing licence limits. This source is included in the Environment Agency Lower Mersey Basin model. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. Overall, the impact of the operation of this option on water has been summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, but these are within the existing UU site. Construction activity may cause some localised	

		disturbance to sediment but this is likely to be minimal and temporary and, therefore, the impact has been assessed as negligible. **Operation** No operational impacts on soil, land use and geology are anticipated. Overall, the impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that materials will be sourced locally to minimise transport requirements, and therefore minimise CO_2 emissions. **Operation** Minor changes to energy use and, therefore, CO_2 emissions are envisaged due to the increased pumping of groundwater. Overall, the impacts on air and climate have been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. The nearest scheduled ancient monument is 2.97km away, this is a moated site with fishponds (Rainhill Farm), and no impacts of construction on this site are anticipated due to the distance between the option and the monument. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Abstraction from the boreholes is within existing licence limits and it is assumed that there will be negligible impacts on surrounding water levels. The Scheduled Ancient Monument, Rainhill Farm, is a moated site with fishponds, and is located 2.7 km from the drought option. Although the moat is waterlogged, due to the distance between the option and the site, operation is not anticipated to impact the ancient monument. The option is not anticipated to impact any other sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts on archaeology and cultural heritage have been summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and have been assessed as negligible. All public rights of way and access to the countryside and open space are unaffected by the drought option during both construction and operation. Therefore, impacts to landscape and visual amenity from the construction phase have been assessed as negligible. **Operation** Operation of the drought option is within existing licenced limits. Overall, the drought option is not anticipated to have any impacts on landscape and visual amenity. The new building is relatively small in size and within the existing site area. Overall impacts have been summarised as negligible.	

Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase.	
		Operation No significant inter-relationships have been identified during the construction phase.	

Table E1.10 Worsthorne Borehole

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction works are required to bring the borehole online as a drought source option. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from designated sites (~1.5 km; including the South Pennine Moors SAC, South Pennine Moors Phase 2 SPA and South Pennine Moors SSSI), construction impacts are considered unlikely. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible and is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	
		Operation No operational impacts of the option on European designated sites were identified by the Review of Consents. No operational impacts on SSSIs, other designated or undesignated habitats or species have been identified. Overall impacts on biodiversity, flora and fauna are anticipated to be negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementing this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets		**Construction**	

and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	It is assumed that any materials required would be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning, it has been assumed that materials will be recycled appropriately. **Operation** Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** Abstraction from the borehole is within existing licence limits. It is assumed that the existing abstraction licence would not have been granted if this option resulted in unsustainable abstraction. No changes to the licence were made as part of the Review of Consents. Groundwater-surface water interactions in the area are currently not fully understood and no groundwater model currently exists for the area. This option in unlikely to impact on inflows to nearby Hurstwood and Swinden Reservoirs, as groundwater storage from within the aquifer would be utilised first during abstraction. The impact of this option on water has been assessed as negligible based on expert judgement.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, however, these are within the existing UU site. This impact has been assessed as negligible. **Operation** No impacts on soil, land use and geology are anticipated. Overall impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that pumps and materials will be sourced locally to minimise transport requirements. This impact has been assessed as negligible. **Operation** Minor changes to energy use and therefore CO_2 emissions are envisaged due to pumping of water from the borehole. This impact has been assessed as negligible.	
Archaeology and	To conserve and enhance the historic	**Construction**	

cultural heritage	environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Abstraction from the borehole is within existing licence limits. Impacts on Hurstwood and Swinden Reservoir levels are considered unlikely, and it is not anticipated that the drought option will have any impacts on any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts have been summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as negligible. **Operation** Impacts on inflows to Hurstwood and Swinden Reservoirs are considered unlikely. It is anticipated that any impacts on reservoir levels if observed, would be temporary and reversible and noted that the reservoirs are not within an AONB. The new building is relatively small in size and within the existing site area. Overall, the impacts have been assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase. **Operation** No significant inter-relationships have been identified during the operational phase.	

Table E1.11 Tankering treated water from the Integrated Resource Zone

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** The option involves minor or temporary construction works on existing UU sites with the introduction of new infrastructure including pipework modifications to allow the filling and emptying of tankers. If tankers are unable to gain direct access to the receiving site to discharge their water then temporary overland pipework (over a field) may be needed to transfer the water from the tanker in to the service reservoir. Construction activities may result in disturbance to local habitats and species during the works, but this disturbance is anticipated to be short term, temporary and reversible and is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible.	

		Operation This option is for the transfer of small volumes of treated water from the Integrated Resource Zone to the West Cumbria Resource Zone. On reaching Drought Trigger 3 approximately 0.6Ml/d of treated water will be tankered from a Water Treatment Works (in the Integrated Resource Zone) to the services reservoir(s) associated with Ennerdale Water (in the West Cumbria Resource Zone), requiring 24 tanker deliveries a day. If a drought order is implemented at Ennerdale Water, tankering will increase to approximately 2Ml/d, requiring 76 tanker deliveries a day. This option will reduce the volumes of water abstracted from Ennerdale Water, preserving storage and reducing the risk of a drought order being required. The transfer of water by tanker will utilise existing highways and access routes. As such increased vehicle movements are not anticipated to impact on any areas or species of conservation interest. Without implementation of this drought option in a severe drought, higher rates of abstraction would be required from Ennerdale Water. As such, reduced abstraction rates at Ennerdale Water, as a result of implementation of this drought option, will slightly reduce the rate of drawdown. Overall, impacts on biodiversity, flora and fauna have been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water.	
		Operation Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this drought option in a severe drought, higher rates of abstraction would be required from Ennerdale Water. There would be an adverse impact on local traffic as a result of tanker movements. Overall impacts on population and human health have been assessed as minor beneficial, taking into account moderate beneficial impacts based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of	**Construction** It is assumed that any materials required would be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning, it has been assumed that materials will be recycled appropriately.	
		Operation Minor changes to energy use are envisaged due to increased vehicle movements. Overall impacts on material assets and resource use have been assessed as minor adverse.	

	natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.		
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible.	
		Operation This option will reduce the volumes of water abstracted from Ennerdale Water which will marginally reduce the time that the River Ehen is maintained at compensation flow. Abstraction from the Integrated Resource Zone will be within existing abstraction licence conditions. The impact has been assessed as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be no land use changes associated with this option. This impact has been assessed as negligible.	
		Operation Overall impacts on soil, geology and land use are summarised as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that pipes and materials will be sourced locally to minimise transport requirements. This impact has been assessed as negligible.	
		Operation Minor changes to energy use and therefore CO_2 emissions are envisaged due to tanker movements. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to existing UU operational sites and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are anticipated to be negligible.	
		Operation Impacts on archaeology and cultural heritage are considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as negligible.	
		Operation The presence of tankers on the local road networks may have a visual impact especially close to the tanker filling and emptying locations. Impacts on landscape and visual amenity are considered to be negligible.	
Inter-	To acknowledge and understand the	**Construction**	

relationships	potential for inter-relationships between topics and anticipate synergistic effects.	No significant inter-relationships have been identified during the construction phase. **Operation** No inter-relationships have been identified.	

Table E1.12 Castle Carrock Reservoir, dead-water storage

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Minor construction work will be required to bring the source online as a drought option. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites. Assuming best practice construction measures, impacts on nearby designated sites (including the North Pennine Moors SAC and River Eden SAC) will be negligible. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible and is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive species, are considered to be negligible, are considered to be negligible. **Operation** The drought option involves abstraction of deadwater from Castle Carrock Reservoir only (which is not part of any area designated for nature conservation), and is not dependent on abstraction from the River Eden i.e., the reservoir can be drawn down even if there is no abstraction from the river. As such, there are no impacts on the designated features of the River Eden SAC. There may be fish resident in the reservoir, and there may be impacts on this population dependant on the extent of drawdown. It is assumed any impacts on fish populations will be mitigated e.g., through fish rescues. This impact has been assessed as minor adverse.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water. **Operation** Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this drought option in a severe	

		drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. There may be some minor adverse impacts on recreation due to potential impacts on fish populations and resulting impacts on angling. Overall, the impacts on population and human health have been assessed as minor beneficial, based on moderate beneficial impacts due to continued supply of drinking water and minor adverse impacts on recreation (angling).	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that pumps and any materials required would be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning, it has been assumed that materials will be recycled appropriately. **Operation** Minor changes to energy use are envisaged due to increased pumping of water from the reservoir. Overall, the impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Temporary submersible pumps would be required to pump the dead storage. The impact of installation of the pumps may be temporary localised minor impacts in water quality in the reservoir, which are anticipated to be negligible. **Operation** Abstraction of dead storage would result in increased drawdown of the reservoir by an estimated additional 6m below the normal operational drawdown limit. However, it is noted that the reservoir is a storage reservoir and not a natural water body, and overall, this impact has been assessed as minor adverse, temporary and reversible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be no major land use changes associated with this option, and works are within the existing UU site. Installation of the pumps in the reservoir may result in small localised reversible changes to geomorphology (due to any disturbance of bed material). This impact has been assessed as negligible. **Operation** Reservoir drawdown and exposure of shoreline margins may result in minor adverse, temporary and reversible geomorphological impacts. Overall, the impacts on soil, geology and land use are summarised as minor adverse.	
Air and climate	To maintain and improve air quality.	**Construction**	

	To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	The installation of the pumps will require delivery of plant and materials to site. It is assumed that pumps and materials will be sourced locally to minimise transport requirements. This impact has been assessed as negligible. **Operation** Minor changes to energy use and therefore CO_2 emissions are envisaged due to pumping of water from the reservoir. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are anticipated to be negligible. **Operation** Additional drawdown of the reservoir is not anticipated to impact any sites of archaeological or cultural heritage importance, or palaeo-environmental remains. In summary, impacts on archaeology and cultural heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a slight impact to landscape and visual amenity during installation of the temporary pumps, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as minor adverse (as the site is within the North Pennines AONB). **Operation** Temporary minor adverse effects on landscape and visual amenity are anticipated due to changes in exposure of the reservoir shoreline. The new buildings are relatively small in size and within the existing site area. In view of the fact that the reservoir levels are likely to be at their lowest during peak tourist season and the site is within the North Pennines AONB, the impact of the drought option on landscape and visual amenity is considered to be moderate adverse but temporary.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase. **Operation** Key inter-relationships between topics include reservoir level impacts on biodiversity, flora and fauna, soil, geology and land use and landscape and visual amenity. Overall these have been summarised as moderate adverse.	

E2 DEMAND SIDE OPTIONS

Table E2.1 Drought publicity

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	Drought publicity is assumed to be communicated through radio and newspaper advertisements. Such methods of publicity are considered to have no impact on biodiversity, flora or fauna, other than to acknowledge that reduced consumer demand for water will result in reduced requirement for abstraction at source (and therefore, potential for positive impacts on flow sensitive habitats/species). Overall, the impact of this option on biodiversity has been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	Drought publicity will result in water savings which will contribute towards improving the security of supply of water in UU's supply region. No impacts on recreation are anticipated. The impact of this option has been summarised as minor beneficial and temporary, taking into account the potential for reduced water consumption.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	Drought publicity is assumed to be communicated through radio and newspaper advertisements and as such will not involve any increased material resource use. Drought publicity will result in increased awareness of the public of water resource consumption and waste (water). This option will reduce the amount of water used in the region. Impacts have been summarised as minor beneficial and temporary.	

Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	Drought publicity is assumed to be communicated through radio and newspaper advertisements. Such methods of publicity are considered to have beneficial impact on water, acknowledging that reduced consumer demand for water will result in reduced requirement for abstraction at source. Overall, the impact of this option on water has been summarised as minor beneficial.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	No impacts of drought publicity on soil, geology and land use are anticipated.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	Drought publicity is assumed to be communicated through radio and newspaper advertisements and as such will not involve any increased resource use, or increased CO_2 emissions. No impacts of drought publicity on air and climate are anticipated.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	No impacts of drought publicity on any archaeological or historic sites are anticipated.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	Drought publicity is considered to have no impact on landscape and visual amenity, other than to acknowledge that reduced consumer demand for water will result in reduced requirement for abstraction at source, potentially reducing any impacts of drought related landscape or visual impacts. This option is not anticipated to have any implications for access to the countryside. Overall, the impacts have been assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	Reduction in water use (Material Assets and Resource Use) has the potential to positively affect other topics including Biodiversity, Flora and Fauna, Water, and Landscape and Visual Amenity due to reduced requirement for abstraction at source. This impact has been summarised as minor beneficial.	

Table E2.2 Increased leakage detection and repair activity

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	Construction activities associated with leakage detection and repair activities may result in disturbance to local habitats and species during the works. This disturbance is, however, anticipated to be short term, temporary and reversible and, overall, is expected to be negligible. It is acknowledged that reduction in water lost through leakage will result in reduced requirement for abstraction at source (and therefore, potential for positive impacts on flow sensitive habitats/species). Impacts on biodiversity have been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	Leakage detection and repairs will provide water savings which will contribute towards improving the security of supply of water in the UU's supply region. Drinking water quality will not be affected by the leakage detection and repair. It is assumed that public rights of way will be maintained during repair activities and there will be no impacts upon recreational opportunity. As such, this option will have a minor beneficial impact due to the security of supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	Leakage detection and repairs will result in the reduction of water lost in the supply network. There will be vehicle movements associated with these activities. Repairs may require raw materials, and it has been assumed that any materials required would be obtained locally, and any waste materials recycled appropriately. The impact of this option has been summarised as minor beneficial, taking into account reductions in water lost.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	This option will not directly result in, or modify any abstraction (surface water or groundwater). Reduction in water lost through leakage will result in reduced requirement for abstraction at source. Overall, the impacts have been assessed as minor beneficial.	

Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	Construction activities associated with leakage detection and repair activities may result in localised disturbance to soils and geology during the works. As leakage detection and repair activity will be on pipelines which are already in situ, this disturbance is anticipated to be short term, temporary and reversible and overall impacts are expected to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	Excavation works and repair activity will require the use of plant and vehicles, which will result in temporary increase in CO_2 emissions in the short term, associated with construction activities. Leakage detection and repairs will result in the reduction of water lost in the supply network and long term energy savings associated with this reduction (decreased CO_2 emissions associated with decreased need for water treatment and pumping). Given these long term benefits, the impacts on air and climate are anticipated to be negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	Leakage detection and repair activity will be on pipelines which are already in situ, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Impacts on archaeology and cultural heritage are anticipated to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	Although there will be some temporary, short term impacts of leakage detection and repair activity upon localised landscapes, the effect of the leakage detection and repair is not anticipated to have any long term impacts upon landscape, as the works will be on pipelines which are already in situ. It is acknowledged that reduced consumer demand for water will result in reduced requirement for abstraction at source, potentially reducing any impacts of drought related landscape or visual impacts. Impacts on landscape and visual amenity are anticipated to be negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	Reduction in water lost (Material Assets and Resource Use) has the potential to positively affect other topics including Biodiversity, Flora and Fauna, Water, and Landscape and Visual Amenity due to reduced requirement for abstraction at source. This impact has been summarised as minor beneficial.	

Table E2.3 Water Use Restriction

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	Water use restrictions are considered to have no impact on biodiversity, flora or fauna, other than to acknowledge that reduced consumer demand for water will result in reduced requirement for abstraction at source (and therefore, potential for positive impacts on flow sensitive habitats/species). Overall, the impact of this option on biodiversity has been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	Water use restrictions will provide water savings which will contribute towards improving the security of supply of water in the UU's supply region. Drinking water quality will not be affected by the restrictions. There may be potential for minor impacts upon recreational opportunity due to restriction on filling of domestic swimming or paddling pools etc. There is the potential for minor local socio-economic impacts of water use restrictions (as given in Section 76 of the Water Industry Act 1991) e.g., on businesses which wash private vehicles using a hosepipe, and businesses which clean walls or windows of domestic properties using a hosepipe. This option has been summarised as having minor beneficial impacts on population and human health taking into account moderate beneficial impacts of security of supply of drinking water, and potential minor adverse effects to recreation and socio-economics.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	Water use restrictions will reduce the demand for water in the region. Impacts have been summarised as minor beneficial and temporary (i.e., while the restrictions are in place).	

Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	This option will not directly result in, or modify any abstraction (surface water or groundwater). Reduction in demand for water will result in reduced requirement for abstraction at source. Overall, the impacts have been assessed as minor beneficial.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	No impacts of demand restrictions on soil, geology and land use are anticipated.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	No impacts of demand restrictions on air and climate are anticipated.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	No impacts of demand restrictions on any archaeological or historic sites are anticipated.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	Demand restrictions are considered to have no impact on landscape and visual amenity, other than to acknowledge that reduced demand for water will result in reduced requirement for abstraction at source, potentially reducing any impacts of drought related landscape or visual impacts. This option is not anticipated to have any implications for access to the countryside. Overall, the impacts have been assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	Reduction in water use (Material Assets and Resource Use) has the potential to positively affect other topics including Biodiversity, Flora and Fauna, Water, and Landscape and Visual Amenity due to reduced requirement for abstraction at source. This impact has been summarised as minor beneficial.	

Table E2.4 Ordinary Drought Order (Non-Essential Use Ban)

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	An Ordinary Drought Order is considered to have no impact on biodiversity, flora or fauna, other than to acknowledge that reduced consumer demand for water will result in reduced requirement for abstraction at source (and therefore, potential for positive impacts on flow sensitive habitats/species). Overall, the impact of this option on biodiversity has been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	An Ordinary Drought Order will provide water savings which will contribute towards improving the security of supply of water in the UU's supply region. Drinking water quality will not be affected by the restrictions. There may be potential for minor impacts upon recreational opportunity due to any restrictions on filling of non-domestic swimming pools etc. There is the potential for minor local socio-economic impacts i.e., due to restrictions on filling of non-domestic swimming pools, mechanical vehicle washers and washing of non-domestic windows using a hosepipe. This option has been summarised as having negligible impacts on population and human health taking into account moderate beneficial impacts of security of supply of drinking water, and potential moderate adverse effects to recreation and socio-economics.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	An Ordinary Drought Order will reduce the demand for water in the region. Impacts have been summarised as minor beneficial and temporary (i.e., while the restrictions are in place).	

Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	This option will not directly result in, or modify any abstraction (surface water or groundwater). Reduction in demand for water will result in reduced requirement for abstraction at source. Overall impacts have been assessed as minor beneficial.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	No impacts of demand restrictions on soil, geology and land use are anticipated.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	No impacts of demand restrictions on air and climate are anticipated.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	No impacts of demand restrictions on any archaeological or historic sites are anticipated.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	An Ordinary Drought Order is considered to have no impact on landscape and visual amenity, other than to acknowledge that reduced demand for water will result in reduced requirement for abstraction at source, potentially reducing any impacts of drought related landscape or visual impacts. This option is not anticipated to have any implications for access to the countryside. Overall, the impacts have been assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	Reduction in water use (Material Assets and Resource Use) has the potential to positively affect other topics including Biodiversity, Flora and Fauna, Water, and Landscape and Visual Amenity due to reduced requirement for abstraction at source. This impact has been summarised as minor beneficial.	

E3 DROUGHT PERMIT/ORDER OPTIONS

Table E3.1 Longdendale Reservoirs

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought options at Longdendale and included an assessment of impacts of the drought option options on biodiversity. Overall, the impacts on trout were summarised as minor adverse; and salmon (fry and parr), lamprey and bullhead as moderate adverse. The impacts on salmon (fry and parr) increase to major adverse and on trout to moderate adverse for the option of reducing the compensation flow to 15Ml/d, With mitigation, impacts on fish populations overall are reported as minor adverse. Minor adverse impacts on macrophytes and in-river habitats were also predicted. The impacts on other ecological receptors were assessed as negligible. No designated sites are impacted by the drought option. The impact has been summarised as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** The reduction in compensation flow under drought powers would enable the continued supply of water if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought options at Longdendale and included an assessment of impacts of the drought option on recreation, including angling. Impacts were assessed as negligible. Overall, the impacts on population and human health have been assessed as major beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered,	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. Option involves modifications to compensation flow only and no changes to energy use are envisaged.	

	whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.		
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought options at Longdendale and included an assessment of impacts of the drought option options on hydrodynamics and water quality. Reduction in compensation flow to 22.5Ml/d and 15M/d were assessed as having minor and moderate adverse impacts on riverine hydrodynamics respectively. With mitigation, the impacts on riverine water quality are predicted to be minor adverse for both scenarios. Negligible impact on reservoir hydrodynamics and water quality are anticipated. Overall, the impact on water has been summarised as minor adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought options at Longdendale and included an assessment of impacts of the drought option options on fluvial geomorphology. The report concluded that given the neutral magnitude of flow effects on sediment dynamics, and the regional value of the geomorphology of the rivers, a negligible impact on geomorphology was anticipated.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation No operational impacts on air quality are anticipated. Option involves modifications to compensation flow only and no changes to energy use and, therefore, greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought options at Longdendale and included an assessment of impacts of the	

	strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	drought option options on archaeology. The only scheduled monument identified was Marple aqueduct, which is located over the River Goyt. There were a number of listed buildings identified. No records were found to indicate that anaerobic / organic remains are located within or immediately adjacent to the watercourses. The heritage features identified as within or immediately adjacent to the rivers within the area of study (including Marple aqueduct) are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter and the overall impact on archaeology is considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought options at Longdendale and included an assessment of impacts of the drought option options on landscape. The aesthetics and landscape of the watercourses and reservoir in the Longdendale study area can be considered to be of parish/neighbourhood value. Bottoms reservoir (the lowest reservoir in the Longdendale reservoir chain from which the compensation flow to the River Etherow is released) is just within the Peak District National Park boundary. Given that the magnitude of the changes in wetted perimeter, are likely to be low adverse, it is anticipated that the proposed drought options will have a minor adverse temporary impact on the aesthetics and landscape of the study area.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation Key inter-relationships include the impact of riverine flow reduction on water quality, fish populations and landscape and visual amenity.	

