United Utilities

Habitats Regulations Assessment

of

United Utilities' Revised Draft Drought Plan 2017

Screening Report

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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 (see Section 1.3.2.).

The focus of this HRA Screening Report 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 in Section 1.3.

UU is the competent authority for the Drought Plan, including the SEA and HRA. Regulation 9(5) of the Conservation of Habitats and Species Regulations 2010 (as amended in 2011 and 2012) (referred to as the Habitats Regulations) requires every competent authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna). UU is committed to fulfilling this role and ensuring that full consideration of the Habitats Directive is being given to the revision of its Drought Plan.

Under Regulation 61 of the Habitats Regulations, any plan or project which is likely to have a significant effect on a European site (either alone or in combination with other plans or projects) and is not directly connected with or necessary for the management of the site, must be subject to an Appropriate Assessment to determine the implications for the site in view of the site's conservation objectives. The responsibility for undertaking the Appropriate Assessment lies with UU as the Plan making authority.

HRA Guidance for the appraisal of Plans[1] summarises the Habitats Regulations. Regulation 61(5) states that the Plan making authority (in this case UU) shall adopt, or otherwise give effect to, the Plan only after having ascertained that it will not adversely affect the integrity of a European site, subject to Regulation 62 of the Habitats

[1] Tyldesley, D and associates (2012) *Draft Guidance for Plan Making Authorities in Wales. The Appraisal of Plans Under the Habitats Regulations* for Countryside Council for Wales, CCW Bangor.

Regulations.

Regulation 62 of the Habitats Regulations states:

62.—(1) If the competent authority are satisfied that, there being no alternative solutions, the plan or project must be carried out for imperative reasons of overriding public interest (which, subject to paragraph (2), may be of a social or economic nature), they may agree to the plan or project notwithstanding a negative assessment of the implications for the European site or the European offshore marine site (as the case may be).

(2) Where the site concerned hosts a priority natural habitat type or a priority species, the reasons referred to in paragraph (1) must be either—

(a) reasons relating to human health, public safety or beneficial consequences of primary importance to the environment; or

(b) any other reasons which the competent authority, having due regard to the opinion of the European Commission, consider to be imperative reasons of overriding public interest.

Article 6 of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) states:

6(3). Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

6(4). If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Guidance[2] recommends that if there are no alternative solutions and if, in exceptional circumstances, it is proposed that a Plan be adopted despite the fact that it may adversely affect the integrity of a European site, the HRA will need to address and

[2] Tyldesley, D and associates (2012) *Draft Guidance for Plan Making Authorities in Wales. The Appraisal of Plans Under the Habitats Regulations* for Countryside Council for Wales, CCW Bangor.

explain the imperative reasons of Overriding Public Interest which the Plan making authority considers to be sufficient to outweigh the potentially adverse effects on the European site(s).

Four stages of the HRA of UU's Drought Plan have been identified:

1. Firstly, a screening process is undertaken to identify whether each drought option in UU's Statutory Drought Plan (either alone or in combination with other plans or projects) is likely to have significant effects on European designated sites.

2. Where a significant effect is likely (noting the precautionary principle), an Appropriate Assessment will then be undertaken of the drought option to determine whether this would adversely affect the integrity of the European site(s), either alone or in combination with other plans and projects, taking into account available mitigation measures (see Section 4 for a description of Appropriate Assessment methodology).

3. Where significant adverse effects are identified at the Appropriate Assessment stage, alternative options would be examined to avoid any potential significant effects on the integrity of the European site as Stage 3 of the HRA.

4. Stage 4 comprises an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest, it is deemed that the Plan should proceed.

HRA Screening (i.e. Stage 1) was undertaken for the drought options in UU's Draft Drought Plan 2012, and identified the likely impacts of the drought options on European sites, and considered whether these impacts are likely to be significant. The findings of the screening assessment were used to make recommendations for sites where an Appropriate Assessment of the drought option was required to be undertaken by UU (as the Plan making authority) (see Section 4).

Subsequent to HRA Screening of the Draft Drought Plan 2012, Appropriate Assessments were undertaken for several of UU's drought permit/order options, and are reported separately (see Section 4.1).

Following publication of a Final Drought Plan 2013, discussions with Defra led UU to updating the plan to include drought options at Ennerdale, including one supply-side option and one drought order option. The HRA Screening was updated at that time to include these options and an Appropriate Assessment completed in 2014 for the drought order option at Ennerdale Water.

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

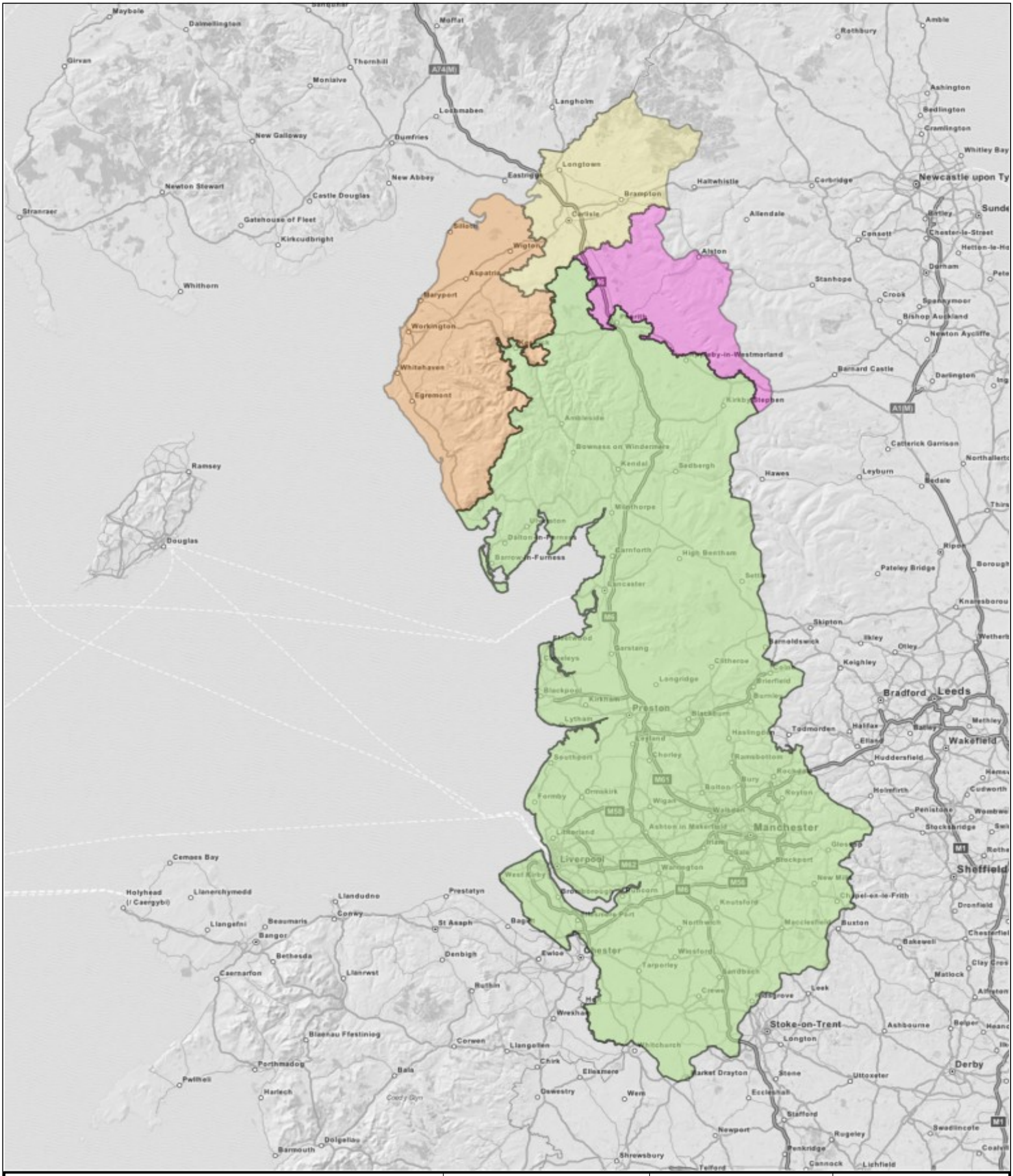
1.2.1 Introduction

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 1.1**).

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 Integrated 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.



United Utilities Water Resource Zones

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

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HRA of United Utilities Drought Plan 2017:

Screening Report

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United Utilities Water Resource Zones

Figure 1.1

1.2.2 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 WRMP are aligned with UU's strategic direction principles. As part of the preparation of their 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 HRA Screening report is to focus on the Drought Plan, not the WRMP. UU's Drought planning process is discussed further in Section1.3 below.

1.2.3 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.

1.2.4 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.

1.2.5 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.

1.2.6 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.

1.3 UU'S DROUGHT PLANNING PROCESS

1.3.1 Overview and Timetable

Water companies in England and Wales are required to prepare and maintain Statutory Drought Plans under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003 and 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 (see Section 1.1 and 1.5.3). 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 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 order option from the Plan. Following direction from Defra, 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.

This document presents HRA Screening assessments of all the drought options that are in the Revised Draft Drought Plan 2017. The period encompassed by the updated Plan is expected to be until 2021. The normal drought plan review cycle is for an updated draft plan to be submitted to the Secretary of State within 5 years of publication of the previous final plan.

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.

Only those drought options which are relevant to the period encompassed by the Drought Plan are included for consideration as part of the HRA Screening process. 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 after this time have, therefore, been excluded from this HRA Screening Report.

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

It was confirmed with Natural England and the Environment Agency that UU's Draft Drought Plan 2012 required both SEA and HRA and this is still the case for the current revision of the plan. This was concluded following the SEA Screening process which was 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 Office of the Deputy Prime Minister (ODPM) SEA Guidelines[3], as described and documented in UU's SEA of United Utilities' Revised Draft Drought Plan 2017, Scoping Report[4]. The SEA Screening process determined that the Drought Plan requires an assessment under Articles 6 and 7 of the Habitats Directive based on environmental assessments undertaken on behalf of UU for site specific drought permits/orders concluding that there is evidence of significant effects on a European Special Area of

[3] Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.
[4] Cascade Consulting (2016) *Strategic Environmental Assessment of United Utilities' Draft Statutory Drought Plan - Scoping Report*. Prepared by Cascade Consulting for United Utilities. March 2016.

Conservation (SAC) which triggers the requirement for Appropriate Assessment under the Habitats Regulations. This, in turn, triggers the requirement for a SEA. The SEA has been undertaken in parallel with HRA Screening and is reported separately.

A Drought Plan Guideline was published by the Environment Agency in 2011[5] and states that consideration is required to ensure that drought management actions meet the requirements of the Habitats Regulations. A revised guideline was published by the Environment Agency in December 2015[6] and includes a requirement to apply best practice guidance published by UKWIR[7]. The revised DPG guidance has informed UU's Revised Draft Drought Plan 2017 preparation and this HRA Screening Report.

HRA refers to the assessment of the potential effects of a plan or project on one or more European Sites (SACs and Special Protection Areas (SPAs)):

- **SACs** are designated under the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) and target **particular habitats** (Annex 1) and/or **species** (Annex II) identified as being of European importance.

- **SPAs** are classified under the European Council Directive 'on the conservation of wild birds' (Directive 2009/147/EC; 'Birds Directive') for the protection of **wild birds and their habitats** (including particularly rare and vulnerable species listed in Annex 1 of the Birds Directive, and migratory species).

The Government also expects potential candidate SACs (cSACs), proposed SPAs (pSPAs) and candidate Ramsar sites to be included within the assessment[8]:

- **Ramsar** sites support internationally **important wetland habitats** and are listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention, 1971).

For ease of reference during HRA, these three designations are collectively referred to as **European sites**, despite Ramsar designations being at the international level.

1.3.3 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

[5] Environment Agency (2015) *Water Company Drought Plan Guideline*.
[6] 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.
[7] 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
[8] Office of the Deputy Prime Minister (2005) *Planning Policy Statement 9: Biodiversity and Geological Conservation*.

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 Drought Plan 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 abstraction licence 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 Borehole
Croft Boreholes
Daresbury Borehole
Landside Borehole
Netherley Boreholes
Pex Hill Boreholes
Stocks Well Boreholes
Walton Boreholes
Water Lane Boreholes
Worsthorne Borehole
West Cumbria Resource Zone
Tankering 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 are included in 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 Permit/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 on drought permits and drought orders[9] 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.

[9] 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.

Supporting Information

Drought options included in the SEA and HRA are documented by UU in its Drought Plan and drought management option forms have been completed as specified by Environment Agency Drought Plan Guideline[10]. Examples of these forms are provided

[10] Environment Agency (2015) *Water Company Drought Plan Guideline*. July 2015.

in **Appendix B**. Information provided in these forms has been used to inform HRA Screening 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.

1.4 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.

Following a drought hearing in 2003 for drought permits/order at Ullswater (which lies within an SAC) and Windermere, UU commissioned detailed environmental studies to support any future drought permit/order applications at these sites. This work was carried out in collaboration with the Environment Agency and Natural England, as well as a range of other interested parties and stakeholders, and involved the collation of various ecological and environmental datasets and the collection of additional information where necessary to allow the study to be undertaken.

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 NERC species 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 Drought Plan (see **Table 1.3**). Environmental Reports, with date of completion are listed in **Table 1.4**.

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. It should be noted, however, 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. Where particular issues have been raised for a specific drought permit/order option, this is described in the relevant HRA screening table (see Section 3). The methodology for the HRA is described in further detail in Section 2.

1.5 HRA STAGES

1.5.1 Introduction

Four stages of the HRA have been identified and are described in the following sections. Detailed methodology for HRA Screening is given in Section 2.

1.5.2 Stage 1 – Screening

The first stage in the HRA is screening to determine the likelihood of any option proposed for inclusion in the Statutory Drought Plan to have a significant effect on any European site (either alone or in-combination with other plans and projects) and thus if a full 'Appropriate Assessment' of any of the drought options would be required prior

to inclusion in the Final Drought Plan.

For each of the four water resource zones listed in Section 1.2, all European sites which could be impacted are listed in **Appendix C**, including all SAC, SPA and Ramsar sites, with their qualifying and supporting features. Drought plan options are assessed against the backdrop of the European sites, considering both the qualifying designated habitats and species of conservation interest, and their supporting features, including hydrology, geomorphology, water quality, habitats etc.

In-combination assessments are carried out to establish the possibility of cumulative or synergistic impacts. The approach to cumulative impact assessment is described in Section 2.4.

The output of this screening stage is the Screening Report which identifies if any of the drought plan options require Appropriate Assessment because it has been determined that they, either alone or in combination with other plans or projects, are likely to have significant effects on European designated sites. The Screening Report is used as a basis for consultation with the regulatory authorities.

1.5.3 Stage 2 – Appropriate Assessment

Only those drought options that have been identified during HRA Screening (Stage 1) as being likely to have a significant effect (either alone or in combination) will be taken forward to Appropriate Assessment. The Appropriate Assessment will consider the impacts of the Drought Plan, against the conservation objectives of a European Site, in order to identify whether there are likely to be any adverse effects on site integrity and site features. The assessment will conclude whether or not the plan, either alone or in combination with other plans and projects, would adversely affect the integrity of the European site in question. This is judged in terms of the implications of the plan for a site's conservation objectives, which relate to its 'qualifying features' (i.e. those Annex I habitats, Annex II species, and Annex I bird populations for which it has been designated). The responsibility for undertaking the Appropriate Assessment lies with UU as the Plan making authority i.e. UU is the competent authority for HRA of the Drought Plan.

UU as the competent authority must consult with the appropriate nature conservation bodies; Natural England and Natural Resources Wales. The Environment Agency is the competent authority for any subsequent drought permit application (or the Secretary of State / Welsh Ministers in the case of drought orders), and therefore is responsible for undertaking an Appropriate Assessment of a drought permit/order application at the time an application is made. It is likely that in the event of a drought permit/order application, the Environment Agency, Secretary of State or Welsh Ministers would make use of any environmental assessment work undertaken by UU in support of the Drought Plan – indeed it is applicant's responsibility under the

Habitats Regulations to provide the competent authority (Environment Agency/ Secretary of State /Welsh Ministers) with the information required to undertake the Appropriate Assessment.

Significantly, HRA is based on a rigorous application of the precautionary principle. Where uncertainty or doubt of the likelihood of significant impacts of a drought option on a European site remains, an impact should be assumed.

The methodology proposed for the Appropriate Assessments is given in Section 4.

If no significant impacts are identified by the Appropriate Assessment (either alone, or in combination with other plans and projects), no further assessments are undertaken. If significant impacts are identified, the assessment will progress to Stage 3.

1.5.4 Stage 3 – Alternative Options Stage

Where significant adverse effects are identified at the Appropriate Assessment stage, alternative options would be examined to avoid any potential damaging effects to the integrity of the European site.

1.5.5 Stage 4 – Assessment where adverse impacts remain

Stage 4 comprises an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest, it is deemed that the project or plan should proceed. Imperative Reasons of Overriding Public Interest will only be progressed if no alternatives are identified as part of Stage 3 (Section 1.5.4).

As described in Section 1.1, guidance[11] recommends that if there are no alternative solutions and if, in exceptional circumstances, it is proposed that a plan be adopted despite the fact that it may adversely affect the integrity of a European site, the HRA will need to address and explain the Imperative Reasons of Overriding Public Interest which the Plan making authority considers to be sufficient to outweigh the potentially adverse effects on the European site(s). The Secretary of State / Welsh Government would be responsible for determination of any Imperative Reasons of Overriding Public Interest case.

1.6 PURPOSE OF THIS DOCUMENT

This document comprises Stage 1 – HRA Screening as described in Section 1.5.2. The report consists of the following Sections:

Section 1 – Introduction

[11] Tyldesley, D (2012) *Draft Guidance for Plan Making Authorities in Wales. The Appraisal of Plans Under the Habitats Regulations* for Countryside Council for Wales, CCW Bangor.

Section 2 – Methodology

Section 3 – HRA Screening Findings for Drought Options

Section 4 – Conclusions and Recommendations

This document will be used as a basis for consultation with Natural England, Natural Resources Wales and the Environment Agency.

2 METHODOLOGY

2.1 APPROACH TO HRA SCREENING

The aim of HRA Screening is to establish whether implementation of the drought options included in UU's Statutory Drought Plan (either alone or in-combination) are likely to have a significant effect on a European site(s).

Drought options include continued 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) and drought permits/orders. Drought options subject to HRA Screening are described in Section 1.3.

The approach adopted in this HRA comprises the assessment of the likelihood of potential for significant effects of drought options considered for inclusion in the Final Drought Plan on European site integrity.

The HRA has been undertaken using information contained in correspondence between UU and the Environment Agency, Natural England and other consultees. The HRA has been undertaken in accordance with currently available guidance[12,13,14,15,16] and is based on a precautionary approach as required under the Habitats Regulations.

2.2 IDENTIFICATION OF EUROPEAN SITES FOR ASSESSMENT

GIS data were used to map the locations and boundaries of European sites within or adjacent to UU's four water resource zones using publicly available data from Natural England and Natural Resources Wales. European sites are shown in **Figures 2.1** and **2.2**.

The attributes of European sites, which contribute to and define their integrity, were considered with reference to Standard Data forms for SACs and SPAs and Information Sheets for Ramsar sites[17]. An analysis of these information sources enabled the identification of European site qualifying features. Conservation objectives and site vulnerability assessments have been provided by Natural England. A summary of the information provided by these documents is provided in **Appendix C.** This information allows identification of those features of each site which determine site

[12] European Commission Environment DG (2001) *Assessment of plans and projects significantly affecting European Sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* November 2001.
[13] Countryside Council for Wales (2010) *Draft Guidance for Plan Making Authorities in Wales; The Appraisal of Plans Under the Habitats Directive*. November 2009 (revised April 2010).
[14] RSPB (2007) *The Appropriate Assessment of Spatial Plans in England. A guide to why, when and how to do it.* August 2007.
[15] Planning Policy Wales Technical Guidance Note 5: Nature Conservation and Planning (Annex 6). Welsh Assembly Government, September 2009.
[16] English Nature (1997) *The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c) Regulations*, 1994 Guidance Note HRGN1.
[17] These were obtained from the Joint Nature Conservation Committee and Natural England websites (www.jncc.gov.uk and www.naturalengland.org.uk).

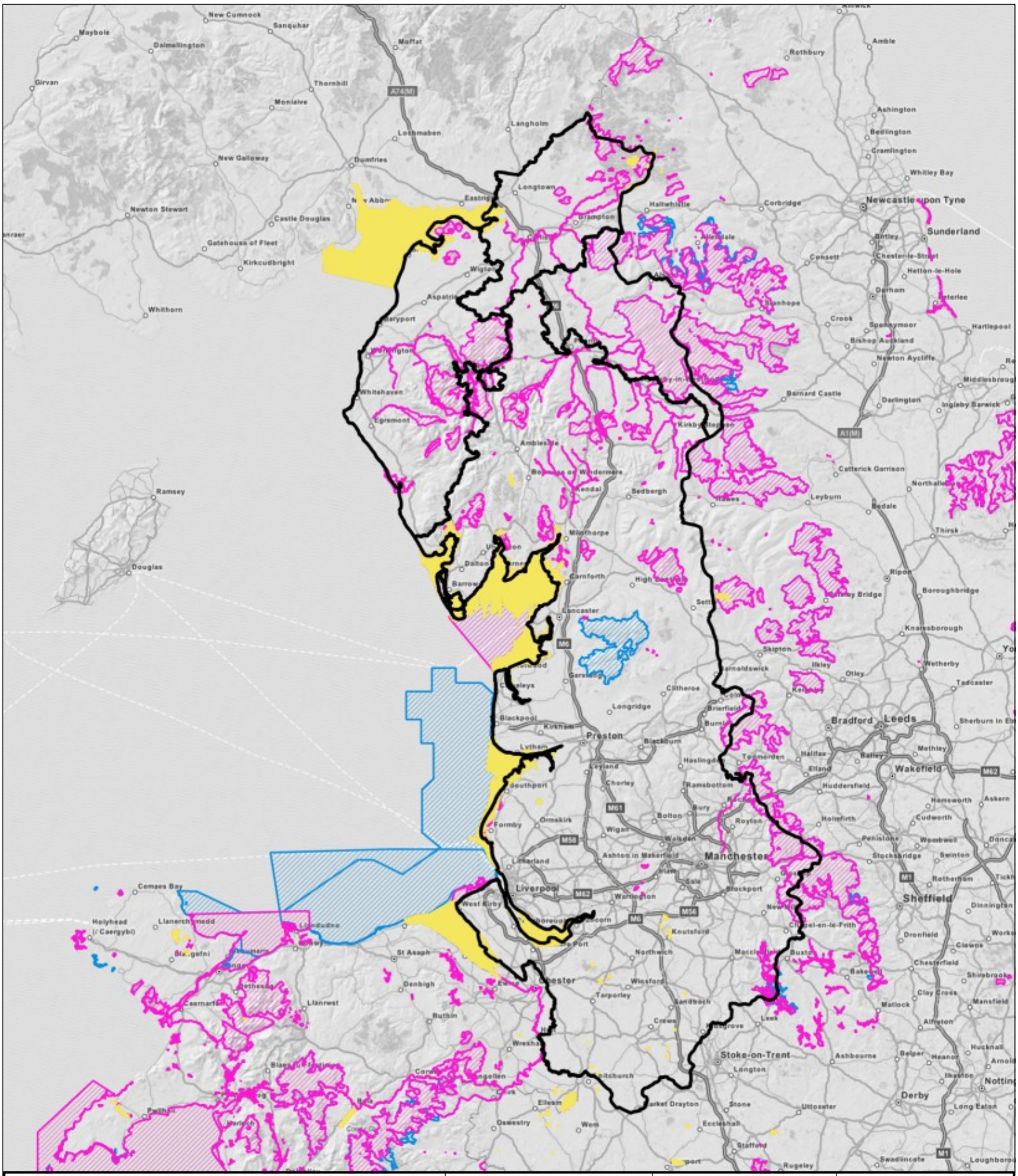
integrity and the specific sensitivities of the site, as well as an analysis of how potential impacts of the drought options may affect site integrity.

The locations of the supply side and drought permit/order options identified in Section 1.3.3 were also mapped in order to establish their geographic proximity to the European sites. Location maps are provided for reference in **Appendix D**.

2.3 POTENTIAL IMPACTS OF DROUGHT OPTIONS

The qualifying habitats and species of European sites are vulnerable to a wide range of impacts such as physical loss or damage of habitat, disturbance from noise, light, human presence, changes in hydrology (e.g. changes in water levels/flow, flooding), changes in water or air quality and biological disturbance (e.g. direct mortality, introduction of disease or non-native species). However, the drought options considered for inclusion in the drought plan only have the potential to give rise to some of these impacts. The demand management schemes are unlikely to have any significant adverse effects on European sites as they relate to measures which will not result in any new development or water abstraction (repairing leakage and water efficiency measures) and which are largely implemented within urban areas.

In determining the likelihood of significant effects on European sites from drought options, particular consideration has been given to the possible source-receptor pathways through which effects may be transmitted to features contributing to the integrity of the European site(s) (e.g. groundwater or surface water catchments, air etc). **Table 2.1** shows the type of impacts that drought plan options could have on European site qualifying features.



Special Area of Conservation
(Including single pink lines)

Special Protection Area

RAMSAR Site

United Utilities Water Resource Zone

0 5 10km

N

CASCADE

United Utilities

Project:

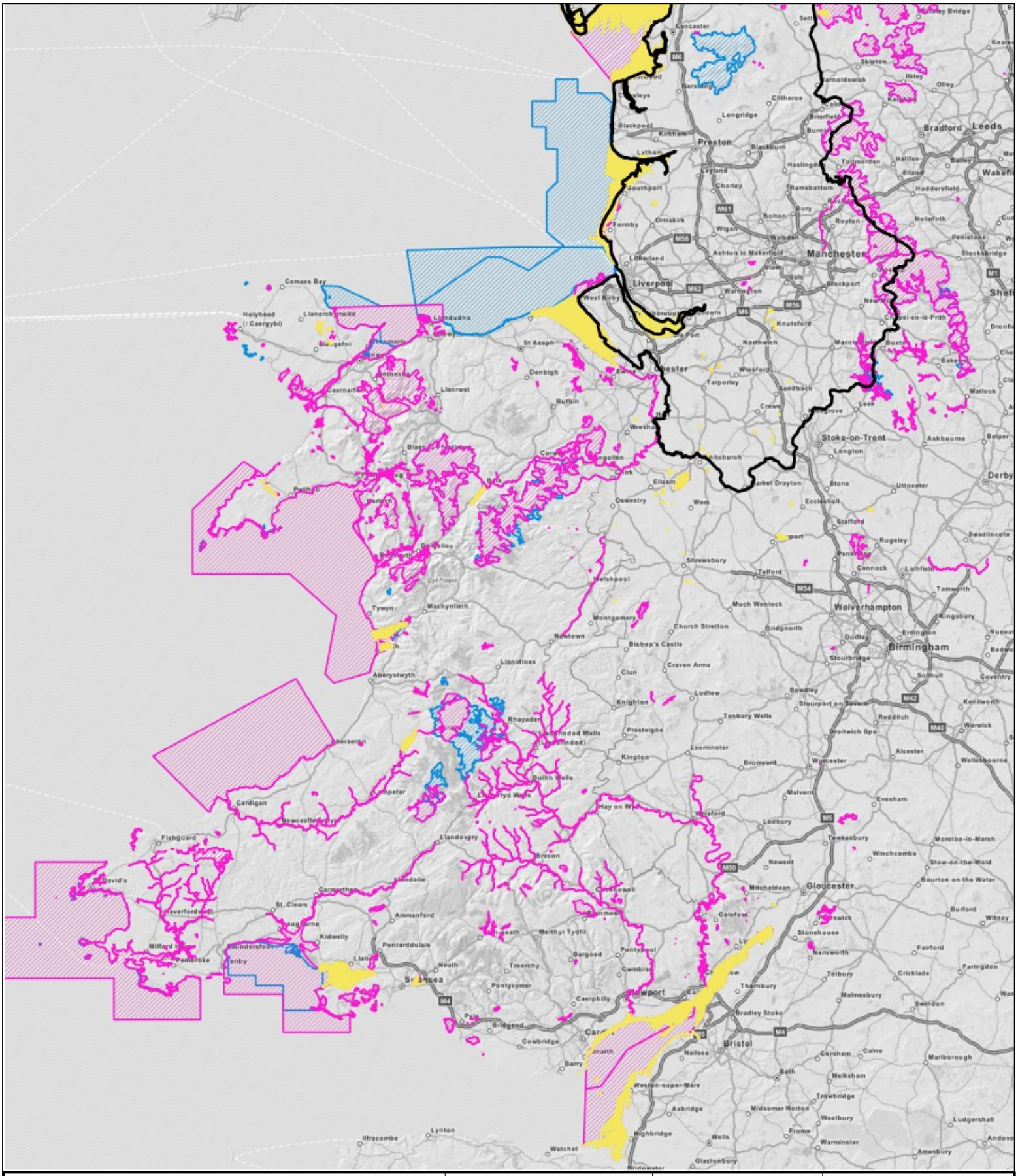
HRA of United Utilities Drought Plan 2017:

Screening Report

Figure Title:

European Designated sites in North West England and North Wales

Figure 2.1



Special Area of Conservation
(Including single pink lines)
Special Protection Area
RAMSAR Site
United Utilities Water Resource Zone

0 5 10km

N

CASCADE

United Utilities

Project:

HRA of United Utilities Drought Plan 2017

Screening Report

Figure Title:

European Designated sites in Wales

Figure 2.2

Table 2.1 Potential impacts of drought options on European sites

Broad categories of potential impacts on European sites, with examples	Examples of operations responsible for impacts *(Distance assumptions shown in italics)*
Physical loss - Removal (including offsite effects, e.g. foraging habitat) - Smothering	Development of built infrastructure associated with scheme, e.g. pipelines, transport infrastructure, temporary weirs. *Physical loss is only likely to be significant where the boundary of the scheme extends within the boundary of the European site, or within an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).*
Physical damage - Sedimentation / silting - Prevention of natural processes - Habitat degradation - Erosion - Fragmentation - Severance/barrier effect - Edge effects	Development of built infrastructure associated with scheme, e.g. temporary weirs. *Physical damage is only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).*
Non-physical disturbance - Noise - Visual presence - Human presence - Light pollution	Noise from vehicular traffic during construction of scheme. *Noise from construction traffic is only likely to be significant where the transport route to and from the scheme is within 3-5km of the boundary of the European site[18].* Plant and personnel involved in construction and operation of schemes e.g. for maintenance, plus non-operational activities such as recreation associated with scheme e.g. reservoirs *These effects (noise, visual/human presence) are only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).* Development of built infrastructure associated with scheme, which includes artificial lighting. *Effects from light pollution are only likely to be significant where the boundary of the scheme is within 500 m of the boundary of the European site. From a review of Environment Agency internal guidance on HRA and various websites it is considered that effects of vibration and noise and light are more likely to be significant if development is within 500 metres of a European site.*

[18] A series of studies carried out in the Netherlands have shown that road noise levels above 42-43dB and 47dB results in a rapid fall in population of woodland and grassland breeding bird species, with disturbance distances varying between species from 20 to 1700 metres from the road (at 5000 cars a day) and up to 3.53 kilometres at 50,000 cars a day. The most recent study is: Reijnen, R.; Foppen, R.; Veenbaas, G. (1997) *Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors.* Biodiversity and Conservation 6 (4), 567-581.

Broad categories of potential impacts on European sites, with examples	Examples of operations responsible for impacts *(Distance assumptions shown in italics)*
Water table/availability - Drying - Flooding / stormwater - Changes to surface water levels and flows - Changes in groundwater levels and flows - Changes to coastal water movement	Changes to water levels and flows due to water abstraction and storage. *These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site.*
Toxic contamination - Water pollution - Soil contamination - Air Pollution	Reduced dilution in downstream or receiving waterbodies due to changes in abstraction or reduced compensation flow. Air emissions associated with vehicular traffic during construction/operation of schemes. *This effect is only likely to be significant where the transport route to and from the scheme is within 100m of the boundary of the European site*[19].
Non toxic contamination - Nutrient enrichment (e.g. of soils and water) - Algal blooms - Changes in salinity - Changes in thermal regime - Changes in turbidity - Changes in sedimentation/silting	Changes to water salinity, nutrient levels, turbidity, thermal regime due to water abstraction, storage, or inter-catchment transfers. *These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site.*
Biological disturbance - Direct mortality - Changes to habitat availability - Out-competition by non-native species - Selective extraction of species - Introduction of disease - Rapid population fluctuations - Natural succession	Potential for changes to habitat availability, for example reductions in wetted width of rivers leading to desiccation of macrophyte beds due to changes in abstraction or reduced compensation flow. *This effect is only likely to be significant where the receiving water for the scheme is the European site or a tributary of the European site.*

As described in Section 1.4, environmental assessment reports have been prepared for the drought permit/order options and include consideration of potential impacts on European sites (see **Table 1.4**). The Environmental Assessment Report for each drought option has been reviewed as part of HRA Screening and 'significant' residual impacts to designated European site features identified (i.e. including those mitigation measures incorporated for avoidance, cancellation and reduction of impacts). It is noted that the Environmental Assessment 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

[19] Institute of Air Quality Management (2012) Guidance on the assessment of the impacts of construction on air quality and the determination of their significance. Accessed at http://www.iaqm.co.uk/text/guidance/construction_guidance_2012.pdf

for the impact assessment. As described in Section 1.4, 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 HRA screening table (see Section 3).

Where an Environmental Report has not been prepared for the drought option (i.e. supply side options), screening for likely significant effects has been determined on a proximity basis. European site(s) that are within 10km of the drought option location were identified and included in the HRA screening assessment.

Consideration was also given to the relative locations of drought option sites and designated sites within the same surface and groundwater catchments (where this information was available) to ensure that any connectivity over a longer distance than the 10km screening distance that might affect water-dependent sites was taken into account. 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 table (**Tables 3.1** and **3.3**).

Information and assessments from the Environment Agency 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 abstraction limits). The Review of Consents has also informed the assessment for drought permit/order options. It should be noted, 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.

Construction phase and operational phase impacts were reviewed and assessed. Most of the drought permit/order options reviewed comprise a change to an existing abstraction licence, with little or no requirement for additional infrastructure, and as such, few of these options can be considered to have a 'construction' phase.

The HRA Screening process has been undertaken using professional judgement taking into account potential extent, complexity, duration, frequency, reversibility and probability of impacts, and assuming the implementation of suitable mitigation measures, i.e. measures 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.

Where uncertainty remains, and it cannot be concluded that the drought option is not likely to have significant effects on the qualifying features of a European site, the

drought option is taken forward to Stage 2 which requires a full Appropriate Assessment of that option to be undertaken.

2.4 REVIEW OF POTENTIAL IN-COMBINATION EFFECTS

Article 6(3) of the Habitats Directive requires an Appropriate Assessment of *'any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plan or projects'.*

The assessments of cumulative, or in-combination, effects have been informed by drought management option forms documented by UU in its Statutory Drought Plan. Examples of these forms are provided in **Appendix B** to this Report. 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 Review of Consents is available for an abstraction licence, this has also been used to inform the in-combination 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.

The potential for cumulative, or in-combination, effects has considered the following:

1. Assessment of the cumulative impacts of the drought option with UU's existing abstraction licences that operate within the zone of influence of the drought option, and other abstraction and discharge consents, as identified in the Environment Agency Review of Consents reports.

2. Assessment of cumulative impacts of the drought option with other UU supply side and drought permit/order options (including both intra- and inter- zone options).

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 (by reducing the demand for water and reducing abstraction at source). Therefore, demand management measures have not been included in the in-combination assessment for each supply side and drought permit/order option, but it is acknowledged that they will have a net positive effect by reducing pressure on water resources. The findings of the assessment are described in Section 3.1.

Consideration has been made of the potential for cumulative impacts of UU's Drought Plan with other plans and projects. Guidance[20] states "*It should be possible to identify the other plans or projects in a targeted way; not trawling for every conceivable plan*

[20] Tyldesley, D (2012) *Draft Guidance for Plan Making Authorities in Wales. The Appraisal of Plans under the Habitats Regulations* for Countryside Council for Wales, CCW Bangor.

or project, whilst identifying all the relevant ones. To be relevant to the in combination effect the residual effects of other plans or projects will need to either make the unlikely effects of the subject plan likely, or insignificant effects of the plan significant, or both."

In accordance with this guidance, other plans and projects of relevance have been considered when undertaking the in combination effects with UU's drought options. Plans cited in the guidance (Table 6[21]) have been considered but it has been concluded that they are not relevant. Such plans, e.g. strategic policies and Local Development Plans which determine potential 'end of pipe' demand are considered to be an issue that relates to wider water resource planning and UU's WRMP rather than UU's Drought Plan.

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 2021) has been undertaken (see Section 3.2.1).

Consideration has also been made of the potential for cumulative impacts of UU's Drought Plan with drought options from other neighbouring water company Drought Plans and Environment Agency /NRW Drought Plans to occur. This has included the review of drought options from neighbouring water company drought plans to identify any drought options within the zone of influence of any of UU's drought options. National Policy Statements for Wastewater and Renewable Energy Infrastructure were also reviewed. The findings of the assessment are described in Section 3.2.

It is noted that there may be cumulative, or in-combination site specific issues with particular drought options which may not be foreseen, for example, other future development projects at, or in the vicinity of specific sites. Such future projects are difficult to define at the time of undertaking HRA Screening of the Drought Plan, due to the uncertainty or timing of implementation, and assessment of these cumulative, or in-combination effects has not been undertaken. For drought permit/order options, these issues will be investigated at the time of any future drought order/permit application, both as part of Environmental Assessments prepared in support of the application, and by the Environment Agency/ Secretary of State/Welsh Ministers when determining the application.

[21] Tyldesley, D (2012) *Draft Guidance for Plan Making Authorities in Wales. The Appraisal of Plans under the Habitats Regulations* for Countryside Council for Wales, CCW Bangor.

3 HRA SCREENING FINDINGS FOR DROUGHT OPTIONS

3.1 HRA SCREENING OF STATUTORY DROUGHT PLAN

The assessments of potential impacts for the drought options that were proposed for inclusion in UU's Drought Plan are presented in **Tables 3.1**, **3.2** and **3.3** for supply side options, demand side options and drought permit/order options, respectively.

Where applicable, drought options are presented for each resource zone. The European sites, their qualifying features and approximate distance from the drought options are provided in **Tables 3.1** to **3.3**. Within each of the tables, the following questions posed are answered by following the approach described in Section 2:

Is scheme likely to have a significant effect on European site(s) alone? – this relates to the specific UU drought option assessed (see Section 2.3).

Effect in combination with existing consents? – this relates to the specific UU drought option assessed in combination with UU's existing abstraction licences that operate within the zone of influence of the drought option, and other abstraction and discharge consents (see Section 2.4, bullet 1.)

Effect in combination with other drought options? - this relates to the specific UU drought option assessed in combination with other UU supply side and drought permit/order options (including both intra- and inter- zone options) (see Section 2.4, bullet 2.)