Table E3.2 Rivington Reservoirs – White Coppice

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (White Coppice) and included an assessment of impacts of the drought option on biodiversity. With mitigation measures in place, impacts on riverine fish populations were assessed as minor adverse. Impacts on macrophytes were assessed as minor adverse, and for all other ecological receptors, effects were assessed as negligible. Impacts on in-river habitats within the study area were assessed as minor adverse. Overall, the impacts on biodiversity have been	

		assessed as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** The reduction in compensation flow under drought powers would enable the continued supply of water if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (White Coppice) and included an assessment of impacts of the drought option on recreation including angling. Impacts were assessed as negligible. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. Option involves modifications to compensation flow only and no changes to energy use are envisaged.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (White Coppice) and included an assessment of impacts of the drought option on hydrology and water quality. The report concluded a minor adverse impact on hydrodynamics of the affected riverine water bodies, and a negligible impact on reservoir hydrodynamics. Impacts on water quality were also assessed as minor adverse. Overall, the impact is summarised as minor adverse and temporary.	
Soil, geology and	To protect and enhance the quality and	**Construction**	

land use	quantity of soils. To protect and enhance geodiversity.	There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (White Coppice) and included an assessment of impacts of the drought option on fluvial geomorphology which the report concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** No operational impacts on air quality are anticipated. Option involves modifications to compensation flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (White Coppice) and included an assessment of impacts of the drought option on archaeology and cultural heritage. The only scheduled monument identified in the study area was Croston Town Bridge, which is located over the River Yarrow. No records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses. The report concluded that heritage features identified as occurring within or immediately adjacent to the rivers within the area of study are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter and the overall impact on archaeology is negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (White Coppice) and included an assessment of impacts of the drought option on landscape and visual amenity which the report concluded to be negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** Key inter-relationships include the potential impact of hydrodynamics and water quality on riverine fish populations.	

Table E3.3 Rivington Reservoirs – Brinscall Brook

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (Brinscall Brook) and included an assessment of impacts of the drought option on biodiversity. With mitigation measures in place, impacts on riverine fish populations were assessed as minor adverse. Impacts on macrophytes were assessed as minor adverse, and for all other ecological receptors, effects were assessed as negligible. Impacts on in-river habitats within the study area were assessed as minor adverse. Overall, the impacts on biodiversity have been assessed as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** The reduction in compensation flow under drought powers would enable the continued supply of water if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (Brinscall Brook) and included an assessment of impacts of the drought option on recreation including angling. Impacts were assessed as negligible. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. Option involves modifications to compensation flow only and no changes to energy use are envisaged.	

	supply for homes and industry in the area is maintained.		
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (Brinscall Brook) and included an assessment of impacts of the drought option on hydrology and water quality. The report concluded a minor adverse impact on hydrodynamics of the affected riverine water bodies (including wetted perimeter), and a negligible impact on reservoir hydrodynamics. Impacts on water quality were also assessed as minor adverse. Overall, the impact is summarised as minor adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (Brinscall Brook) and included an assessment of impacts of the drought option on fluvial geomorphology which the report concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation No operational impacts on air quality are anticipated. The option involves modifications to compensation flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (Brinscall Brook) and included an assessment of impacts of the drought option on archaeology and cultural heritage. The only scheduled monument identified in the study area was Croston Town Bridge, which is located over the River Yarrow. No records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses. The report concluded that heritage features identified as occurring within or immediately adjacent to the rivers within the area of study are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter and the overall impact on archaeology is negligible.	
Landscape and	To protect and enhance designated and	**Construction**	

visual amenity	undesignated landscape, townscape and the countryside.	There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Rivington (Brinscall Brook) and included an assessment of impacts of the drought option on landscape and visual amenity. The report concluded that the magnitude of changes in wetted perimeter are likely to be minor and are anticipated to have a negligible impact on the landscape and visual amenity.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** Key inter-relationships include the potential impact of hydrodynamics and water quality on riverine fish populations.	

Table E3.4 Jumbles Reservoir

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Jumbles and included an assessment of impacts of the drought option on biodiversity. Impacts on juvenile trout and riverine macrophytes, and in-river habitats (with mitigation) have been assessed as minor adverse. Impacts on all other ecological receptors were assessed as negligible. No designated sites are within the zone of influence of the drought option. The overall impact has been assessed as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** Jumbles Reservoir is used as a compensation release reservoir only (no water is abstracted from Jumbles reservoir for public supply). The function of the drought option at Jumbles would be to conserve storage in the reservoir, thereby reducing the transfer of water needed from Wayoh and Entwistle reservoirs to Jumbles and maintaining water in those reservoirs for abstraction and public water supply. An Environmental Report has been prepared for drought contingency planning for the drought option at Jumbles and included an assessment of impacts of the drought option on recreation including angling. Impacts were assessed as negligible.	

		Minor to moderate adverse impacts on other amenity and commercial abstractors were also identified, which could result in minor to moderate adverse socio-economic impacts. Overall, the impacts on population and human health have been assessed as moderate beneficial, based on minor to moderate negative impacts on other abstractors and major beneficial impacts on security of water supply.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. The option involves modifications to compensation flow only and no changes to energy use are envisaged.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Jumbles and included an assessment of impacts of the drought option on hydrodynamics and water quality. With mitigation, impacts of the drought option on hydrology and water quality were assessed as minor adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Jumbles and included an assessment of impacts of the drought option on fluvial geomorphology which the report concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** No operational impacts on air quality are anticipated. The option involves	

		modifications to compensation flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Jumbles and included an assessment of impacts of the drought option on archaeology and cultural heritage. There are no scheduled monuments located in the area and no records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses. Four listed buildings were identified in the vicinity. Overall, the report concluded impacts on archaeology were predicted to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Jumbles and included an assessment of impacts of the drought option on landscape and visual amenity. The option is not within any designated landscape and impacts were assessed as minor adverse and temporary.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation Key inter-relationships include impacts of hydrodynamics and water quality on biodiversity (fish) and landscape.	

Table E3.5 Delph Reservoir

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Delph and included an assessment of impacts of the drought option on biodiversity. Impacts on river fish populations and riverine macrophytes were assessed as minor adverse (with mitigation). Impacts on all other ecological receptors and habitats were assessed as negligible, including negligible impacts on Nob End SSSI. Overall, the impact of the drought option is summarised as minor adverse and temporary.	

Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** The reduction in compensation flow under drought powers would enable the continued supply of water and maintain compensation releases if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Delph and included an assessment of impacts of the drought option on recreation including angling. Negligible impacts were predicted. Minor adverse impacts on other amenity and commercial abstractors were also identified, which could result in minor adverse socio-economic impacts. Overall, the impacts on population and human health have been assessed as minor beneficial, based on minor negative impacts on other abstractors and moderate beneficial impacts on security of water supply.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. The option involves modifications to compensation flow only and no changes to energy use are envisaged.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Delph and included an assessment of impacts of the drought option on hydrodynamics and water quality. The report concluded minor adverse impacts on riverine hydrodynamics. Water quality impacts of the drought option on the Eagley Brook (which receives compensation flow from Delph Reservoir) were assessed as minor adverse. Impacts on the reservoir were assessed as negligible. Overall, the impacts on water have been assessed as minor adverse and temporary.	

Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Delph, and included an assessment of impacts of the drought option on fluvial geomorphology which tconcluded the impact to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation No operational impacts on air quality are anticipated. Option involves modifications to compensation flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Delph and included an assessment of impacts of the drought option on archaeology and cultural heritage. There are no scheduled monuments located in the area and no records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses. A total of nine listed buildings were identified, but only three of these (former mills) occur immediately adjacent to the channels. Overall, the report concluded impacts on archaeology were predicted to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Delph and included an assessment of impacts of the drought option on landscape and visual amenity. The option is not within any designated landscape and impacts were assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation Key inter-relationships include impacts of hydrodynamics and water quality on biodiversity (fish and macrophyte populations).	

Table E3.6 Dovestone Reservoir

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Dovestone and included an assessment of impacts of the drought option on biodiversity. The report concluded minor adverse impacts on macrophytes and in-river habitats. For the option of reducing the compensation flow to 5Ml/d a minor adverse impact on trout was identified. Impacts on all other ecological receptors were assessed as negligible. Overall, the impact of the drought option is summarised as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** The reduction in compensation flow under drought powers would enable the continued supply of water and maintain compensation releases if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Dovestone and included an assessment of impacts of the drought option on recreation including angling. Negligible impacts were predicted. Overall, the impacts on population and human health have been assessed as major beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. The option involves modifications to compensation flow only and no changes to energy use are envisaged.	

Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Dovestone and included an assessment of impacts of the drought option on hydrodynamics and water quality. The report concluded minor adverse impacts on riverine hydrodynamics and water quality. Impacts on the reservoir were assessed as negligible. Overall, the impacts on water have been assessed as minor adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Dovestone and included an assessment of impacts of the drought option on fluvial geomorphology which concluded the impact to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation No operational impacts on air quality are anticipated. The option involves modifications to compensation flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Dovestone and included an assessment of impacts of the drought option on archaeology and cultural heritage. The only scheduled monument identified was as post-medieval glassworks near Haughton Green. No records were found to indicate that anaerobic / organic remains are located within or immediately adjacent to the watercourses. A total of 22 listed buildings were identified, but only eight of these (mainly aqueducts and bridges) occur immediately adjacent to the channels. Overall, the report concluded impacts on archaeology were predicted to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for	

		the drought option at Dovestone and included an assessment of impacts of the drought option on landscape and visual amenity. Dovestone reservoir is just within the Peak District National Park boundary. The Environmental Report predicted negligible impacts on landscape and visual amenity.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation Key inter-relationships include impacts of hydrodynamics and water quality on biodiversity (macrophyte populations and in-river habitats).	

Table E3.7 Lake Vyrnwy

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Vyrnwy and included an assessment of impacts of the drought option on biodiversity. The report concluded minor adverse impacts on riverine fish (with mitigation measures), macrophytes and in-river habitats. Impacts on all other ecological receptors were assessed as negligible. The Severn Estuary SAC is not in the zone of hydrological influence of the scheme. There is no hydrological connectivity of the option with the Montgomery Canal SAC. Overall, the impact of the drought option is summarised as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation The reduction in compensation flow under drought powers would enable the continued supply of water and would also serve to maintain compensation releases if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Vyrnwy and included an assessment of impacts of the drought option on recreation including angling. Negligible impacts and minor adverse impacts (summer only) were predicted for recreation and angling (on the downstream river only) respectively. An adverse impact on another abstractor has been identified, which could result in moderate adverse local socio-economic impacts. However, with mitigation measures, the residual impact was assessed as minor adverse. Overall impacts on population and human health have been assessed as moderate beneficial, based on minor negative impacts on recreation and	

		angling, minor impacts on another abstractor and major beneficial impacts on security of water supply.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** No operational impacts on material assets and resource use are anticipated. The option involves modifications to compensation flow only, and no changes to energy use are envisaged.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Vyrnwy and included an assessment of impacts of the drought option on hydrodynamics and water quality. The report concluded minor adverse impacts on riverine hydrodynamics and water quality. Impacts on the reservoir were assessed as negligible. Overall, the impacts on water have been assessed as minor adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Vyrnwy and included an assessment of impacts of the drought option on fluvial geomorphology which concluded the impacts to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only. **Operation** No operational impacts on air quality are anticipated. The option involves modifications to compensation flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	

Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Vyrnwy and included an assessment of impacts of the drought option on archaeology and cultural heritage. Of the 57 sites identified, only ten are located in the river channel or immediately adjacent to the channel. The majority of these were bridges and aqueducts, along with two former mills. No records were found to indicate that anaerobic / organic remains are located within or immediately adjacent to the Afon Vyrnwy. The report concluded that the heritage features identified as occurring within or immediately adjacent to the rivers within the area of study are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter. Impacts on archaeology have been assessed as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Vyrnwy and included an assessment of impacts of the drought option on landscape and visual amenity. The option is not within any designated landscape and given that the magnitude of changes in wetted perimeter are likely to be minor, impacts on landscape were assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to compensation flow only.	
		Operation Key inter-relationships include impacts of hydrodynamics and water quality on biodiversity (riverine fish, macrophyte populations and in-river habitats).	