Potential mitigation measures available were taken into account in the screening process. As stated in Section 2.2, site vulnerability assessments for each of the European sites included in the assessment tables are provided in **Appendix C.**

Table 3.1 Habitats Regulations Screening of supply side drought options

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
Integrated Resource Zone						
Belle Vale Borehole	Mersey Estuary SPA (5.5 km SW)	**Article 4.1** Over winter the area regularly supports: Golden plover (*Pluvialis apricaria*). **Article 4.2** Over winter the area regularly supports: Northern pintail (*Anas acuta*), teal (*Anas crecca*), wigeon (*Anas penelope*), dunlin (*Calidris alpina alpina)*, black-tailed godwit (*Limosa limosa islandica*), curlew (*Numenius arquata)*, grey plover (*Pluvialis squatarola*), great crested grebe (*Podiceps cristatus*), shelduck (*Tadorna tadorna*), redshank (*Tringa tetanus*), lapwing (*Vanellus vanellus*). On passage the area regularly supports: Ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*).	To bring this option online, the water from Belle Vale could be treated at Netherly Borehole (option 1) - the diversion infrastructure is already in place and the treatment plant at Belle Vale could be abandoned. Alternatively, a new treatment plant could be built at Belle Vale, this would entail a construction period of 12 months and would require an access route, however, this is not the preferred construction option. There will be no loss of designated habitat due to the scheme as the borehole does not overlap any designated sites. If a new treatment plant is required, transport of materials and equipment during construction on site will require a maximum of 4 HGV deliveries and general construction traffic consisting of 4 trips per day for 3 weeks. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction phase of this scheme is not likely to have significant effects on the qualifying features of the SPA and Ramsar sites. The abstraction is part of a combined licence with Water Lane, Stocks Well, Belle Vale, and Netherley (existing licences and supply side options). No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Mersey Estuary Ramsar (5.5 km SW)	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: Common shelduck (*Tadorna tadorna*), black-tailed godwit (*Limosa limosa islandica*), common redshank (*Tringa totanus totanus*). Species with peak counts in winter: Eurasian teal (*Anas crecca*), Northern pintail (*Anas acuta*), dunlin (*Calidris alpina alpina*).		No	No	No
Croft Borehole	Manchester Mosses SAC (3.1km SE)	***Primary Habitats and Species*** **7120 Degraded raised bogs still capable of natural regeneration -** Mossland formerly covered a very large part of low-lying Greater Manchester, Merseyside and southern Lancashire. Most has been converted to agriculture or lost to development; however several examples have survived as degraded raised bog. Past drainage has produced dominant purple moor grass (*Molinia caerulea)*, bracken (*Pteridium aquilinum*) and birch (*Betula spp.*) scrub or woodland, wetter pockets have enabled the peat-forming species to survive.	A new treatment line and first stage filtration and disinfection plant will need to be constructed, as well as new borehole pumps, the construction phase will take approximately 6 months to complete. Works will include the removal of existing boreholes, pump and rising main and replacement/renewal as needed. The construction of a concrete base and temporary building (approximately 6mx4m) would also be required to house disinfection and filtration rigs. An access track would be required. A mobile crane will be on site for one week to replace/renew borehole pumps and rising mains. A mobile crane and excavator will be on site for a period of approximately 2 and 3 weeks respectively for the rest of the construction works. 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 between the SACs and site (3km or more), impacts from noise, dust or chemical leak are considered unlikely. Transport of materials and equipment during construction on site will require a maximum of 13 HGV deliveries and general construction traffic consisting of 4 trips per day for 6 weeks. Transport will utilise the existing road network however the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore the construction phase of this scheme is not likely to have significant effects on SAC qualifying features. Connectivity to 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 (both alone and in combination with other	No	No	No
	Rixton Clay Pits SAC (5.5km E)	***Primary Habitats and Species*** **1166 Great crested newt *Triturus cristatus* -** The excavation of disused brickworks in glacial boulder clay has left a series of hollows, which have filled with water leading to a variety of pond sizes. New ponds have also been created more recently for wildlife and amenity purposes. Great crested newts (Triturus cristatus) are known to occur in at least 20 ponds across the site. The site also supports species-rich grassland, scrub and mature secondary woodland.		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
			consents). As the drought option would operate under the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.			
Daresbury Borehole	Mersey Estuary SPA (7.1km W)	**Article 4.1** Over winter the area regularly supports: Golden plover (*Pluvialis apricaria*). **Article 4.2** Over winter the area regularly supports: Northern pintail (*Anas acuta*), teal (*Anas crecca*), wigeon (*Anas penelope*), dunlin (*Calidris alpina alpina)*, black-tailed godwit (*Limosa limosa islandica*), curlew (*Numenius arquata)*, grey plover (*Pluvialis squatarola*), great crested grebe (*Podiceps cristatus*), shelduck (*Tadorna tadorna*), redshank (*Tringa tetanus*), lapwing (*Vanellus vanellus*). On passage the area regularly supports: Ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*).	Minor construction works are required to bring the borehole online as a drought source option and these will take approximately 6 months to complete. Works will include construction of a concrete base and temporary building (approximately 4mx3m) to house disinfection and UV rigs. An access track would be required. A mobile crane and excavator will be on site for a period of approximately 1 and 2 weeks respectively. 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 between the SPA, Ramsars and site (greater than 7km); impacts from noise or dust are considered unlikely. Transport of materials and equipment during construction on site will require a maximum of 6 HGV deliveries and general construction traffic consisting of 4 trips per day for 3 weeks. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction phase of this scheme is not likely to have significant effects on the qualifying features of the SPA and Ramsar sites. Hough Lane, Walton abstraction is in the vicinity (supply side drought option). Appleton Reservoir is geographically close but the reservoir is sited on Mercia Mudstone sequence isolated from the Sherwood Sandstone aquifer. No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Mersey Estuary Ramsar (7.1km W)	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: Common shelduck (*Tadorna tadorna*), black-tailed godwit (*Limosa limosa islandica*), common redshank (*Tringa totanus totanus*). Species with peak counts in winter: Eurasian teal (*Anas crecca*), Northern pintail (*Anas acuta*), dunlin (*Calidris alpina alpina*).		No	No	No
Landside Borehole	Manchester Mosses SAC (3.8km E)	***Primary Habitats and Species*** **7120 Degraded raised bogs still capable of natural regeneration -** Mossland formerly covered a very large part of low-lying Greater Manchester, Merseyside and southern Lancashire. Most has been converted to agriculture or lost to development; however several examples have survived as degraded raised bog. Past drainage has produced dominant purple moor grass (*Molinia caerulea)*, bracken (*Pteridium aquilinum*) and birch (*Betula spp.*) scrub or woodland, wetter pockets have enabled the peat-forming species to survive.	A new borehole pump together with 75m of rising main would be required, this would take 1 month to implement. Works will include the removal of existing boreholes, pump and rising main and replacement/renewal as needed. A mobile crane will be on site for one week to replace/renew borehole pumps and rising mains. 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 between the SACs and site (>3km), impacts from noise or dust are considered unlikely. Transport of materials and equipment during construction on site will require a maximum of 2 HGV deliveries and general construction traffic consisting of 4 trips per day for 1 week. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction phase of this scheme is not likely to have significant effects on the SAC's qualifying features. 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 (both alone and in combination with other consents). As the drought option would operate under the terms of the existing licence, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination.	No	No	No
	Rixton Clay Pits SAC (7.3km SE)	***Primary Habitats and Species*** **1166 Great crested newt *Triturus cristatus* -** The excavation of disused brickworks in glacial boulder clay has left a series of hollows, which have filled with water leading to a variety of pond sizes. New ponds have also been created more recently for wildlife and amenity purposes. Great crested newts (Triturus cristatus) are known to occur in at least 20 ponds across the site. The site also supports species-rich grassland, scrub and mature secondary woodland.		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
Netherley Borehole	Mersey Estuary SPA (5.9km S)	**Article 4.1** Over winter the area regularly supports: Golden plover *Pluvialis apricaria* (1.2% of the GB population) **Article 4.2** Over winter the area regularly supports: Northern pintail *Anas acuta* (1.9% of the population), teal *Anas crecca* (2.9% of the population), wigeon *Anas penelope* (4.2% of the population in Great Britain), dunlin *Calidris alpina alpina* (3.6% of the population), black-tailed godwit *Limosa limosa islandica* (1.6% of the population), curlew *Numenius arquata* (1.1% of the population in Great Britain), grey plover *Pluvialis squatarola* (2.3% of the population in Great Britain), great crested grebe *Podiceps cristatus* (1.4% of the population in Great Britain), shelduck *Tadorna tadorna* (2.2% of the population), redshank *Tringa totanus* (2.8% of the population), lapwing *Vanellus vanellus* (0.7% of the population in Great Britain). On passage the area regularly supports: Ringed plover *Charadrius hiaticula* (1.7% of the population in Great Britain), redshank *Tringa totanus* (3.8% of the population)	Although it is assumed that exiting pump-sets and boreholes will be utilised, minor construction works are required to bring the borehole online as a drought source option and these will take approximately 3 months to complete. Works will include construction of a concrete base and temporary building (approximately 6mx4m) including access track and installation of disinfection and UV rigs including tapping into existing pipework. This drought option will also involve onsite storage of hypochlorite. A mobile crane and excavator will be on site for a period of approximately 2 weeks. 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 between the designated sites and Netherley boreholes 5.9km), impacts from noise, dust or chemical leak are considered unlikely. Transport of materials and equipment during construction will require 8 HGV deliveries and general construction traffic consisting of a maximum 4 trips per day for 4 weeks. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction of the scheme is not likely to have significant effects on the qualifying features of both the SPA and Ramsar sites. The abstraction is part of a combined licence with Water Lane, Stocks Well, Belle Valle, Pex Hill and Greensbridge Lane (existing sources and supply side options). No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Mersey Estuary Ramsar (5.9km S)	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: Common shelduck *Tadorna tadorna* (4.2% of the population), black-tailed godwit *Limosa limosa islandica* (5.7% of the population), common redshank *Tringa totanus totanus* (2.6% of the population). Species with peak counts in winter: Eurasian teal *Anas crecca* (2.6% of the population), Northern pintail *Anas acuta* (2% of the GB population), dunlin *Calidris alpina alpina* (3.6% of the population)		No	No	No
Pex Hill Boreholes	Mersey Estuary SPA (4.8km S)	**Article 4.1** Over winter the area regularly supports: Golden plover *Pluvialis apricaria* (1.2% of the GB population) **Article 4.2** Over winter the area regularly supports: Northern pintail *Anas acuta* (1.9% of the population), teal *Anas crecca* (2.9% of the population), wigeon *Anas penelope* (4.2% of the population in Great Britain), dunlin *Calidris alpina alpina* (3.6% of the population), black-tailed godwit *Limosa limosa islandica* (1.6% of the population), curlew *Numenius arquata* (1.1% of the population in Great Britain), grey plover *Pluvialis squatarola* (2.3% of the population in Great Britain), great crested grebe *Podiceps cristatus* (1.4% of the population in Great Britain), shelduck *Tadorna tadorna* (2.2% of the population), redshank *Tringa totanus* (2.8% of the population), lapwing *Vanellus vanellus* (0.7% of the population in Great Britain). On passage the area regularly supports:	It is assumed that exiting pump-sets and boreholes will be utilised, however, minor construction works are required to bring the borehole online as a drought source option and these will take approximately 3 months to complete. It will be necessary to construct a concrete base and temporary building (approximately 6mx4m) including access track. A disinfection rig will be installed on site to be housed in the temporary pre-fabricated building, tapping into existing pipework. This drought option will also involve onsite storage of hypochlorite. A mobile crane and excavator will be on site for a period of approximately 1 and 2 weeks respectively. 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 between the designated sites and Pex Hill (4.8km), impacts from noise, dust or chemical leak are considered unlikely. Transport of materials and equipment during construction will require 5 HGV deliveries and general construction traffic consisting of a maximum 4 trips per day for 3 weeks. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction of the scheme is not likely to have significant effects on the qualifying features of both the SPA and Ramsar sites.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Ringed plover *Charadrius hiaticula* (1.7% of the population in Great Britain), redshank *Tringa totanus* (3.8% of the population).	The abstraction is part of a combined licence with Water Lane, Stocks Well, Belle Valle, Netherley, and Greensbridge Lane (existing licences and supply side options). No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.			
	Mersey Estuary Ramsar (4.8km S)	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: Common shelduck *Tadorna tadorna* (4.2% of the population), black-tailed godwit *Limosa limosa islandica* (5.7% of the population), common redshank *Tringa totanus totanus* (2.6% of the population). Species with peak counts in winter: Eurasian teal *Anas crecca* (2.6% of the population), Northern pintail *Anas acuta* (2% of the GB population), dunlin *Calidris alpina alpina* (3.6% of the population)		No	No	No
Stocks Well Boreholes	Mersey Estuary SPA (4.7 km S)	**Article 4.1** Over winter the area regularly supports: Golden plover (*Pluvialis apricaria*). **Article 4.2** Over winter the area regularly supports: Northern pintail (*Anas acuta*), teal (*Anas crecca*), wigeon (*Anas penelope*), dunlin (*Calidris alpina alpina*), black-tailed godwit (*Limosa limosa islandica*), curlew (*Numenius arquata)*, grey plover (*Pluvialis squatarola*), great crested grebe (*Podiceps cristatus*), shelduck (*Tadorna tadorna*), redshank (*Tringa tetanus*), lapwing (*Vanellus vanellus*). On passage the area regularly supports: Ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*)	To bring this option online, the slipline pipework needs to be investigated and tested to ensure turbidity levels are adequate. This requires minimal intrusion with no new mains needed. There will be no loss of designated habitat due to the scheme as the borehole does not overlap any designated sites (4.7 km away). There is a potential minor risk of construction noise affecting the SPA and RAMSAR sites due to the distance of the borehole from the sites. Transport will utilise the existing road network, and the increase in vehicle numbers required to bring this scheme online is considered to be negligible, and will be for a temporary period. Therefore, construction movements for the scheme are not likely to have significant effects on the qualifying features of the SAC and SPA sites. The abstraction is part of a combined licence with Water Lane, Stocks Well, Belle Vale and Netherley (existing licences and supply side options). No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Mersey Estuary Ramsar (4.7 km S)	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn:		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Common shelduck (*Tadorna tadorna*), black-tailed godwit (*Limosa limosa islandica*), common redshank (*Tringa totanus totanus*). Species with peak counts in winter: Eurasian teal (*Anas crecca*), Northern pintail (*Anas acuta*), dunlin (*Calidris alpina alpina*).				
Walton Boreholes	Manchester Mosses SAC (15 km NE)	***Primary Habitats and Species*** **7120 Degraded raised bogs still capable of natural regeneration -** Mossland formerly covered a very large part of low-lying Greater Manchester, Merseyside and southern Lancashire. Most has been converted to agriculture or lost to development; however several examples have survived as degraded raised bog. Past drainage has produced dominant purple moor grass (*Molinia caerulea)*, bracken (*Pteridium aquilinum*) and birch (*Betula spp.*) scrub or woodland, wetter pockets have enabled the peat-forming species to survive	Minor construction works are required to bring the borehole online as a drought source option and these will take approximately 3 months to complete. Works will include construction of a concrete base and temporary building (approximately 4m x 3m) to house disinfection and UV rigs. An access track would be required. A mobile crane and excavator will be on site for a period of approximately 1 and 2 weeks respectively. 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 between the designated sites and Hough Lane (9km or more), impacts from noise or dust are considered unlikely. Transport of materials and equipment during construction on site will require a maximum of 6 HGV deliveries and general construction traffic consisting of 4 trips per day for 3 weeks. Transport will utilise the existing road network however the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction phase of this scheme is not likely to have significant effects on the qualifying features of the SACs, SPA and Ramsar sites. Daresbury abstraction is in the vicinity (supply side drought option). Appleton Reservoir is geographically close but the reservoir is sited on Mercia Mudstone sequence isolated from the Sherwood Sandstone aquifer. No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination. 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 (both alone and in combination with other consents). As the drought option would operate under the terms of the existing licence, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination.	No	No	No
	Mersey Estuary SPA (9.4km W)	**Article 4.1** Over winter the area regularly supports: Golden plover (*Pluvialis apricaria*). **Article 4.2** Over winter the area regularly supports: Northern pintail (*Anas acuta*), teal (*Anas crecca*), wigeon (*Anas penelope*), dunlin (*Calidris alpina alpina*), black-tailed godwit (*Limosa limosa islandica*), curlew (*Numenius arquata)*, grey plover (*Pluvialis squatarola*), great crested grebe (*Podiceps cristatus*), shelduck (*Tadorna tadorna*), redshank (*Tringa tetanus*), lapwing (*Vanellus vanellus*). On passage the area regularly supports: Ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*).		No	No	No
	Mersey Estuary Ramsar (9.4 km W)	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: Common shelduck (*Tadorna tadorna*), black-tailed godwit (*Limosa limosa islandica*), common redshank (*Tringa totanus totanus*). Species with peak counts in winter: Eurasian teal (*Anas crecca*), Northern pintail (*Anas acuta*), dunlin (*Calidris alpina alpina*).		No	No	No
	Rixton Clay Pits SAC (9.8km NE)	***Primary Habitats and Species*** **1166 Great crested newt *Triturus cristatus* -** The excavation of disused brickworks in glacial boulder clay has left a series of hollows, which have filled with water leading to a variety of pond sizes. New ponds have also been created more recently for wildlife and amenity purposes. Great crested newts (Triturus cristatus) are known to occur in at least 20 ponds across the site. The site also supports species-rich grassland, scrub and mature secondary woodland.		No	No	No
	Rostherne More Ramsar (14 km N)	***Ramsar criterion 1*** *Rostherne Mere is one of the deepest and largest of the meres of the Shropshire-Cheshire Plain. Its shoreline is fringed with common reed Phragmites australis*		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
Water Lane Boreholes	Mersey Estuary SPA (7.1 km SE)	**Article 4.1** Over winter the area regularly supports: Golden plover (*Pluvialis apricaria*). **Article 4.2** Over winter the area regularly supports: Northern pintail (*Anas acuta*), teal (*Anas crecca*), wigeon (*Anas penelope*), dunlin (*Calidris alpina alpina*), black-tailed godwit (*Limosa limosa islandica*), curlew (*Numenius arquata)*, grey plover (*Pluvialis squatarola*), great crested grebe (*Podiceps cristatus*), shelduck (*Tadorna tadorna*), redshank (*Tringa tetanus*), lapwing (*Vanellus vanellus*). On passage the area regularly supports: Ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*)	This option could be brought online with minor testing and remedial work - a new domestic supply feed needs to be constructed to direct water to Pex Hill. The construction work will take 4 months. There will be no loss of designated habitat due to the scheme as the borehole does not overlap any designated sites (7.1 km away). Transport of materials and equipment during construction on site will require a maximum of 5 HGV deliveries and general construction traffic consisting of 4 trips per day for 6 weeks. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction phase of this scheme is not likely to have significant effects on the qualifying features of the SACs, SPA and Ramsar sites. The abstraction is part of a combined licence with Water Lane, Stocks Well, Belle Vale and Netherley (existing licences and supply side options). No modifications were made to the existing abstraction licence as part of the Review of Consents for the Mersey Estuary SPA and Ramsar sites. As the drought option would operate within the terms of the existing licence, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Mersey Estuary Ramsar (7.1 km SE)	**Article 4.1** Over winter the area regularly supports: Golden plover (*Pluvialis apricaria*). **Article 4.2** Over winter the area regularly supports: Northern pintail (*Anas acuta*), teal (*Anas crecca*), wigeon (*Anas penelope*), dunlin (*Calidris alpina alpina*), black-tailed godwit (*Limosa limosa islandica*), curlew (*Numenius arquata)*, grey plover (*Pluvialis squatarola*), great crested grebe (*Podiceps cristatus*), shelduck (*Tadorna tadorna*), redshank (*Tringa tetanus*), lapwing (*Vanellus vanellus*). On passage the area regularly supports: Ringed plover (*Charadrius hiaticula*), redshank (*Tringa totanus*).		No	No	No
Worsthorne Borehole	South Pennine Moors SAC (1.5km E)	**4030 European dry heaths -** upland heath of the South Pennines is strongly dominated by heather (*Calluna vulgaris*). **7130 Blanket bogs***Priority feature* - Hare's-tail cottongrass (*Eriophorum vaginatum*) is often overwhelmingly dominant and the usual bog-building *Sphagnum mosses* are scarce. **91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles** – Located around the fringes of the upland heath and bog of the south Pennines are blocks of old sessile oak woods, usually on slopes. **4010 Northern Atlantic wet heaths with Erica tetralix** **7140 Transition mires and quaking bogs**	Minor construction works are required to bring the borehole online as a drought source option and these will take approximately 2 months to complete. Works will include constructing a concrete base for an acid dosing rig/M&E building (approximately 3mx4m) including access track. Installation of acid rig including tapping into existing pipework. A mobile crane will be onsite for 1 week. This drought option will also involve onsite chemical storage. A mobile crane and excavator will be on site for a period of approximately 1 and 2 weeks, respectively. 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 between the SPA, SAC and the site (1.5km), impacts from noise, dust or chemical leak are considered unlikely. Transport of materials and equipment during construction on site will require a maximum of 6 HGV deliveries and general construction traffic consisting of 4 trips per day for 2 weeks. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, the construction phase of the scheme is not likely to have significant effects on the qualifying features of both the SPA and SAC. The Review of Consents for the South Pennine Moors SAC and SPA concluded no impacts of any abstraction licences (both alone and in combination with other consents). As the drought option would operate under the terms of the existing licence, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination.	No	No	No
	South Pennine Moors Phase 2 SPA (1.5km E)	**Article 4.1** During the breeding season, the site regularly supports short-eared owl (*Asio flammeus*), merlin (*Falco columbarius*), and golden plover (*Pluvialis apricaria*) (North-western Europe - breeding). **Article 4.2** During the breeding season, the site regularly supports common sandpiper (*Actitis hypoleucos*), dunlin (*Calidris alpina schinzii*), twite (*Carduelis flavirostris*), snipe (*Gallinago gallinago*), curlew (*Numenius arquata*),		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Northern wheatear (*Oenanthe oenanthe*), whinchat (*Saxicola rubetra*), redshank (*Tringa tetanus*), ring ouzel (*Turdus torquatus*) and lapwing (*Vanellus vanellus*).				
West Cumbria Resource Zone						
Tankering to support Ennerdale Water	Tarn Moss SAC (within 100m of transport route)	**Primary Habitats and Species** **7140 Transition mires and quaking bogs**	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. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites. Following best practice construction techniques, impacts from noise, dust or chemical leak are considered unlikely. Therefore, the construction phase of the scheme is not likely to have significant effects on the qualifying features of the SACs. 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 reservoirs 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 for up to 3 months. This option will reduce the volumes of water abstracted from Ennerdale Water, preserving storage and reducing the risk of a drought order being required. Activities associated with the operational phase include vehicle movements (averaging one per hour in a 24 hour period prior to drought order implementation and 3 per hour in a 24 hour period during drought order implementation) and provision of water to service reservoirs to ensure security of supply. Transport will utilise the existing road network therefore there will be no loss of designated habitat due to the scheme. Impacts associated with the movement of vehicles include noise disturbance. However, no qualifying features have been identified that are considered to be sensitive to noise, and any sites adjacent to existing road networks are likely to comprise species that are habituated to noise and visual disturbance from traffic movements. It should be noted that no SPAs were identified adjacent to the proposed transport route. Increased air emissions associated with the vehicle movements have the potential to impact on the nutrient status of some of the qualifying features, e.g. nitrogen deposition in oligotrophic to mesotrophic standing waters, or the chemical status of sensitive habitats, e.g. acid deposition in limestone pavement habitats. However, the designated sites do not currently show a vulnerability to air pollution associated with traffic levels and the habitats (see Appendix C). Furthermore, the sensitive habitat types are typically located away from the major roads, on which the vehicle movements will be concentrated. The management units of the European Sites adjacent to the road (within 100m) comprise qualifying features that are considered less vulnerable to the deposition of air pollutants. Therefore, the operational phase of the scheme is not likely to have significant effects on the qualifying features of the SACs.	No	No	No
	Asby Complex SAC (within 100m of transport route)	**Primary Habitats and Species** **6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)** **6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)** **7220 Petrifying springs with tufa formation (Cratoneurion)** **7230 Alkaline fens** **8240 Limestone pavements** **1013 Geyer`s whorl snail** **1393 Slender green feather-moss** **Qualifying Features** **3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.** **4030 European dry heaths** **7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae**		No	No	No
	River Derwent & Bassenthwaite Lake SAC (within 100m of transport route)	**Primary Habitats and Species** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea** **1065 Marsh fritillary butterfly (*Euphydryas (Eurodryas, Hypodryas) aurinia*)** **1095 Sea lamprey (*Petromyzon marinus*)** **1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*)** **1106 Atlantic salmon (*Salmo salar*)** **1355 Otter (*Lutra lutra*)** **1831 Floating water-plantain (*Luronium natans*)** **Qualifying Features** **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**		No	No	No
	River Ehen SAC (within 100m of transport route)	**Primary Habitats and Species** **1029 Freshwater mussel (*Margaritifera margaritifera*) -** The River Ehen supports the largest freshwater mussel (*Margaritifera margaritifera*) population in England, with population estimates for the entire river exceeding 100,000. The river has high conservation importance due to the presence of juvenile mussels, indicating recruitment since 1990.		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		<u>Qualifying Features</u> **1106 Atlantic salmon (*Salmo salar*)**				
	River Kent SAC (within 100m of transport route)	**<u>Primary Habitats and Species</u>** **1092 White-clawed (or Atlantic stream) crayfish** **<u>Qualifying Features</u>** **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation** **1029 Freshwater mussel (*Margaritifera margaritifera*)** **1163 Bullhead**		No	No	No
	Lake District High Fells SAC (within 100m of transport route)	**<u>Primary Habitats and Species</u>** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea** **4010 Northern Atlantic wet heaths with Erica tetralix** **4030 European dry heaths** **4060 Alpine and Boreal heaths** **5130 Juniperus communis formations on heaths or calcareous grasslands** **6150 Siliceous alpine and boreal grasslands** **6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels** **7130 Blanket bogs (* if active bog)** **8110 Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)** **8220 Siliceous rocky slopes with chasmophytic vegetation** **91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles** **<u>Qualifying Features</u>** **6230 Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)** **7230 Alkaline fens** **8210 Calcareous rocky slopes with chasmophytic vegetation** **1393 Slender green feather-moss**		No	No	No
Carlisle Resource Zone						
Castle Carrock reservoir, dead-water storage	North Pennine Moors SAC (1km NE)	**<u>4030 European dry heaths</u>** The North Pennine Moors (along with the North York Moors) hold much of the upland heathland of northern England. At higher altitudes and to the wetter west and north of the site complex, the heaths grade into extensive areas of **7130 blanket bogs**. The most abundant heath communities are H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. There are also examples of H18 *Vaccinium myrtillus – Deschampsia flexuosa*, H10 *Calluna vulgaris – Erica cinerea* and H21 *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heaths. **<u>5130 *Juniperus communis* formations on heaths or calcareous grasslands</u>** The North Pennine Moors includes one major stand of juniper scrub in Swaledale as well as a number of small and isolated	Castle Carrock is an offline storage reservoir which is filled using the abstraction from the River Gelt. The drought option comprises abstraction of the deadwater from Castle Carrock only (i.e. water that is not normally available/accessible for abstraction). The reservoir has no compensation flow and no statutory releases would be put at risk. No further abstraction licence would be required and no reduction to the hands off flow for this abstraction is proposed. Minor construction work will be required to bring the source online as a drought option. Construction works will take approximately 3 months to complete. It will be necessary to construct a concrete base for a pre-fabricated filtration plant and M&E building (~3mx4m) including access track. An acid rig with then be installed, including tapping into existing pipework. A mobile crane and excavator will be on-site for 1 and 3 weeks respectively. This phase will require 18 HGV deliveries, general construction traffic movements of 4 trips per day for 4 weeks.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		localities. The Swaledale site grades into heathland and bracken *Pteridium aquilinum* but the core area of juniper is of W19 *Juniperus communis – Oxalis acetosella* woodland with scattered rowan *Sorbus aucuparia* and birch *Betula* spp. **7130 Blanket bogs** The North Pennine Moors hold the major area of blanket bog in England. A significant proportion remains active with accumulating peat, although these areas are often bounded by sizeable zones of currently non-active bog, albeit on deep peat. The main NVC type is M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire, but there is also representation of M18 *Erica tetralix – Sphagnum papillosum* blanket mire and some western localities support M17 *Scirpus cespitosus – Eriophorum vaginatum* blanket mire. Forms of M20 *Eriophorum vaginatum* blanket mire predominate on many areas of non-active bog. **7220 Petrifying springs with tufa formation (*Cratoneurion*)** The petrifying spring's habitat is very localised in occurrence within the North Pennine Moors, but where it does occur it is species-rich with abundant bryophytes, sedges and herbs including bird's-eye primrose *Primula farinosa* and marsh valerian *Valeriana dioica*. **8220 Siliceous rocky slopes with chasmophytic vegetation** Acidic rock outcrops and screes are well-scattered across the North Pennine Moors and support vegetation typical of Siliceous rocky slopes with chasmophytic vegetation in England, including a range of lichens and bryophytes, such as *Racomitrium lanuginosum*, and species like stiff sedge *Carex bigelowii* and fir clubmoss *Huperzia selago*. **91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles** Birk Gill Wood is an example of old sessile oak woods well to the east of the habitat's main distribution in the UK. However, this sheltered river valley shows the characteristic rich bryophyte and lichen communities of the type under a canopy of oak, birch *Betula* sp. and rowan *Sorbus aucuparia*. The slopes are boulder-strewn, with mixtures of heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus* and moss carpets in the ground flora. **4010 Northern Atlantic wet heaths with *Erica tetralix*** (qualifying feature but not primary reason for selection) **6130 Calaminarian grasslands of the *Violetalia calaminariae*** (qualifying feature but not primary reason for selection) **6150 Siliceous alpine and boreal grasslands** (qualifying feature but not primary reason for selection) **6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)** (qualifying feature but not primary reason for selection) **7230 Alkaline fens** (qualifying feature but not primary reason for selection) **8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)** (qualifying feature but not primary reason for selection)	Phase 2 will involve construction of a concrete base and temporary building (~3mx4m), including access track, and installation of pump-sets/M&E, including tapping into existing pipework. A mobile crane and excavator will be on-site for a period of 1 week. This phase will require 7 HGV deliveries, general construction traffic movements of 4 trips per day for 2 weeks. This option will involve on-site chemical storage. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites. However, given the distance between drought option site and the North Pennine Moors SAC and River Eden SAC designated sites, there is the potential for impacts from noise, dust or chemical leak. Assuming best practice construction measures, impacts on designated sites will be negligible. Transport will utilise the existing road network, however, the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, construction vehicle movements are not likely to have significant effects on the qualifying features of the various designated sites. The Review of Consents for the North Pennine Moors SAC and North Pennine Moors SPA concluded that there was no adverse impact of this licence on the integrity of these sites (both alone and in combination). As the drought option would operate under the terms of the existing licence, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination. The River Eden Review of Consents assessed that the River Gelt abstraction system alone does have an adverse impact on the integrity of the River Eden SAC. However, the drought option involves abstraction of deadwater from Castle Carrock Reservoir only (which is not part of the designated area), and is not dependant on abstraction from the river i.e. the reservoir can be drawn down even if there is no abstraction from the river. As such, there are not anticipated to be likely significant effects on the designated features of the River Eden SAC.			