Table E3.8 River Lune LCUS abstraction

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at the River Lune and included an assessment of impacts of the drought option on biodiversity. The report concluded moderate adverse impacts on salmon smolt and minor on sea trout smolt, due to the potential for increased	

	capital and the ecosystem services from natural capital that contribute to the economy.	predation at weirs. Mitigation measures were recommended to reduce the impact of predation. Impacts on all other ecological receptors were assessed as negligible. No impacts on the Morecombe Bay SAC are anticipated. Overall, the impact of the drought option is summarised as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only. **Operation** The drought powers (reduction in hands-off flow) would allow water resources to be supported for a longer period, preserving reservoir storages elsewhere in the system, and at greater volumes than would otherwise be possible. However, if weather conditions prove to be favourable, abstraction would only be carried out under normal conditions. Only in sustained dry conditions would the drought powers be required. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at the River Lune and included an assessment of impacts of the drought option on recreation including angling. Minor adverse impacts were predicted for angling. Negligible impacts are reported for canoeing, tourism and recreation, and navigation. Minor adverse impacts on other amenity and commercial abstractors were identified, which could result in adverse local socio-economic impacts. Overall, the impacts on population and human health have been assessed as moderate beneficial, taking into account minor negative impacts on recreation, moderate impacts on other abstractors and major beneficial impacts on security of water supply.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only. **Operation** No operational impacts on material assets and resource use are anticipated. The option involves modifications to hands-off flow only and no changes to energy use are envisaged.	
Water	To avoid adverse impact on surface and groundwater levels and flows.	**Construction** There is no construction phase associated with this drought option. The option	

	To protect and enhance surface and groundwater quality.	involves modifications to hands-off flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at the River Lune and included an assessment of impacts of the drought option on hydrodynamics and water quality. Impacts on river flows at the Halton weir were assessed as short term and minor to moderate. Impacts on water quality are negligible. Overall, the impacts on water have been assessed as minor adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at the River Lune and included an assessment of impacts of the drought option on fluvial geomorphology which the report concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to hands-off flow only. **Operation** No operational impacts on air quality are anticipated. Option involves modifications to hands-off flow only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at the River Lune and included an assessment of impacts of the drought option on archaeology and cultural heritage. The four heritage features identified as occurring within or immediately adjacent to the River Lune were assessed as unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter. Changes to riverine hydrodynamics are assessed as minor/negligible, therefore no implications for any previously undiscovered anaerobic / organic remains are anticipated. The overall impact on archaeology is considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at the River Lune and included an assessment of impacts of the drought option on landscape and visual amenity. The River Lune LCUS pumping	

		station is just within the Forest of Bowland AONB. The Environmental Report identified the impact on landscape and visual amenity as minor adverse or negligible and temporary.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to hands-off flow only.	
		Operation Key inter-relationships include impacts of hydrodynamics on biodiversity (riverine fish), recreation (including angling), navigation and landscape.	

Table E3.9a Lake Windermere Scenario 1

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought options at Lake Windermere, and includes an assessment of the hydrological, water quality and ecological impacts of the two drought option scenarios. Windermere is designated as a County Wildlife Site. Under Scenario 1, draw down of lake levels would not be beyond those which may occur under baseline natural drought conditions, and the impact on fish, macrophytes and invertebrates will be negligible and short term.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only.	
		Operation The water abstracted from Windermere under a drought option would effectively reduce abstraction of water from Haweswater reservoir and other UU reservoirs and thus conserve reservoir storage if dry weather continues. This measure will serve to safeguard public water supplies. An Environmental Report has been prepared for drought contingency planning for the drought options at Lake Windermere, and includes an assessment of the impacts on recreation. Water-based commercial (including lake cruisers) and recreational activities will not be significantly affected for drought option Scenario 1 and the impact will be negligible. Negligible impacts on angling opportunity are anticipated. There are no anticipated socio-economic impacts of this drought option. Overall, the impact of the drought option on population and human health has been assessed as major beneficial based on continued provision of public water supplies.	
Material assets and resource use		**Construction** There is no construction phase associated with this drought option. Option involves	

	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	modifications to abstraction regime and compensation flow only. **Operation** The abstraction of water from Windermere is via pumped abstraction and will increase energy consumption. This impact has been assessed as minor adverse and temporary.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only. **Operation** An Environmental Report has been prepared for drought contingency planning for Windermere, and includes an assessment of the hydrological, water quality and ecological impacts of the two drought option scenarios. The conclusions of the report were that drought option Scenario 1 would not significantly impact on lake levels during periods of summer drought, constituting only a negligible impact on water levels, and would not significantly influence the minimum flow seen in the river, but would slightly increase the duration of low flows. Drought option Scenario 1 is expected to have negligible impact on lake hydrochemistry and water quality and be short term. Overall, the impact of the drought option on water has been assessed as negligible, based on negligible impacts to lake level and river water quality.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for Windermere, and includes an assessment of geomorphological impacts. Lake drawdown with drought Scenario 1 is similar to a normal drought situation and changes in geomorphological function of the lake would be negligible. The low flow and the velocity envelope in the River Leven with Scenario 1 would be very similar to normal drought conditions	

		throughout the year, as the hands-off flow protects the lowest flows. No changes in geomorphological function would therefore be expected and the impact is negligible. The impact on sediment transport in the River Leven would also be negligible. Overall, the impact on soil, geology and land use has been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only.	
		Operation The abstraction of water from Windermere is via pumped abstraction and will increase energy consumption and, therefore, greenhouse gas emissions.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only.	
		Operation The only known Scheduled Monument on Windermere or the River Leven is Newby Bridge itself and there are no known water level dependent archaeological/cultural heritage features. Changes to hydrodynamics are assessed as negligible, therefore, no implications for any previously undiscovered anaerobic / organic remains are anticipated. Impacts on cultural heritage are therefore considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only.	
		Operation Windermere and the River Leven are set within the Lake District National Park. An Environmental Report has been prepared for drought contingency planning for Windermere, and includes an assessment of landscape impacts. Under Scenario 1, lake levels would remain within the normal drought envelope and effect on river levels and wetted area are predicted to be negligible therefore landscape impacts are assessed as negligible. Overall, landscape impacts are assessed as negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime and compensation flow only.	
		Operation Key adverse inter-relationships between river flows, water quality and biodiversity. This has been as assessed as a minor adverse inter-relationship.	

Table E3.9b Lake Windermere Scenario 2

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought options at Lake Windermere, and includes an assessment of the hydrological, water quality and ecological impacts of the two drought option scenarios. Windermere is designated as a County Wildlife Site. Under Scenario 2, all impacts on fish have been assessed as negligible/minor, other than impacts on salmon migration to and from tributaries of Windermere during periods of peak migratory activity which have been assessed as moderate adverse. However impacts on migration could be mitigated by dredging the affect mouths of tributaries to maintain connectivity. Impacts on lake levels during the summer period are predicted to have minor, short term impacts on shoreline macrophytes and some macroinvertebrate species. Overall, the impacts have been assessed as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. Option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow. **Operation** The water abstracted from Windermere under a drought option would effectively reduce abstraction of water from Haweswater reservoir and other UU reservoirs and thus conserve reservoir storage if dry weather continues. This measure will serve to safeguard public water supplies. An Environmental Report has been prepared for drought contingency planning for the drought options at Lake Windermere, and includes an assessment of the impacts on recreation. Under Scenario 2, the reduction in lake level could influence access for lakeside (including lake cruisers) and boat angling, although with little effect on angling success. The effects of drawdown would be temporary and relatively short-lived, however, the drawdown of Windermere in summer represents a major negative impact on commercial and recreational activities. This option has the potential to result in major negative local socio-economic impacts. Overall, the impact of the drought option on population and human health has been assessed as moderate adverse, based on major beneficial impacts to public water supply, and major negative impacts to recreation and socio-economics. The major negative impacts to socio-economics will be mitigated for example, by extending or floating jetties, having a proactive dredging programme, extension of areas of hazard buoys	

		and an early warning system for lake users. If dredging was to be implemented it would be subject to a separate environmental assessment as this activity is not included in the current drought option.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow. **Operation** The abstraction of water from Windermere is via pumped abstraction and will increase energy consumption. This impact has been assessed as minor adverse and temporary.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow. **Operation** An Environmental Report has been prepared for drought contingency planning for Windermere, and includes an assessment of the hydrological, water quality and ecological impacts of the two drought option scenarios. Under Scenario 2, changes in lake level are considered to constitute a minor to moderate effect on lake levels, with the largest impact near Belle Isle. The drought option scenario is expected to have negligible impact on lake hydrochemistry and water quality. Flows in the River Leven would represent a minor/moderate short term variation from the typical flow regime during a drought period and may increase the risk of impacts associated with dilution of diffuse pollution. A minor adverse impact on river water quality in the winter is predicted. Overall, the impact of the drought option on water has been assessed as moderate adverse and temporary, based on moderate impacts to lake level.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for Windermere, and	

		includes an assessment of geomorphological impacts. Under drought option Scenario 2, drawdown of the lake in spring/summer could influence geomorphological function at the lake margin and exposure of previously submerged sediments and substrates that would then be subject to modification, this impact was assessed as minor adverse. The assessment concluded impacts on in-river habitat in the River Leven would be negligible/minor and of short duration.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow.	
		Operation The abstraction of water from Windermere is via pumped abstraction and will increase energy consumption and, therefore, greenhouse gas emissions. This impact has been assessed as minor adverse.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow.	
		Operation The only known Scheduled Monument on Windermere or the River Leven is Newby Bridge itself and there are no known water level dependent archaeological/cultural heritage features. There are no known anaerobic / organic remains within the zone of influence, however, under drought option conditions, the occurrence of extreme low flow events in the River Leven during periods of summer drought would be reduced. Impacts on cultural heritage are, therefore, considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and compensation flow.	
		Operation Windermere and the River Leven are set within the Lake District National Park. An Environmental Report has been prepared for drought contingency planning for Windermere, and includes an assessment of landscape impacts. If implemented during the peak summer tourist months, Scenario 2 drawdown of the lake could result in a high but temporary impact on landscape and visual amenity. Given that the river would be supported in summer and only modestly affected in winter, the landscape and visual amenity impacts on the River Leven are considered to be minor. Overall, landscape impacts are assessed as moderate adverse due to the temporary landscape impacts of drawdown on the setting of the National Park.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves a lake drawdown in addition to modifications to the abstraction regime and	

		compensation flow.	
		Operation Key negative inter-relationships between lake level (water), and recreation (navigation) and landscape and visual amenity are noted and have been summarised as moderate adverse.	