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		8210 Calcareous rocky slopes with chasmophytic vegetation (qualifying feature but not primary reason for selection) **1528 Marsh saxifrage (*Saxifraga hirculus*)** (qualifying feature but not primary reason for selection)				
	River Eden SAC (1km NE)	***Primary Habitats and Species*** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea –** Ullswater is the second largest lake in Cumbria and is an example of a relatively deep lake with both oligotrophic and mesotrophic flora and fauna species. The lake has an extremely rich aquatic flora, including eight species of *Potamogeton*. These include various-leaved pondweed (*P. gramineus*), red pondweed (*P. alpinus*) and long-stalked pondweed (*P. praelongus*). The nationally scarce six-stamened waterwort (*Elatine hexandra*) is also found in some of the bays. One of the few populations of powan (*Coregonus lavaretus*) in the UK is supported by Ullswater. **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation -** The River Eden flows over both calcareous limestone and sandstone, which creates a wide diversity of ecological conditions, ranging from oligotrophic to mesotrophic. This river has 184 recorded plant species, more than any other river in the UK. Species of the river system include stream water-crowfoot (*Ranunculus penicillatus ssp. Penicillatus*) and others, such as *R. penicillatus ssp. pseudofluitans* and river water-crowfoot (*R. fluitans*). **91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* Priority feature –** Along the length of the River Eden, stands of alder (*Alnus glutinosa*) and willow (*Salix spp.*) can be found, associated with backwaters and seasonally-flooded channels. Ground flora includes common nettle (*Urtica dioica*), butterbur (*Petasites hybridus*) and hogweed (*Heracleum sphondylium*) that grade into hollows with greater tussock-sedge (*Carex paniculata*). **1092 White-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes)* –** High water quality in the River Eden allows it to support a large population of White-clawed crayfish. **1095 Sea lamprey (*Petromyzon marinus*) 1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*) -** An extensive river system on a varied and base-rich geology with highly erodible rock results in extensive areas of gravel and finer silts being deposited throughout the system, which provide suitable conditions for spawning and nursery areas, supporting a large population of Sea, Brook and River lamprey. **1106 Atlantic salmon (*Salmo salar*)** The large river system flowing over varied, base-rich geology, coupled with a large range in altitude, results in the development of distinct habitat types, supporting diverse plant and invertebrate communities. The high ecological value of the River Eden across a large area of the catchment means a high population of salmon can be supported.		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		1163 Bullhead (*Cottus gobio*) – The River Eden is relatively unmodified; in the northern part of its range, with extensive areas of gravel and generally good water quality across the catchment, providing good habitat for bullheads. **1355 Otter (*Lutra lutra*)** – The River Eden is an example of a lowland otter habitats in north-west England.				
	North Pennine Moors SPA (2.2km E)	**Article 4.1** During the breeding season the area regularly supports: Hen harrier *Circus cyaneus* (2.2% of GB breeding population) Merlin *Falco columbarius* (10.5% of GB breeding population) Peregrine falcon *Falco peregrinus* (1.3% of GB breeding population) Golden plover *Pluvialis apricaria* (6.2% of GB breeding population)		No	No	No
North Eden Resource Zone						
None						

Table 3.2 Habitats Regulations Screening of demand side drought options

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
All Resource Zones						
Drought Publicity	None	-	None – drought publicity includes increased water efficiency messages via increased customer communications. No impacts on designated sites are anticipated, other than to acknowledge that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought option sites that have the potential to impact European sites due to reduced pressure on water resources and reduced abstraction at source.	No	No	No
Increased leakage detection and repair activity	None	-	None - it is envisaged that leakage detection and repair schemes will largely be undertaken primarily in urban areas. No impacts on designated sites are anticipated, other than to acknowledge that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought option sites that have the potential to impact European sites due to reduced pressure on water resources and reduced abstraction at source.	No	No	No
Water Use Restriction	None	-	None – restrictions on consumer water use are demand management measures and as such, are not anticipated to have impacts on European designated sites. It is acknowledged that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought option sites that have the potential to impact European sites, due to reduced pressure on water resources and reduced abstraction at source.	No	No	No
Ordinary Drought Order (Non-Essential Use Ban)	None	-	None – Ordinary Drought Orders are demand management measures and as such are not anticipated to have impacts on European designated sites. It is acknowledged that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought option sites that have the potential to impact European sites due to reduced pressure on water resources and reduced abstraction at source.	No	No	No

Table 3.3 Habitats Regulations Screening of drought permit/order options

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
Integrated Resource Zone						
Longdendale Reservoirs	South Penine Moors SAC	**4030 European dry heaths** The site is representative of upland dry heath at the southern end of the Pennine range, the habitat's most south-easterly upland location in the UK. Dry heath covers extensive areas, occupies the lower slopes of the moors on mineral soils or where peat is thin, and occurs in transitions to acid grassland, wet heath and **7130 blanket bogs**. The upland heath of the South Pennines is strongly dominated by heather *Calluna vulgaris*. Its main NVC types are H9 *Calluna vulgaris –Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. More rarely H8 *Calluna vulgaris – Ulex gallii* heath and H10 *Calluna vulgaris – Erica cinerea* heath are found. On the higher, more exposed ground H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath becomes more prominent. In the cloughs, or valleys, which extend into the heather moorlands, a greater mix of dwarf shrubs can be found together with more lichens and mosses. The moors support a rich invertebrate fauna, especially moths, and important bird assemblages. **7130 Blanket bogs (* if active bog)** * Priority feature This site represents **blanket bog** in the south Pennines, the most south-easterly occurrence of the habitat in Europe. The bog vegetation communities are botanically poor. Hare's-tail cottongrass *Eriophorum vaginatum* is often overwhelmingly dominant and the usual bog-building *Sphagnum* mosses are scarce. Where the blanket peats are slightly drier, heather *Calluna vulgaris*, crowberry *Empetrum nigrum* and bilberry *Vaccinium myrtillus* become more prominent. The uncommon cloudberry *Rubus chamaemorus* is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass *E. angustifolium*. Substantial areas of the bog surface are eroding, and there are extensive areas of bare peat. In some areas erosion may be a natural process reflecting the great age (9000 years) of the south Pennine peats. **91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles** Around the fringes of the upland heath and bog of the south Pennines are blocks of **old sessile oak woods**, usually on slopes. These tend to be dryer than those further north and west, such that the bryophyte communities are less developed (although this lowered diversity may in some instances have been exaggerated by the effects of 19th century air pollution). Other components of the ground flora such as grasses, dwarf shrubs and ferns are common. Small areas of alder woodland along stream-sides add to the overall richness of the woods.	There is no construction phase associated with this drought option. An Environmental Report has been prepared for the drought option for drought contingency planning purposes. No adverse operational impacts on the South Pennine Moors SAC were reported. Therefore, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination.	No	No	No
Rivington Reservoirs – White Coppice	None	-	An Environmental Report has been prepared for the drought option for drought contingency planning purposes. The report confirms that there are no European sites within the zone of influence of the scheme.	No	No	No
Rivington Reservoirs – Brinscall Brook	None	-	An Environmental Report has been prepared for the drought option for drought contingency planning purposes. The report confirms that there are no European sites within the zone of influence of the scheme.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
Jumbles Reservoir	None	-	An Environmental Report has been prepared for the drought option for drought contingency planning purposes. The report confirms that there are no European sites within the zone of influence of the scheme.	No	No	No
Delph Reservoir	None	-	An Environmental Report has been prepared for the drought option for drought contingency planning purposes. The report confirms that there are no European sites within the zone of influence of the scheme.	No	No	No
Dovestone Reservoir	Rochdale Canal SAC	**Primary Habitats and Species** **1831 Floating water-plantain Luronium natans –** The canal has predominantly mesotrophic water and supports a large population of floating water-plantain within a diverse waterplant community containing a wide range of other species such as pondweeds (*Potamogeton spp.*).	There is no construction phase associated with this drought option. An Environmental Report has been prepared for the drought option for drought contingency planning purposes. No adverse operational impacts on the Rochdale Canal SAC were reported. Therefore, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination.	No	No	No
Lake Vyrnwy	Severn Estuary SAC	**Primary Habitats and Species** **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** **1095 Sea lamprey (*Petromyzon marinus*)** **1099 River lamprey (*Lampetra fluviatilis)*** **1103 Twaite shad (*Alosa fallax*)** **Qualifying Features** **1110 Sandbanks which are slightly covered by sea water all the time** **1170 Reefs**	There is no construction phase associated with this drought option. An Environmental Report has been prepared for the drought option for drought contingency planning purposes. No adverse impacts on the Severn Estuary SAC or SPA were reported. The Environment Agency has confirmed that the Vyrnwy abstraction was scoped out of the Review of Consents before Stage 3 (although it is noted that the Review of Consents was carried out on the existing abstraction licence, and not the drought option). The Vyrnwy Aqueduct on the Montgomery Canal is the aqueduct that carries the canal over the River Vyrnwy and belongs to British Waterways. This is distinct from the aqueduct which transfers raw water from Vyrnwy to UU's Oswestry water treatment works. The Vyrnwy Aqueduct on the Montgomery Canal conveys the canal over the River Vyrnwy. Information from British Waterways is that the Montgomery Canal is fed indirectly by the Llangollen Canal via Frankton Locks; by controlled feeds from the River Severn at Penarth (upstream of the confluence with the River Vyrnwy), the River Morda at Maesbury Mill, the River Tanat just upstream of Carreghofa Locks and the Lledan Brook at Welshpool; and an uncontrolled feed at Rednal Moss near Aston. There is no connectivity of the Montgomery Canal with UU's Vyrnwy Reservoir, UU's Vyrnwy aqueduct or the Afon Vyrnwy. The findings of the Environmental Report confirm that the operation of the drought option will not result in likely significant effects on the SACs, SPAs or Ramsar sites identified (either alone or in combination).	No	No	No
	Severn Estuary SPA	**Article 4.1** Over winter the area supports Bewick's swan (*Cygnus columbianus bewickii).* **Article 4.2** Over winter the area supports Curlew (*Numenius arquata),* Dunlin (*Calidris alpina alpine),* Pintail (*Anas acuta),* Redshank (*Tringa tetanus),* Shelduck (*Tadorna tadorna)* and on passage Ringed Plover (*Charadrius hiaticula).* The site regularly supports an important assemblage of at least 20,000 waterfowl.		No	No	No
	Severn Estuary Ramsar	**Ramsar Criterion 1** Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities. **Ramsar Criterion 3** Due to unusual estuarine communities, reduced diversity and high productivity. **Ramsar Criterion 4** This site is important for the run of migratory fish between sea and river via estuary. **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance **Ramsar Criterion 6** The site supports a variety of species/populations occurring at levels of international importance.		No	No	No
	Berwyn and South Clwyd Mountains SAC	***Primary Habitats and Species*** **4030 European dry heaths –** Berwyn contains the largest stands of upland European dry heath in Wales. **7130 Blanket bogs****Priority feature* – Berwyn supports the most extensive tract of near-natural blanket bog in Wales. ***Qualifying Features***		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) **7140 Transition mires and quaking bogs** **8120 Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)** **8210 Calcareous rocky slopes with chasmophytic vegetation**				
	Berwyn SPA	**Article 4.1** During the breeding season, the site regularly supports *Circus cyaneus, Falco columbarius, Falco peregrinus, and Milvus milvus.*		No	No	No
	Montgomery Canal SAC	**<u>Primary Species</u>** **1831 Floating water-plantain *Luronium natans*** – This is the largest and the most extensive population of floating water-plantain *Luronium natans* in Britain and is a highly significant lowland population. In favourable management conditions the species can be dominant over kilometre lengths of canal, carpeting the shallow bed and flowering and setting seed in abundance. This is a semi-natural population, having colonised from drift material or seed but needing periodic human disturbance for continued growth; in this respect the canal is a substitute for the species' former slow-moving, mesotrophic river niche, which has been largely destroyed in lowland Britain.		No	No	No
River Lune LCUS abstraction	Morecambe Bay SAC	**<u>Primary Habitats and Species</u>** **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide 1160 Large shallow inlets and bays** **1170 Reefs** **1220 Perennial vegetation of stony banks** **1310 Salicornia and other annuals colonising mud and sand** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** **2120 Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`)**. In some areas, transitions to **2010 Embryonic Shifting Dunes** are observed. **2130 Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature – 2190 Humid dune slacks** **1166 Great crested newt *Triturus cristatus*** **<u>Qualifying Features</u>** **1110 Sandbanks which are slightly covered by sea water all the time** **1150 Coastal lagoons* *Priority feature*** **1170 Reefs** **2110 Embryonic shifting dunes** **2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)* *Priority feature*** **2170 Dunes with *Salix repens ssp. Argentea* (*Salicion arenariae*)**	There is no construction phase associated with this drought option. The River Lune is one of the five major fresh water sources to Morecambe Bay which also include the Rivers Leven, Kent, Keer and Wyre. It is noted that the River Lune was not considered within the Environment Agency's Review of Consents process. It is acknowledged that the Review of Consents was carried out on the existing licence and not the drought option proposed. An Environmental Assessment Report has been prepared for the drought option for drought contingency planning purposes in2016. The report concluded no adverse operational impacts on the Morecambe Bay SAC/SPA. Therefore, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination.	No	No	No
	Morecambe Bay SPA	**Article 4.1** Over winter the site supports Bar-tailed godwit (*Limosa lapponica)* and Golden plover (*Pluvialis apricaria)*. During breeding season the site supports Little tern (*Sterna albifrons)* and Sandwich tern (*Sterna sandvicensis).* **Article 4.2**		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Over winter the site supports Curlew (*Numenius arquata),* Dunlin (*Calidris alpina alpine),* Grey plover (*Pluvialis squatarola),* Knot (*Calidris canutus),* Oystercatcher (*Haematopus ostralegus),* Pink-footed goose (*Anser brachyrhynchus),* Pintail (*Anas acuta),* Redshank (T*ringa tetanus),* Shelduck (*Tadorna tadorna)* and Turnstone (*Arenaria interpres)* and on passage *Ringed plover (*Charadrius hiaticula) and S*anderling (*Calidris alba). During breeding season the site supports Herring gull (*Larus argentatus)* and Lesser black-backed gull (*Larus fuscus).* The site regularly supports important assemblages of at least 20,000 waterfowl and 20,000 seabirds.				
	Morecambe Bay Ramsar	**<u>Ramsar Criterion 4</u>** Over winter, the site supports a large waterfowl assemblage of international importance. **<u>Ramsar Criterion 5</u>** Over winter, the site supports a large waterfowl assemblage of international importance. **<u>Ramsar Criterion 6</u>** The site supports a variety of species/populations occurring at levels of international importance.		No	No	No
Lake Windermere – Scenario 1	Morecambe Bay SAC	**<u>Primary Habitats and Species</u>** **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide 1160 Large shallow inlets and bays** **1170 Reefs** **1220 Perennial vegetation of stony banks** **1310 Salicornia and other annuals colonising mud and sand** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** **2120 Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`)**. In some areas, transitions to **2010 Embryonic Shifting Dunes** are observed. **2130 Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature – 2190 Humid dune slacks** **1166 Great crested newt *Triturus cristatus*** **<u>Qualifying Features</u>** **1110 Sandbanks which are slightly covered by sea water all the time** **1150 Coastal lagoons* *Priority feature*** **1170 Reefs** **2110 Embryonic shifting dunes** **2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)* *Priority feature*** **2170 Dunes with *Salix repens ssp. Argentea* (*Salicion arenariae*)**	There is no construction phase associated with this drought option. The River Leven flows from the southern edge of Windermere for 5km to its tidal limit at Low Wood Bridge and then into Morecambe Bay. An Environmental Assessment Report has been prepared for drought contingency planning for the two drought options at Lake Windermere (referred to as Scenarios 1 and 2), and includes an assessment of the hydrological, water quality and ecological impacts of the scenarios. Scenario 1 at Windermere included a reduction in hands-off flow conditions to a minimum of 95 Ml/d and relaxes the 12-month rolling abstraction licence limit. During periods of low level, releases to the River Leven would be made by the EA through their fisheries sluice depending on the prevailing requirements of the river. The hydrological influence of the scenarios on the Morecambe Bay SAC, SPA and Ramsar are likely to be insignificant given the relative volumes of water involved and the large attenuation volumes available in Morecambe Bay. Discussions with the Environment Agency and Natural England during the drought contingency planning exercise confirmed this conclusion. In addition, it is noted that the site is primarily designated for features of interest associated with coastal habitats alone. Therefore, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Morecambe Bay SPA	**Article 4.1** Over winter the site supports Bar-tailed godwit (*Limosa lapponica)* and Golden plover (*Pluvialis apricaria).* During breeding season the site supports Little tern (*Sterna albifrons)* and Sandwich tern (*Sterna sandvicensis).* **Article 4.2** Over winter the site supports Curlew (*Numenius arquata),* Dunlin (*Calidris alpina alpine),* Grey plover (*Pluvialis squatarola),* Knot (*Calidris canutus),* Oystercatcher (*Haematopus ostralegus),* Pink-footed goose (*Anser brachyrhynchus),* Pintail (*Anas acuta),* Redshank (T*ringa tetanus),* Shelduck (*Tadorna tadorna)* and		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Turnstone (*Arenaria interpres)* and on passage *Ringed plover (*Charadrius hiaticula) and S*anderling (*Calidris alba). During breeding season the site supports Herring gull (*Larus argentatus)* and Lesser black-backed gull (*Larus fuscus)*. The site regularly supports important assemblages of at least 20,000 waterfowl and 20,000 seabirds.				
	Morecambe Bay Ramsar	**Ramsar Criterion 4** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 6** The site supports a variety of species/populations occurring at levels of international importance.		No	No	No
Lake Windermere – Scenario 2	Morecambe Bay SAC	**Primary Habitats and Species** **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide 1160 Large shallow inlets and bays** **1170 Reefs** **1220 Perennial vegetation of stony banks** **1310 Salicornia and other annuals colonising mud and sand** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** **2120 Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`)**. In some areas, transitions to **2010 Embryonic Shifting Dunes** are observed. **2130 Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature – 2190 Humid dune slacks** **1166 Great crested newt *Triturus cristatus*** **Qualifying Features** **1110 Sandbanks which are slightly covered by sea water all the time** **1150 Coastal lagoons* *Priority feature*** **1170 Reefs** **2110 Embryonic shifting dunes** **2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)* *Priority feature*** **2170 Dunes with *Salix repens ssp. Argentea* (*Salicion arenariae*)**	There is no construction phase associated with this drought option. The River Leven flows from the southern edge of Windermere for 5km to its tidal limit at Low Wood Bridge and then into Morecambe Bay. An Environmental Assessment Report has been prepared for drought contingency planning for the two drought options at Lake Windermere (referred to as Scenarios 1 and 2), and includes an assessment of the hydrological, water quality and ecological impacts of the scenarios. Scenario 2 includes a relaxation of 12-month rolling abstraction licence limit and permit drawdown of lake level (up to a maximum of 0.5 m below weir crest). During periods of lake drawdown, releases to the River Leven would be made by the EA through their fisheries sluice depending on the prevailing requirements of the river. The hydrological influence of the scenarios on the Morecambe Bay SAC, SPA and Ramsar are likely to be insignificant given the relative volumes of water involved and the large attenuation volumes available in Morecambe Bay. Discussions with the Environment Agency and Natural England during the drought contingency planning exercise confirmed this conclusion. In addition, it is noted that the site is primarily designated for features of interest associated with coastal habitats alone. Therefore, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
	Morecambe Bay SPA	**Article 4.1** Over winter the site supports Bar-tailed godwit (*Limosa lapponica)* and Golden plover (*Pluvialis apricaria)*. During breeding season the site supports Little tern (*Sterna albifrons)* and Sandwich tern (*Sterna sandvicensis)*. **Article 4.2** Over winter the site supports Curlew (*Numenius arquata),* Dunlin (*Calidris alpina alpine),* Grey plover (*Pluvialis squatarola),* Knot (*Calidris canutus),* Oystercatcher (*Haematopus ostralegus),* Pink-footed goose (*Anser brachyrhynchus),* Pintail (*Anas acuta),* Redshank (T*ringa tetanus),* Shelduck (*Tadorna tadorna)* and Turnstone (*Arenaria interpres)* and on passage *Ringed plover (*Charadrius hiaticula) and S*anderling (*Calidris alba). During breeding season the site supports Herring gull (*Larus argentatus)* and Lesser black-backed gull (*Larus fuscus)*. The site regularly		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		supports important assemblages of at least 20,000 waterfowl and 20,000 seabirds.				
	Morecambe Bay Ramsar	**Ramsar Criterion 4** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 6** The site supports a variety of species/populations occurring at levels of international importance.		No	No	No
Ullswater	River Eden SAC	**Primary Habitats and Species** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea** – Ullswater is the second largest lake in Cumbria and is an example of a relatively deep lake with both oligotrophic and mesotrophic flora and fauna species. **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation –** The River Eden flows over both calcareous limestone and sandstone, which creates a wide diversity of ecological conditions, ranging from oligotrophic to mesotrophic. **91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* Priority feature 1092 White-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes)* –** High water quality in the River Eden allows it to support a large population of White-clawed crayfish. **1095 Sea lamprey (*Petromyzon marinus*) 1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*)** **1106 Atlantic salmon (*Salmo salar*)** **1163 Bullhead (*Cottus gobio*) –1355 Otter (*Lutra lutra*)**	The River Eamont is a major tributary of the River Eden. An Environmental Assessment Report has been prepared for drought contingency planning at Ullswater and includes an assessment of the hydrological, water quality and ecological impacts of the drought option. The Ullswater drought option has been the subject of previous environmental assessment studies and was included in UU's Final Drought Plan 2014. However, the drought option included in the Final Drought Plan 2014, and assessed by previous studies, included the construction and maintenance of a temporary weir across the River Eamont near Pooley Bridge, which was intended to provide benefit to delaying the onset and reducing the severity of extreme low river flows in times of drought. Further analysis and assessment undertaken since publication of the Final Drought Plan 2014 has shown that there is no benefit to water resources by doing this and the option no longer requires construction of a weir. An updated Environmental Assessment Report prepared in 2016 presents an assessment of the revised drought permit option, without construction of the temporary weir. The only ecological feature screened in for further assessment in the 2016 report was the upstream migration of Atlantic salmon and sea trout, as agreed following extensive stakeholder consultation. The assessment has concluded that there is a negligible impact on lake level and a negligible impact on river flows as a result of implementing the drought permit. Consequently, there are negligible impacts on the physical environment of the river, including water quality. The assessment concluded that the impacts of drought permit implementation on upstream migration of adult salmon and sea trout are negligible. The short term and very small magnitude of changes in river flows in the River Eamont (less than 10% within the study area from the outflow of Ullswater to the confluence with Dacre Beck only) are considered unlikely to result in significant changes in migratory opportunity to adult fish. It is also noted that during a period of natural environmental drought, adult fish waiting to migrate are considered more likely to be present lower in the catchment and, therefore, adult fish are less likely to be present within the reach of the river under the influence of the drought permit. Therefore, no likely significant effects of the operation of the drought option on these sites are anticipated, either alone or in combination.	No	No	No
Swineshaw Boreholes	South Pennine Moors SAC (1km E)	***Primary Habitats and Species*** **4030 European dry heaths -** upland heath of the South Pennines is strongly dominated by heather (*Calluna vulgaris*). Its main NVC types are H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath.	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 assessed the impacts on groundwater and surface water as likely to be negligible, based on current understanding. The report also concluded that the boreholes are unlikely to be hydrologically connected to the surface	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		More rarely H8 *Calluna vulgaris – Ulex gallii* heath and H10 *Calluna vulgaris – Erica cinerea* heath are found. On the higher, more exposed ground H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath becomes more prominent. The moors also support a rich invertebrate fauna, especially moths, and important bird assemblages. **7130 Blanket bogs***Priority feature* - Hare's-tail cottongrass (*Eriophorum vaginatum*) is often overwhelmingly dominant and the usual bog-building *Sphagnum mosses* are scarce. Where the blanket peats are slightly drier, heather (*Calluna vulgaris*), crowberry (*Empetrum nigrum*) and bilberry (*Vaccinium myrtillus*) become more prominent. The uncommon cloudberry (*Rubus chamaemorus*) is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass (*E. angustifolium*). **91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles –** Located around the fringes of the upland heath and bog of the south Pennines are blocks of old sessile oak woods, usually on slopes. Ground flora such as grasses, dwarf shrubs and ferns are common. Small areas of alder woodland along stream-sides add to the overall richness and diversity of the woods. ***Qualifying Features*** **4010 Northern Atlantic wet heaths with Erica tetralix** **7140 Transition mires and quaking bogs**	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 likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination. 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 designated feature and groundwater, which may indicate a potential pathway for impacts on the feature(s) 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. Minor construction works are required to bring the boreholes back online as a drought source option and these will take approximately 1 months to complete. There are 2 boreholes each requiring new pump-sets, starter panels and, potentially, rising mains. There will be no loss of designated habitat due to the scheme as the construction footprint does not overlap any designated sites, however, there is potential for impacts from construction noise. Transport of materials and equipment during construction will require 3 HGV deliveries and general construction traffic consisting of a maximum 4 trips per day for 1 week. Transport will utilise the existing road network and the increase in vehicle numbers required for the construction of the scheme is considered to be negligible, and will be for a temporary period. Therefore, construction movements for the scheme are not likely to have significant effects on the qualifying features of the SAC and SPA sites.			
	Peak District Moors (South Pennine Moors Phase 1) SPA (1km E)	**Article 4.1** During the breeding season, the site regularly supports *Asio flammeus, Falco columbarius* and *Pluvialis apricaria* (North-western Europe - breeding)		No	No	No
West Cumbria Resource Zone						
Scales boreholes	Solway Firth SAC	**Primary Habitats and Species** **1110 Sandbanks which are slightly covered by sea water all the time** **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide** **1310 Salicornia and other annuals colonising mud and sand** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** **1095 Sea lamprey *Petromyzon marinus*** **1099 River lamprey *Lampetra fluviatilis***	There is no construction associated with this option. An Environmental Report has been prepared for drought contingency planning and includes an assessment of the hydrological, water quality and ecological impacts of the drought option. The environmental assessment concluded that there would be no operational impact of the drought option on any European site as all sites identified are outside the potential zone of hydrological impact of the drought option. Therefore, no likely significant effects of the operation of the drought option on this site are anticipated, either alone or in combination. It is also noted that no licence modifications were made as part of the Review of Consents for South Solway Mosses SAC or Upper Solway Flats SPA (and Ramsar).	No	No	No
	South Solway Mosses SAC	***Primary Habitats and Species*** **7110 Active raised bogs** *Priority feature Site supports typical bog vegetation, including bog rosemary (*Andromeda polifolia*), cranberry (*Vaccinium oxycoccos*) and great sundew (*Drosera anglica*). The central part of Glasson Moss displays some of the most diverse raised bog vegetation in the UK.		No	No	No
	Upper Solway Flats and Marshes SPA	**Article 4.1** Over winter the area regularly supports *Branta leucopsis*, *Cygnus Cygnus*, *Limosa lapponica* and *Pluvialis apricaria*. **Article 4.2** Over winter the area regularly supports		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Anas acuta, Anas clypeata, Anas crecca, Anser brachyrhynchus, Arenaria interpres, Aythya marila, Bucephala clangula, Calidris alb, Calidris alpina alpin, Calidris canutus, Haematopus ostralegu, Numenius arquata, Tadorna tadorn, Pluvialis squatarol and *Tringa tetanus*. The area also supports a large population of waterfowl.				
	Upper Solway Flats and Marshes Ramsar	**Ramsar Criterion 2** The site supports over 10% of the British population of natterjack toad (*Bufo calamita*) (Habitats Directive Annex IV species (S1202)). **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 6** The site supports a variety of species/populations occurring at levels of international importance.		No	No	No
Ennerdale Water – drawdown of lake to 2.5m below weir crest	River Ehen SAC	**Primary Habitats and Species** **1029 Freshwater mussel (*Margaritifera margaritifera*)** – The River Ehen supports the largest freshwater mussel (*Margaritifera margaritifera*) population in England, with population estimates for the entire river exceeding 100,000. The river has high conservation importance due to the presence of juvenile mussels, indicating recruitment since 1990. **Qualifying Features** **1106 Atlantic salmon (*Salmo salar*)**	An Environmental Assessment Report has been prepared for drought contingency planning 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 the existing 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. Cumulative effects have been identified with UU's existing abstraction licence.	Yes	Yes	Yes
Crummock Water (lake drawdown to 1.5m below weir crest)	River Derwent and Bassenthwaite Lake SAC	**Primary Habitats and Species** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea** **1065 Marsh fritillary butterfly (*Euphydryas (Eurodryas, Hypodryas) aurinia*)** **1095 Sea lamprey (*Petromyzon marinus*)** **1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*)** **1106 Atlantic salmon (*Salmo salar*)** **1355 Otter (*Lutra lutra*)** **1831 Floating water-plantain (*Luronium natans*)**	An Environmental Assessment Report was prepared for drought contingency planning at Crummock in 2016 and included an assessment of the hydrological, water quality and ecological impacts of a drought option to allow pumping of compensation flows at lake levels below 0.97 m below weir crest level to 1.5 m below weir crest level and pumped abstraction (both using temporary pumps) with no reduction in licensed compensation flow of 27.3 Ml/d. 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 water into the existing UU abstraction intakes. The impact of pumping to supply the compensation release during lake level drawdown on water quality has been assessed as negligible. The impact of pumping to supply compensation release during lake level drawdown on the River Cocker is anticipated to be minor adverse.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Qualifying Features **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**	Lake drawdown has the potential to affect the macrophyte community of the lake (which is a feature of the designation) and a report undertaken by Dr Nigel Holmes (Alconbury Environmental Consultants)[22] concluded that the macrophyte community, as a whole and also individual component species, will not be discernibly impacted by the operation of a drawdown regime that may go 0.75m lower than has been recorded previously, the potential impacts are deemed to be negligible for all months of the year. There are no cumulative impacts of implementing the Crummock drought permit with existing licenses, consents and plans. Overall, the impacts of drought permit implementation have been assessed as minor adverse on the River Derwent and Bassenthwaite Lake SAC. This is due to the minor adverse impact on salmon in Crummock Water during the period July to December and the minor adverse impact on fish migration in the River Cocker during the period August to October. There are no other drought options within the hydrological zone of influence. Therefore, no likely significant effects of the operation of the drought option on European designated sites are anticipated, either alone or in combination.			
Carlisle Resource Zone						
None				-	-	
North Eden Resource Zone						
Eden Valley boreholes: - Bowscar boreholes	River Eden SAC	**Primary Habitats and Species** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea –** Ullswater is the second largest lake in Cumbria and is an example of a relatively deep lake with both oligotrophic and mesotrophic flora and fauna species. **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation –** The River Eden flows over both calcareous limestone and sandstone, which creates a wide diversity of ecological conditions, ranging from oligotrophic to mesotrophic. **91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)* Priority feature 1092 White-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes*) –** High water quality in the River Eden allows it to support a large population of White-clawed crayfish. **1095 Sea lamprey (*Petromyzon marinus*) 1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*)** **1106 Atlantic salmon (*Salmo salar*)** **1163 Bullhead (*Cottus gobio*) –1355 Otter (*Lutra lutra*)**	There is no construction phase associated with this drought option. It is noted that the licence at Bowscar boreholes was reviewed as part of Stage 3 Review of Consents; which concluded no adverse impact of the existing licensed abstraction. It is acknowledged that the Review of Consents was carried out on the existing licence and not the drought option proposed. An Environmental Report has been prepared for drought contingency planning at the Eden Valley boreholes sites. The report concluded that the reduction in water level under the proposed drought permit 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). Therefore, no likely significant effects of the operation of the drought option on European designated sites are anticipated, either alone or in combination.	No	No	No
	North Pennine Moors SPA	**Article 4.1** During the breeding season the area regularly supports: Hen harrier Circus cyaneus (2.2% of GB breeding population) Merlin Falco columbarius (10.5% of GB breeding population) Peregrine falcon Falco peregrinus (1.3% of GB breeding population)		No	No	No