Table E3.10 Ullswater

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only.	
		Operation Ullswater and the River Eamont form part the Eden catchment and are included in the River Eden SAC and River Eden and Tributaries SSSI. An Environmental Report has been prepared for drought contingency planning for Ullswater, and includes an assessment of the hydrological, water quality and ecological impacts of the drought option. The report concluded that there would be negligible impacts on fish (including salmon and sea trout) and invertebrates (including the white-clawed crayfish). No impacts on macrophyte communities are anticipated when implementing the drought order. No adverse impacts on SACs or SSSI sites are anticipated.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only.	
		Operation The water abstracted from Ullswater under drought powers would augment the storage in Haweswater Reservoir if dry weather continues. Without these powers, in a severe drought, there would be a growing risk of a storage deficit, placing public water supplies at an unacceptable risk. This option is, therefore, deemed to have a beneficial impact in ensuring security of supply of drinking water. Recreational activities on Ullswater include angling, boating, commercial navigation (including lake cruisers) and watersports. With implementation of this drought option there would be no deviation in lake level outside the normal envelope of extremes at any time of the year. Impacts on recreational and / or commercial activities are, therefore, negligible. Canoeing is carried out on the Eamont, mainly from downstream of Eamont Bridge. Other recreational activities along the Eamont include angling and walking. Implementation of the drought option will have negligible impacts on angling and canoeing. Overall, the impacts on population and human health have been assessed as major beneficial based on continued provision of public water supplies.	
Material assets		**Construction**	

and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** The abstraction of water from Ullswater is via pumped abstraction and will increase energy consumption. Overall, the impact has been assessed as minor adverse.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** An Environmental Report has been prepared for drought contingency planning for Ullswater, and includes an assessment of the hydrological and water quality impacts of the drought option. The report concluded little effect of the drought option on water levels in Ullswater, which would remain within natural lake level variability. The impact of implementing the drought option would result in negligible impacts to the physical environment of the river including water quality and hydrodynamics.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** There would be no significant land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for Ullswater, and includes an assessment of geomorphological impacts. Overall, the impacts on geomorphology have been summarised as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** The abstraction of water from Ullswater is via pumped abstraction and will increase energy consumption and, therefore, greenhouse gas emissions. This impact has been assessed as minor adverse.	
Archaeology and	To conserve and enhance the historic	**Construction**	

cultural heritage	environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** Eamont Bridge is a scheduled ancient monument. Under drought option conditions, flow variation in the River Eamont is likely to be within the natural fluctuations experienced in the river, although minor adverse impacts to flows may occur in autumn / winter. However, no significant implications for Eamont Bridge or any previously undiscovered anaerobic / organic remains are anticipated. Impacts on archaeology and cultural heritage are, therefore, considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** Ullswater and the River Eamont are set within the Lake District National Park. An Environmental Report has been prepared for drought contingency planning for Ullswater, and includes an assessment of landscape impacts. There would be no deviation in lake level outside the normal envelope of extremes at any time of the yeartherefore, the drought permit is considered to have a negligible impact on the landscape and visual amenity of Ullswater and its environs. In the River Eamont, flow variation is likely to be within the natural fluctuations experienced in the river, and the impact on visual amenity is negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** Key inter-relationships in the operational phase include flow mediated impacts on biodiversity, noting the potential benefits resulting from augmented flows in spring / summer.	

Table E3.11 Swineshaw Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the	**Construction** Minor construction works are required to bring the boreholes online as a drought source option. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, and given the distance from European designated sites (1 km) and SSSIs (>2.5 km), construction impacts are considered unlikely. Construction activities may result in disturbance to local habitats and species during the works. This disturbance is anticipated to be short term, temporary and reversible is expected to be of negligible impact. Assuming best practice construction and mitigation methods are implemented, the potential impacts of construction, including on the potential spread of invasive	

	economy.	species, are considered to be negligible. **Operation** An environmental assessment has been undertaken for drought contingency planning for Swineshaw Boreholes, and included an assessment of the hydrological and ecological impacts of the drought option. The report concluded that there would be negligible impacts on biodiversity, flora and fauna, including the designated features of the South Pennine Moors SAC (which includes blanket bog habitat). The report concluded that the boreholes are unlikely to be hydrologically connected to the surface waters within the South Pennine Moors SAC due to the depth of the aquifer and the presence of impermeable mudstone beds between the surface and the aquifer. In addition, the report concluded there is only a small potential intersection between the estimated recharge zone and the SAC. No adverse impacts on SACs or SSSI sites are therefore anticipated. Overall, the impacts on biodiversity, flora and fauna are anticipated to be negligible, based on current understanding. In order to provide additional evidence to support the conclusions of the environmental assessment UU will commission a walkover survey to take place during spring / summer 2017 (when vegetation is present). This survey will focus on the presence of habitats and species which indicates any linkages between the blanket bogs SAC designated feature and groundwater, which may indicate a potential pathway for impacts on the SAC during drought order implementation. If the walkover survey does not support the finding of the environmental assessment, UU will consult with the Environment Agency and Natural England as to what further work may be needed or agree to remove this option from the drought plan (through the annual Water Resources Management Plan review process). UU will not seek to implement this drought option until such time as impacts on the SAC are confirmed.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. It is assumed that public rights of way will be maintained during the construction phase. During the construction phase, there will be no impact on security of supplies or quality of drinking water. **Operation** Implementation of this drought option would enable the continued supply of water if dry weather continues. Without implementation of this option in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. No impacts of the drought option on recreation are anticipated. Overall, the impacts on population and human health have been assessed as moderate beneficial based on continued supply of drinking water.	

Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that any materials required would be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning, it has been assumed that materials will be recycled appropriately. **Operation** Minor changes to energy use are envisaged due to increased pumping of groundwater. Overall, the impacts on material assets and resource use have been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Assuming best practice construction methods, impacts of the construction phase on water are anticipated to be negligible. **Operation** An environmental assessment has been undertaken for drought contingency planning for Swineshaw Boreholes, and included an assessment of the hydrological impacts of the drought option. Abstraction from the boreholes was assessed, based on current understanding, as having a negligible effect upon the local ground water levels. Impacts on surface water levels and flow were also assessed as negligible. Impacts of this drought option on water are summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There would be minor land use changes associated with this option, however, these are within the existing UU site. This impact has been assessed as negligible. **Operation** No impacts on soil, land use and geology are anticipated. Overall, the impacts have been assessed as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Construction will require delivery of plant and materials to site. It is assumed that materials will be sourced locally to minimise transport requirements. This impact has been assessed as negligible. **Operation** Minor changes to energy use and therefore CO_2 emissions are envisaged due to pumping of water from the borehole. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings.	**Construction** The construction phase is restricted to the area within the existing site, and as such, it is not anticipated that any sites of archaeological or cultural heritage importance will be affected. Construction impacts on archaeology and cultural heritage are	

	To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	anticipated to be negligible. **Operation** Abstraction from the borehole has been assesses as having a negligible impact on levels in Swineshaw Reservoirs and the option is not anticipated to impact on any sites of archaeological or cultural heritage importance or palaeo-environmental remains. Overall, the impacts have been summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during construction, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as negligible. **Operation** An environmental assessment has been undertaken for drought contingency planning for Swineshaw Boreholes, impact on inflows to the Swineshaw Reservoirs will be negligible. The impact of this option on landscape and visual amenity is considered to be negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships have been identified during the construction phase. **Operation** No significant inter-relationships have been identified during the operational phase.	

Table E3.12 Scales Boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. Option involves modifications to abstraction regime only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Scales, and includes an assessment of the ecological impacts of the drought option. The report concluded that habitats within the River Waver catchment (i.e., the catchment within which the Scales boreholes are located) are currently considered to be badly degraded, with a general lack of habitat complexity. Moderate adverse impacts on habitats are anticipated, noting that none of the affected water bodies are nationally or internationally designated. Impacts on fish and macroinvertebrate populations are anticipated to be negligible except for minor adverse impacts on coarse fish. Impacts on bird populations are summarised as minor adverse. Impacts on macrophyte and otter populations are summarised as moderate adverse, but with mitigation, residual impacts were summarised as minor and negligible for these receptors respectively. Overall, the impacts on biodiversity	

		have been summarised as minor adverse and temporary.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** The modifications to abstraction regime under drought powers would enable the continued supply of water if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Scales and included an assessment of impacts of the drought option on recreation including angling. The watercourses in the study area are not known to be used for canoeing or kayaking. There is also limited angling interest on the watercourses in the study area. There are some footpaths and tracks that run close to the watercourses in places. Negligible impacts on recreation and angling are anticipated. Moderate adverse impacts to other amenity and commercial abstractors were also identified, which could result in adverse local socio-economic impacts. Overall, the impacts on population and human health have been assessed as moderate beneficial, based on moderate negative impacts on other abstractors and major beneficial impacts on security of water supply.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** The drought option comprises changes to the abstraction regime. No impacts on material assets and resource use are anticipated.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Scales, and includes an assessment of the hydrological and water quality impacts of the drought option. The report assessed the impacts on	

		hydrodynamics and water quality of the potentially affected watercourses (including Crummock Beck, Langrigg Beck, Holme Dub, Crooklands Beck, Ranny Gill and Sandraw Beck) concluding that there would be moderate adverse hydrological impacts, and minor to moderate adverse water quality impacts, however a lack of baseline data was noted in the report. Overall, the impacts on water have been summarised as moderate adverse and temporary.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Scales, and includes an assessment of the geomorphological impacts of the drought option. River flow rates in the study area are characterised by high winter flows. It is during these high flows that the vast majority of coarse sediment transport occurs, shaping the morphology of the rivers. The proposed drought option will not affect high flow events, and hence coarse sediment transport, as the drought option will only be in force during periods of naturally low flow. Impacts were summarised as negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** No operational impacts on air quality are anticipated. The option involves modifications to abstraction regime only and no changes to energy use, and therefore greenhouse gas emissions, are envisaged.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Scales, and includes an assessment of the impacts of the drought option on archaeology and cultural heritage. No scheduled monuments were identified in the area. No records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses. Two listed buildings (a house and a milestone) were identified, but neither of these are located in or immediately adjacent to the channels. Impacts on archaeology and cultural heritage are considered to be negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only. **Operation**	

		An Environmental Report has been prepared for drought contingency planning for the drought option at Scales, and includes an assessment of the impacts of the drought option on landscape and visual amenity. The aesthetics and landscape of the watercourses and reservoir in the Scales study area can be considered to be of parish/neighbourhood value. The report concluded a minor adverse temporary impact on these undesignated landscapes.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves modifications to abstraction regime only.	
		Operation Key inter-relationships include impacts of hydrodynamics on biodiversity and landscape.	

Table E3.13 Ennerdale – Drawdown of lake level to 2.5m below weir crest.

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation The River Ehen is an extremely important site for nature conservation, due to the rare and endangered population of freshwater mussels that it supports. The river is designated as an SAC and SSSI. Ennerdale Water is designated as a SSSI and supports a characteristic freshwater flora and fauna which include examples of nationally rare and local species. An Environmental Report has been prepared for drought contingency planning for the drought options at Ennerdale, and includes an assessment of the hydrological, water quality and ecological impacts of the drought option. It is acknowledged that UU's abstraction licence operated under the requirements of the existing abstraction and impoundment licences cannot be concluded to result in no adverse impacts on site integrity of the River Ehen SAC. Therefore, the baseline environment of drought order implementation is one which has been demonstrated to be adversely affecting site integrity of the River Ehen SAC. Implementation of a drought order would, at worst case, result in an additional month that the River Ehen is at the compensation flow regime in line with operation of the abstraction licence under the requirements of existing abstraction and impoundment licences, in addition to the 180 or more days that the river	

		would have been at compensation flow prior to drought order implementation (worst case). No impacts of drought order implementation on water quality in the River Ehen were identified. The environmental assessment concluded the potential for major impacts on freshwater mussel populations as a result of drought order implementation. Impacts could lead to the acceleration of extinction of the freshwater mussel population in the River Ehen, and may be permanent and irreversible. Significant impacts on adult upstream migration of Atlantic salmon and sea trout; and salmon/sea trout spawning and egg survival; were also identified. Implementation of a drought order is also anticipated to result in failure to meet many of the conservation objectives which have been prepared for the River Ehen SAC and SSSI. Overall, the impacts of the drought option on flora and fauna have been summarised as major adverse.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation The additional lake drawdown under drought powers would enable the continued supply of water to the local supply area, and water for compensation releases to the River Ehen if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk, and threatening the availability of water for compensation releases to the River Ehen. The impact of the drought option on recreational angling in Ennerdale Water is considered to be minor adverse and temporary. The impact of the drought option on bird-watching, swimming, walking, launching canoes or similar craft into Ennerdale Water is considered to be minor or negligible. The impact of the drought option on recreational angling on the River Ehen is considered to be moderate adverse, but temporary. Overall, the impact of the drought option on population and human health has been assessed as moderate beneficial, based on major beneficial impacts to public water supply, and temporary adverse impacts on angling.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore,	

	To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution. **Operation** The option involves active pumping of compensation flow to the River Ehen. Pumping will result in increased energy use and, therefore, overall impacts have been assessed as minor adverse.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution. **Operation** An Environmental Report has been prepared for drought contingency planning and includes an assessment of the hydrological and water quality impacts of the drought option. The drought option is considered to have adverse hydrodynamic impact on Ennerdale Water, associated with the potential temporary exposure of the lake shore and will result in lake drawdown to lower levels than have been recorded in the past. Under the drought option flow regime, flows in the River Ehen would be impacted by any extension of the duration of lake levels below weir crest such that lake level recovery to and above weir crest level is extended. In such circumstances, river flows would be maintained at compensation flow for a period of up to a month, beyond the 180 or more days river flows would already have been maintained at compensation flow under the operation of the existing abstraction and impoundment licences. No impacts on water quality of the lake or river have been identified. It is noted that the compensation release would be pumped, and there are risks associated with pump failure. Overall, the impact of the lake drawdown option on water has been assessed as moderate based on hydrodynamic impacts on Ennerdale Water and the River Ehen.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore,	

		there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought options at Ennerdale, and includes an assessment of impacts of the option on geomorphology. Lake drawdown and exposure of shoreline margins may result in minor adverse geomorphological impacts due to the possibility of erosion and issues with lake-channel discontinuity. Minor adverse geomorphological impacts in the River Ehen could be associated with the increased time the river would be at the compensation flow, compared with a non-drought option situation. Issues are specifically in terms of destabilisation of banks and sediment dynamics. Overall, this impact has been assessed as minor adverse.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation The drought option requires the compensation flow to be pumped. This impact has been assessed as minor adverse.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation None of the seven Scheduled Ancient Monuments or non-statutory archaeological features within the vicinity are considered to be impacted by the drought option as they are not within hydrogeomorphological influence of the River Ehen or Ennerdale Water. No records were found to indicate that anaerobic / organic remains are located adjacent to the waterbodies and there would be minor impacts to fluvial geomorphology from the operation of the drought option, compared to those resulting from a normal drought. The impact of the drought option on archaeological features is considered to be negligible throughout the year.	
Landscape and	To protect and enhance designated and	**Construction**	

visual amenity	undesignated landscape, townscape and the countryside.	Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought options at Ennerdale, and includes an assessment of impacts of the option on landscape and visual amenity. Ennerdale Water and approximately 3km of the River Ehen are set within the Lake District National Park (LDNP). Visual disamenity may occur due to reduced lake levels and the presence of the temporary pumping infrastructure. It is noted that the lake levels are likely to be at their lowest during peak tourist season and are within the LDNP, however, the impact of the drought option on landscape and visual amenity for both Ennerdale Water and the River Ehen is considered to be moderate adverse, temporary and reversible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** Temporary infrastructure (e.g., pumps and pipework from the existing intake pipe to the fish pass at Ennerdale weir) will be required to provide compensation flow releases during drought order implementation. However, this infrastructure will be required for operation in advance of drought order implementation and, therefore, there is no construction phase associated with this drought option. It is noted that a project is underway to replace the current temporary pumping infrastructure with a permanent solution.	
		Operation Key inter-relationships between topics include lake level impacts on ecological features (including Ennerdale SSSI and River Ehen SAC) and landscape visual amenity, and river flow impacts on freshwater mussel populations (primary feature of the River Ehen SAC). This has been assessed as major adverse.	

Table E3.14 Crummock Water - Allow pumping of abstraction and compensation flows at lake levels below 0.97m below weir crest level to 1.5m below weir crest level

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** Installation of temporary submersible pumps would be required to pump the required flow of compensation water from Crummock Water to the head of the River Cocker and for pumping abstracted water into the existing UU intake. Impacts on marshy grassland adjacent Crummock Water have been assessed as minor adverse due to potential physical disturbance during deployment and retrieval of temporary pipework. Operation Designations associated with Crummock Water and the River Cocker include: River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI. An Environmental Report has been prepared for drought contingency planning for the drought options at Crummock, and includes an assessment of the hydrological, water quality and ecological impacts of the lake drawdown to 1.5 m below weir crest. The report concluded a minor adverse impact on macroinvertebrates and resident fish (including salmon), minor impacts on eel escapement from Crummock Water during October to November, minor (but temporary and reversible) impacts on upstream adult salmon/trout migration in the River Cocker during August to October **The impact on macrophytes** (a primary **feature of the lake) has been assessed as negligible. Minor impacts on the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI were concluded. Overall, the impacts of the drought option on flora and fauna have been summarised as minor adverse.**	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** Construction impacts are likely to be of a short-term and temporary nature. As they will be limited in scale, the impacts on the local community will be short-term, reversible and minor. Negligible impacts are, therefore, anticipated. During the construction phase, there will be no impact on security of supplies or quality of drinking water. **Operation** The water abstracted from Crummock Water under drought powers would effectively enable the continued supply of water to the local supply area if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a shortage deficit, placing public water supplies at an unacceptable risk. Effects on recreational angling opportunities in Crummock Water are expected to be negligible. Minor adverse impacts on bird watchers and walkers have been assessed for July to December due to temporary measures to allow safe passage over pumping infrastructure. Negligible impacts were assessed for other recreational activity.	

		Overall, the impact of the drought option on population and human health has been assessed as moderate beneficial, based on major beneficial impacts to public water supply, and minor but temporary adverse impacts on recreation.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** It is assumed that pumps and any materials required would be sourced locally to minimise transportation and greenhouse gas emissions. On decommissioning, it has been assumed that materials will be recycled appropriately. **Operation** Option involves active pumping of compensation flow to the River Cocker and of abstracted water into the existing UU intake. Pumping will result in increased energy use and, therefore, overall impacts have been assessed as minor adverse.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** Temporary submersible pumps would be required to pump the required flow of compensation water from Crummock Water to the head of the River Cocker and for pumping abstracted water into the existing UU intake. The impact of installation of the pumps on water quality in the lake has been assessed as negligible. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought options at Crummock, and includes an assessment of the hydrological and water quality impacts of the drought option. The drought option would potentially result in major adverse impacts due to an increase in shoreline exposure by ~1.5ha per 0.1 m lake drawdown, an increase to the risk of wetted continuity between Buttermere Dubs and Crummock Water and delay to lake level recovery to weir crest level by up to a month. No adverse water quality impacts are anticipated in Crummock water or the River Cocker during construction or operation. Overall, the impact of the option on water has been assessed as minor adverse based on potentially major impacts on shoreline exposure and negligible impacts.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** Installation of the pumps in the lake may result in small localised reversible changes to geomorphology. This impact has been assessed as negligible. **Operation** There would be no significant land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought options at Crummock, and includes an assessment of impacts of the option on geomorphology. Lake drawdown and exposure of shoreline margins may result	

		in minor adverse impacts due to the possibility of discontinuity between Crummock Water and tributaries. Overall, this impact has been assessed as minor adverse.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** The installation of the pumps will require delivery of plant and materials to site. It is assumed that pumps and materials will be sourced locally to minimise transport requirements. This impact has been assessed as minor adverse. **Operation** The increased pumping of the abstraction and pumping the compensation flow associated with this option will increase energy consumption and, therefore, greenhouse gas emissions. This impact has been assessed as minor adverse.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There are no known archaeological features which will be affected by the construction phase (installation of temporary pumps). **Operation** An Environmental Report has been prepared for drought contingency planning for the drought options at Crummock, and includes an assessment of impacts of the option on archaeology and cultural heritage. None of the six Scheduled Ancient Monuments (SAM), or non-statutory archaeological features within the vicinity, including Loweswater Moated SAM or Scale Beck medieval shieling settlement are considered to be impacted by the drought option as they are not within hydrogeomorphological influence of the drought option. There are no known water dependant archaeological features in the zone of influence. No records were found to indicate that anaerobic / organic remains are located adjacent to the waterbodies and impacts on river wetted width or depth will be imperceptible. The impact of the drought option on archaeological features is considered to be negligible throughout the year.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There may be a minor adverse impact to landscape and visual amenity during installation of the temporary pumps, due to plant and vehicles on site. This impact is temporary and reversible and has been assessed as minor adverse. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Crummock, and includes an assessment of impacts of the option on landscape and visual amenity. Crummock Water and approximately 9km of the River Cocker are set within the Lake District National Park (LDNP). Potential impacts on landscape and visual amenity are predicted due to implementation of a drought permit relating to the exposure of lake shore associated with increased drawdown of the lake. Implementation of a drought permit would, at worst case, result in the exposure of 6.0ha of lake shore. This is in addition to the 11.8ha that would have been exposed prior to drought permit implementation. The most at risk areas of shoreline exposure are determined due to the bathymetry of the lake and would be concentrated around the southern and eastern shores of the lake. This has been assessed as a moderate adverse impact during the period July to December.	

		The impact of the drought option on landscape and visual amenity is considered to be moderate adverse but temporary and reversible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** No significant inter-relationships between topics have been identified for the construction phase.	
		Operation Key inter-relationships between topics include lake level impacts on landscape and visual amenity, and lake macrophyte communities (primary feature of the SAC).	

Table E3.15a Bowscar boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. Option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Bowscar (part of the Eden Valley Boreholes group). It was concluded that there would be no measurable impacts on river flows or levels in the River Eden itself (which is located in the study area). No impacts on ecological features were reported. There are no anticipated impacts on the River Eden SAC. Overall impacts on biodiversity, flora and fauna have been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation The drought option would enable the continued supply of water if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Bowscar and concluded negligible impacts on recreation. Overall, the impacts on population and human health have been assessed as major beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy.	**Construction** There is no construction phase associated with this drought option. Option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation This drought option involves modifications to annual licensed limit only. Minor	

	To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	changes to energy use are envisaged due to increased pumping of water from the boreholes. This impact has been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Bowscar. The report concluded that the reduction in river water levels under the proposed drought option will not be significantly lower than the predicted water level in a drought under the normal abstraction scenario. Similarly, no major changes in average velocity, depth, wetted width or wetted area are predicted. The results of the hydrogeological assessment indicate that the drought option at Bowscar is unlikely to have a measurable impact on flows in the River Eden (due to the large size of the river at this point). Impacts of this drought option on water are summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Bowscar and included an assessment of impacts on fluvial geomorphology, which was concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation This drought option involves modifications to annual licensed limit only. Minor changes to energy use and therefore CO_2 emissions are envisaged due to increased pumping of water from the boreholes. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their	**Construction** There is no construction phase associated with this drought option. The option	

	settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Bowscar and included an assessment of impacts on archaeology. The report concluded that heritage features identified as occurring within or immediately adjacent to the watercourses within the area of study are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter. No records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses, however, no major changes in wetted width or wetted area were predicted. Overall, the impacts on archaeology and cultural heritage are summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Bowscar and included an assessment of impacts on landscape and visual amenity, which were concluded to be negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation Key inter-relationships include the impact of riverine flow reduction on biodiversity, geomorphology and landscape. However, as the impact on flow reductions are predicted to be negligible, negligible impacts on other topics are anticipated.	

Table E3.15bGamblesby boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Gamblesby (part of the Eden Valley Boreholes group). It was concluded that the drought option would have negligible impacts on river flows and levels. No impacts on ecological features were reported. There are no anticipated impacts on the River Eden SAC which is located within the study area. Overall, the impacts on biodiversity, flora and fauna have been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the services they need.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** The drought option would enable the continued supply of water if dry weather continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Gamblesby and concluded negligible impacts on recreation. Overall, the impacts on population and human health have been assessed as major beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** This drought option involves modifications to annual licensed limit only. Minor changes to energy use are envisaged due to increased pumping of water from the boreholes. This impact has been assessed as negligible.	

Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Gamblesby. The report concluded that the reduction in river water levels under the proposed drought option will not be significantly lower than the predicted water level in a drought under the normal abstraction scenario. Similarly, no major changes in average velocity, depth, wetted width or wetted area are predicted. The results of the hydrogeological assessment indicate that the drought option at Gamblesby is unlikely to have a measurable impact on flows in the River Eden (due to the large size of the river at this point). Impacts of this drought option on water are summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option at Gamblesby and included an assessment of impacts on fluvial geomorphology, which were concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation This drought option involves modifications to annual licensed limit only. Minor changes to energy use and therefore CO_2 emissions are envisaged due to increased pumping of water from the boreholes. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate.	
		Operation An Environmental Report has been prepared for drought contingency planning for the drought option at Gamblesby and included an assessment of impacts on archaeology. The report concluded that heritage features identified as occurring within or immediately adjacent to the watercourses within the area of study are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter. No records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses, however, no major changes in wetted width	

		or wetted area were predicted. Overall, the impacts on archaeology and cultural heritage are summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Gamblesby and included an assessment of impacts on landscape and visual amenity, which were concluded to be negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** Key inter-relationships include the impact of riverine flow reduction on biodiversity, geomorphology and landscape. However, as the impact on flow reductions are predicted to be negligible, negligible impacts on other topics are anticipated.	

Table E3.15c Tarn Wood boreholes

Topic	Objectives	Description of Effect and Commentary	Impact
Biodiversity, flora and fauna	To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species (with particular regard to avoiding the effects of over-abstraction on sensitive sites, habitats and species) and consider adaptability to climate change. To protect, conserve and enhance natural capital and the ecosystem services from natural capital that contribute to the economy.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Tarn Wood (part of the Eden Valley Boreholes group). It was concluded that there would be no measurable impacts on river flows or levels in the River Eden which is located within the study area. No impacts on ecological features were reported. There are no anticipated impacts on the River Eden SAC. Overall, the impacts on biodiversity, flora and fauna have been summarised as negligible.	
Population and human health	To protect and improve health and well-being and reduce inequalities. To protect and enhance opportunities for formal and informal recreation. To promote a sustainable economy and thriving communities with good access to the	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** The drought option would enable the continued supply of water if dry weather	

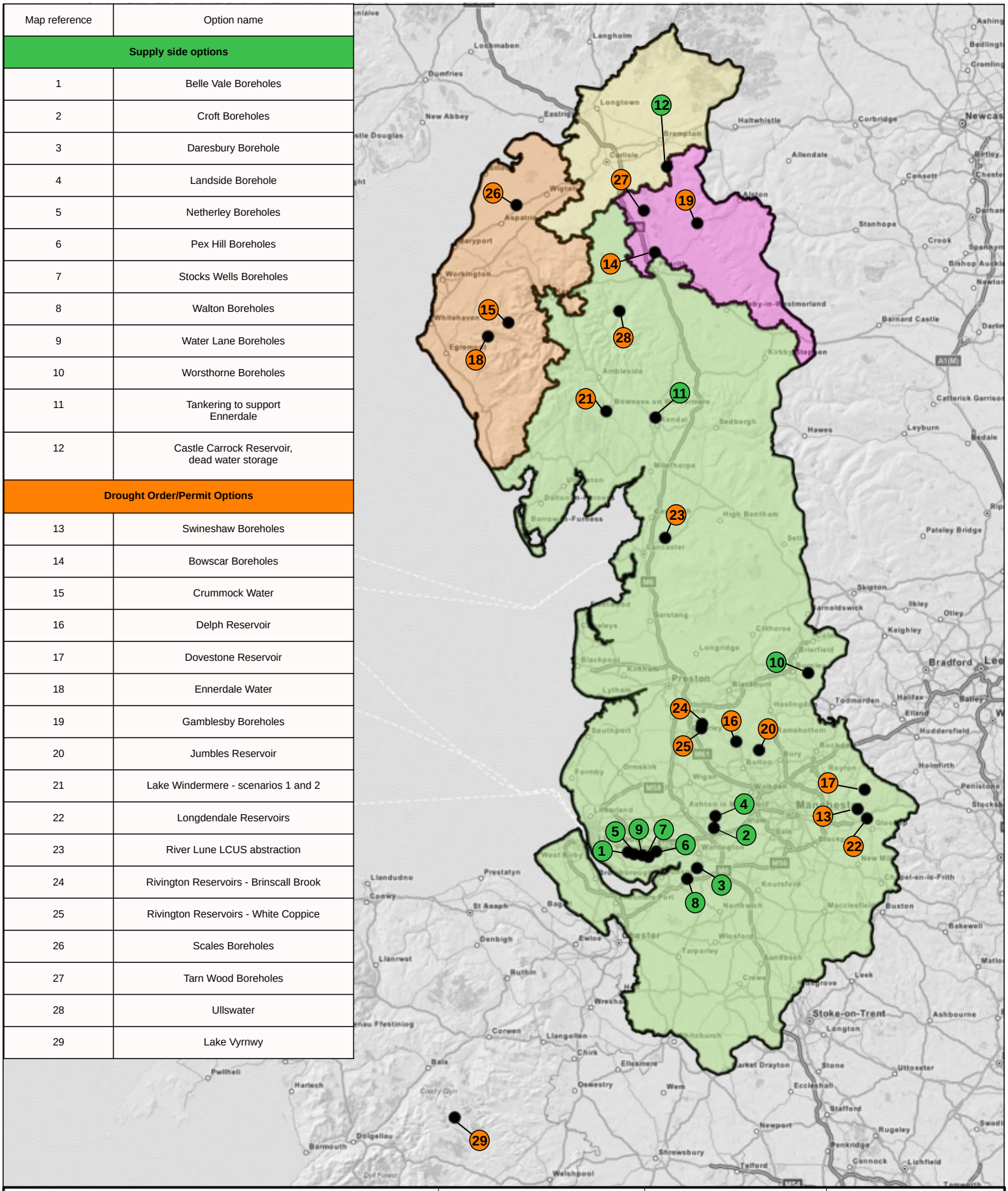
	services they need.	continues. Without these powers in a severe drought, there would be a growing risk of a deficit, placing public water supplies at an unacceptable risk. An Environmental Report has been prepared for drought contingency planning for the drought option at Tarn Wood and concluded negligible impacts on recreation. Overall, the impacts on population and human health have been assessed as major beneficial based on continued supply of drinking water.	
Material assets and resource use	To promote energy efficiency and energy saving opportunities, thereby minimising greenhouse gas emissions. To minimise consumption of resources and contribute to a resource efficient, green low carbon economy. To minimise waste production and increase, in order of priority, the proportion of waste reused, recycled, composted and recovered, whilst following the principles of regional self-sufficiency and the proximity principle. To promote the sustainable management of natural resources including efficient water resource management and to ensure water supply for homes and industry in the area is maintained.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** This drought option involves modifications to annual licensed limit only. Minor changes to energy use are envisaged due to increased pumping of water from the boreholes. This impact has been assessed as negligible.	
Water	To avoid adverse impact on surface and groundwater levels and flows. To protect and enhance surface and groundwater quality.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Tarn Wood. The report concluded that the reduction in river water levels under the proposed drought option will not be significantly lower than the predicted water level in a drought under the normal abstraction scenario. Similarly, no major changes in average velocity, depth, wetted width or wetted area are predicted. The results of the hydrogeological assessment indicate that the drought option at Tarn Wood is unlikely to have a measurable impact on flows in the River Eden (due to the large size of the river at this point). Impacts of this drought option on water are summarised as negligible.	
Soil, geology and land use	To protect and enhance the quality and quantity of soils. To protect and enhance geodiversity.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** There would be no land use changes associated with this option. An Environmental Report has been prepared for drought contingency planning for the drought option	

		at Tarn Wood and included an assessment of impacts on fluvial geomorphology, which were concluded to be negligible.	
Air and climate	To maintain and improve air quality. To minimise greenhouse gas emissions. To consider the need for adaptive measures for climate change.	**Construction** There is no construction phase associated with this drought option. The option involves an increase in the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** This drought option involves modifications to annual licensed limit only. Minor changes to energy use and therefore CO_2 emissions are envisaged due to increased pumping of water from the boreholes. This impact has been assessed as negligible.	
Archaeology and cultural heritage	To conserve and enhance the historic environment, heritage assets and their settings. To protect, enhance and manage the character and appearance of landscapes/townscapes maintaining and strengthening local distinctiveness and sense of place. To protect archaeologically important sites.	**Construction** There is no construction phase associated with this drought option. The option involves an increase in the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Tarn Wood and included an assessment of impacts on archaeology. The report concluded that heritage features identified as occurring within or immediately adjacent to the watercourses within the area of study are unlikely to be directly impacted by any reduction in flow rate, velocity or wetted perimeter. No records were found to indicate that anaerobic / organic remains are located adjacent to the watercourses, however, no major changes in wetted width or wetted area are predicted. Overall impacts on archaeology and cultural heritage are summarised as negligible.	
Landscape and visual amenity	To protect and enhance designated and undesignated landscape, townscape and the countryside.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** An Environmental Report has been prepared for drought contingency planning for the drought option at Tarn Wood and included an assessment of impacts on landscape and visual amenity, which were concluded to be negligible.	
Inter-relationships	To acknowledge and understand the potential for inter-relationships between topics and anticipate synergistic effects.	**Construction** There is no construction phase associated with this drought option. The option involves increase of the annual licensed limit to enable continuation of the maximum daily abstraction rate. **Operation** Key inter-relationships include the impact of riverine flow reduction on biodiversity, geomorphology and landscape. However, as the impact on flow reductions are predicted to be negligible, negligible impacts on other topics are anticipated.	

APPENDIX F

FIGURES

Map reference	Option name
Supply side options	
1	Belle Vale Boreholes
2	Croft Boreholes
3	Daresbury Borehole
4	Landside Borehole
5	Netherley Boreholes
6	Pex Hill Boreholes
7	Stocks Wells Boreholes
8	Walton Boreholes
9	Water Lane Boreholes
10	Worsthorne Boreholes
11	Tankering to support Ennerdale
12	Castle Carrock Reservoir, dead water storage
Drought Order/Permit Options	
13	Swineshaw Boreholes
14	Bowscar Boreholes
15	Crummock Water
16	Delph Reservoir
17	Dovestone Reservoir
18	Ennerdale Water
19	Gamblesby Boreholes
20	Jumbles Reservoir
21	Lake Windermere - scenarios 1 and 2
22	Longdendale Reservoirs
23	River Lune LCUS abstraction
24	Rivington Reservoirs - Brinscall Brook
25	Rivington Reservoirs - White Coppice
26	Scales Boreholes
27	Tarn Wood Boreholes
28	Ullswater
29	Lake Vyrnwy



SSSI
NNR
Marine Conservation Zone
United Utilities Water Resource Zone
Drought Order/Permit Options
Supply side options

0 5 10km N

CASCADE

United Utilities

Project:

SEA of United Utilities Drought Plan 2017:

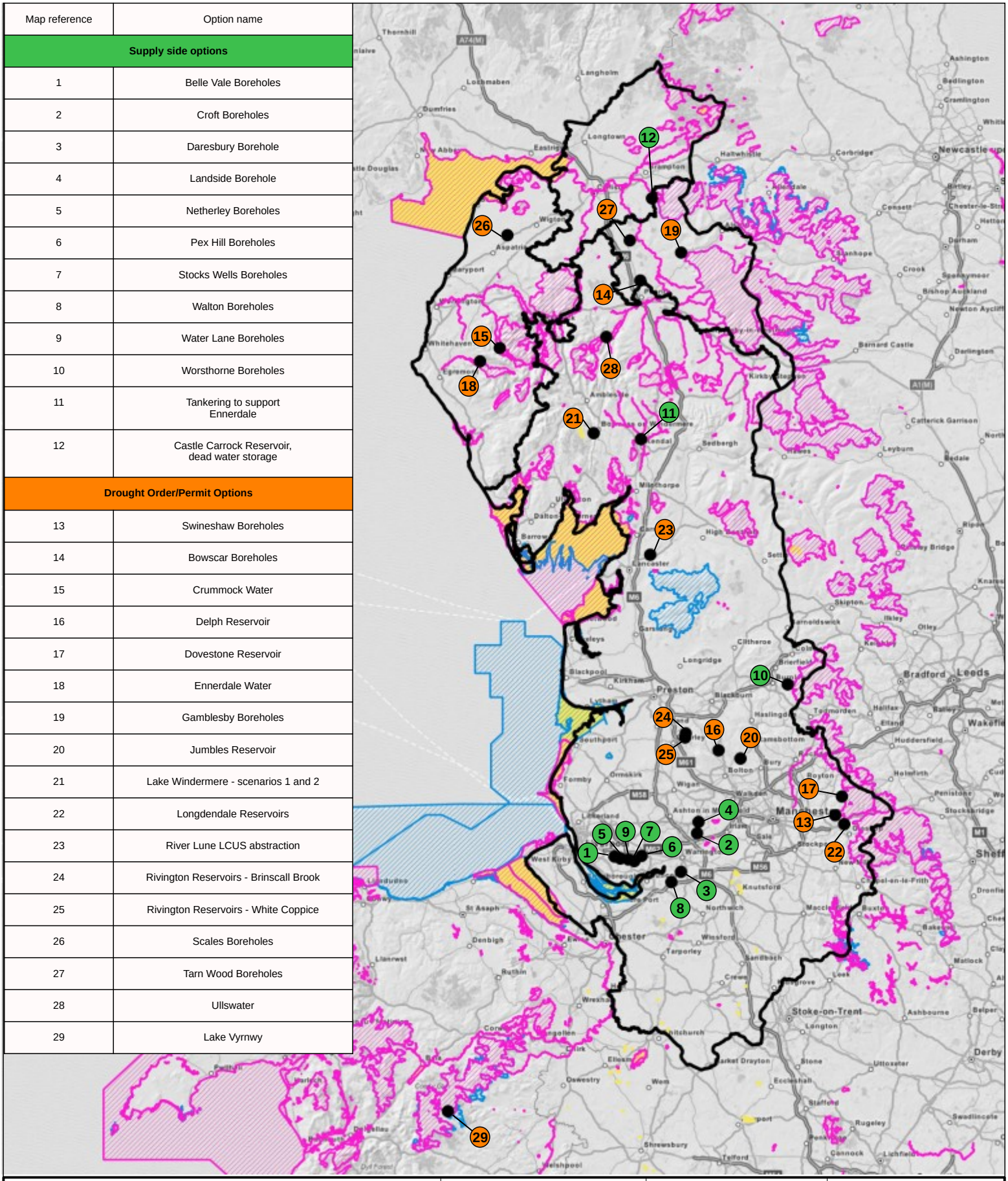
Environmental Report

Figure Title:

United Utilities Water Resource Zones and Drought Options

Figure F1

Map reference	Option name
Supply side options	
1	Belle Vale Boreholes
2	Croft Boreholes
3	Daresbury Borehole
4	Landside Borehole
5	Netherley Boreholes
6	Pex Hill Boreholes
7	Stocks Wells Boreholes
8	Walton Boreholes
9	Water Lane Boreholes
10	Worsthorne Boreholes
11	Tankering to support Ennerdale
12	Castle Carrock Reservoir, dead water storage
Drought Order/Permit Options	
13	Swineshaw Boreholes
14	Bowscar Boreholes
15	Crummock Water
16	Delph Reservoir
17	Dovestone Reservoir
18	Ennerdale Water
19	Gamblesby Boreholes
20	Jumbles Reservoir
21	Lake Windermere - scenarios 1 and 2
22	Longdendale Reservoirs
23	River Lune LCUS abstraction
24	Rivington Reservoirs - Brinscall Brook
25	Rivington Reservoirs - White Coppice
26	Scales Boreholes
27	Tarn Wood Boreholes
28	Ullswater
29	Lake Vyrnwy



Special Area of Conservation (Including single pink lines)
Special Protection Area
RAMSAR site
United Utilities Water Resource Zone
Drought Order/Permit Options
Supply Side Options

0 5 10km

N

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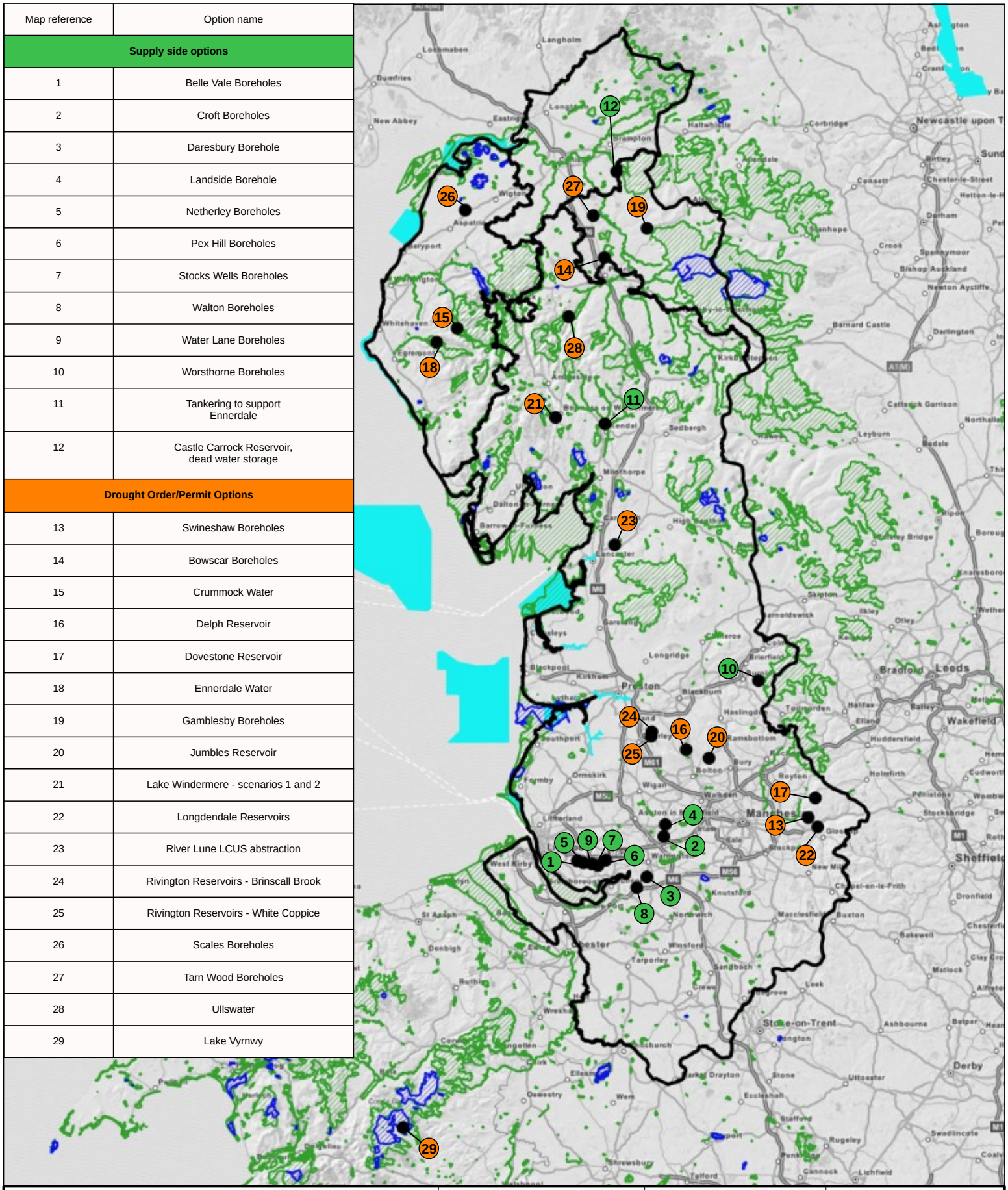
Environmental Report

Figure Title:

European Designated Conservation Sites in North West England and North Wales and Drought Options

Figure F2

Map reference	Option name
Supply side options	
1	Belle Vale Boreholes
2	Croft Boreholes
3	Daresbury Borehole
4	Landside Borehole
5	Netherley Boreholes
6	Pex Hill Boreholes
7	Stocks Wells Boreholes
8	Walton Boreholes
9	Water Lane Boreholes
10	Worsthorne Boreholes
11	Tankering to support Ennerdale
12	Castle Carrock Reservoir, dead water storage
Drought Order/Permit Options	
13	Swineshaw Boreholes
14	Bowscar Boreholes
15	Crummock Water
16	Delph Reservoir
17	Dovestone Reservoir
18	Ennerdale Water
19	Gamblesby Boreholes
20	Jumbles Reservoir
21	Lake Windermere - scenarios 1 and 2
22	Longdendale Reservoirs
23	River Lune LCUS abstraction
24	Rivington Reservoirs - Brinscall Brook
25	Rivington Reservoirs - White Coppice
26	Scales Boreholes
27	Tarn Wood Boreholes
28	Ullswater
29	Lake Vyrnwy



SSSI
NNR
Marine Conservation Zone
United Utilities Water Resource Zone
Drought Order/Permit Options
Supply side options

0 5 10km

N

CASCADE

United Utilities

Project:

SEA of United Utilities Drought Plan 2017:

Environmental Report

Figure Title:

SSSI, NNR, MCZ and Drought Options

Figure F3