[22] Alconbury Environmental Consultants (2014) *Macrophytes of Crummock Water*, Report to Cascade Consulting.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Golden plover Pluvialis apricaria (6.2% of GB breeding population)				
Eden Valley boreholes: - Gamblesby boreholes	River Eden SAC	**<u>Primary Habitats and Species</u>** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea –** Ullswater is the second largest lake in Cumbria and is an example of a relatively deep lake with both oligotrophic and mesotrophic flora and fauna species. **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation –** The River Eden flows over both calcareous limestone and sandstone, which creates a wide diversity of ecological conditions, ranging from oligotrophic to mesotrophic. **91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)*** **Priority feature 1092 White-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes*) –** High water quality in the River Eden allows it to support a large population of White-clawed crayfish. **1095 Sea lamprey (*Petromyzon marinus*) 1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*)** **1106 Atlantic salmon (*Salmo salar*)** **1163 Bullhead (*Cottus gobio*) –1355 Otter (*Lutra lutra*)**	There is no construction phase associated with this drought option. It is noted that Gamblesby boreholes were scoped out of the River Eden SAC Review of Consents before Stage 3. It is acknowledged that the Review of Consents was carried out on the existing licence and not the drought option proposed. An Environmental Report has been prepared for drought contingency planning at the Eden Valley boreholes sites. The report concluded that the reduction in water level under the proposed drought permit 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. Therefore, no likely significant effects of the operation of the drought option on European designated sites are anticipated, either alone or in combination.	No	No	No
	North Pennine Moors SPA	**<u>Article 4.1</u>** During the breeding season the area regularly supports: Hen harrier Circus cyaneus (2.2% of GB breeding population) Merlin Falco columbarius (10.5% of GB breeding population) Peregrine falcon Falco peregrinus (1.3% of GB breeding population) Golden plover Pluvialis apricaria (6.2% of GB breeding population)		No	No	No
Eden Valley boreholes: - Tarn Wood boreholes	River Eden SAC	**<u>Primary Habitats and Species</u>** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea –** Ullswater is the second largest lake in Cumbria and is an example of a relatively deep lake with both oligotrophic and mesotrophic flora and fauna species. **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation –** The River Eden flows over both calcareous limestone and sandstone, which creates a wide diversity of ecological conditions, ranging from oligotrophic to mesotrophic. **91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)*** **Priority feature 1092 White-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes*) –** High water quality in the River Eden allows it to support a large population of White-clawed crayfish. **1095 Sea lamprey (*Petromyzon marinus*) 1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*)** **1106 Atlantic salmon (*Salmo salar*)** **1163 Bullhead (*Cottus gobio*) –1355 Otter (*Lutra lutra*)**	There is no construction phase associated with this drought option. It is noted that Tarn Wood boreholes were scoped out of the River Eden SAC Review of Consents before Stage 3. It is acknowledged that the Review of Consents was carried out on the existing licence and not the drought option proposed. An Environmental Report has been prepared for drought contingency planning at the Eden Valley boreholes sites. The report concluded that the reduction in water level under the proposed drought permits 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. Therefore, no likely significant effects of the operation of the drought option on European designated sites are anticipated, either alone or in combination.	No	No	No
	North Pennine Moors SPA	**<u>Article 4.1</u>** During the breeding season the area regularly supports: Hen harrier Circus cyaneus (2.2% of GB breeding population)		No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?
		Merlin Falco columbarius (10.5% of GB breeding population) Peregrine falcon Falco peregrinus (1.3% of GB breeding population) Golden plover Pluvialis apricaria (6.2% of GB breeding population)				

3.2 POTENTIAL IN-COMBINATION EFFECTS WITH OTHER PLANS AND PROJECTS

Potential in-combination effects with other relevant plans and projects (as described in Section 2.4) have been reviewed and are summarised in this section.

3.2.1 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.

The Thirlmere Transfer scheme, to link UU's West Cumbria Resource Zone to the Integrated Zone (see Section 1.2.2) will be operational in 2022, which is outside the period covered by the Revised Draft Drought Plan 2017. The application for Planning Permission has been submitted. Assuming that Planning Permission is received, 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 a suite of leakage, water efficiency and metering actions being 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.

3.2.2 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 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 the latter group. The other actions in the Plans relate to drought planning, monitoring and communications and are not direct actions which would physically result in cumulative effects.

The Environment Agency[23] previously advised that SEA for 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 UU's drought management actions on the environment. Likewise, the Environment Agency have 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.

The Environment Agency / Natural Resource 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 / NRW 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

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

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 Environment Agency's North West Region Drought Plan; Hollingworth Lake, and Walverden Reservoir. No cumulative impacts on European sites of the Environment Agency drought order 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 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.

3.2.3 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.

3.2.4 National Policy Statements

National Policy Statement for Wastewater[24]; 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

[24] Defra (2012) *National Policy Statement for Wastewater*. March 2012.

major infrastructure projects are put forward, both in the south east of the UK.

National Policy Statement for Renewable Energy Infrastructure[25]**;** 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 implications of these National Policy Statements on the findings of the HRA Screening were identified.

3.2.5 Summary

No cumulative impacts on European sites have been identified between UU's drought options, and actions in Environment Agency Drought Plans, other water company Drought Plans or key National Policy Statements.

[25] Department of Energy and Climate Change (2011) *National Policy Statement for Renewable Energy Infrastructure (EN-3).* July 2011.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 SUMMARY OF HRA SCREENING CONCLUSIONS

A summary of the conclusions of HRA Screening is presented in **Table 4.1**. The table also presents the drought options that were taken forward to Appropriate Assessment. The methodology for undertaking the Stage 2 Appropriate Assessment is described in Section 4.2 below.

Table 4.1 Summary of HRA Screening conclusions

Drought Option	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?	AA required?
Supply Side Options				
Integrated Resource Zone				
Belle Vale Borehole	No	No	No	No
Croft Boreholes	No	No	No	No
Daresbury Borehole	No	No	No	No
Landside Boreholes	No	No	No	No
Netherley Boreholes	No	No	No	No
Pex Hill Boreholes	No	No	No	No
Randles Bridge Boreholes	No	No	No	No
Stocks Well Boreholes	No	No	No	No
Walton Borehole	No	No	No	No
Water Lane Boreholes	No	No	No	No
Worsthorne Borehole	No	No	No	No
West Cumbria Resource Zone				
Tankering to support Ennerdale Water	No	No	No	No
Carlisle Resource Zone				
Castle Carrock Reservoir, dead-water storage	No	No	No	No
North Eden Resource Zone				
None	No	No	No	No
Demand Management				
Drought Publicity	No	No	No	No
Increased leakage detection and repair activity	No	No	No	No
Water Use Restriction	No	No	No	No
Ordinary Drought Order (Non-Essential Use Ban)	No	No	No	No

Drought Option	Is scheme likely to have a significant effect on European site(s) alone?	Effect in combination with existing consents?	Effect in combination with other drought options?	AA required?
Drought Order/Permit				
Integrated Resource Zone				
Longdendale Reservoirs	No	No	No	No
Rivington Reservoirs – White Coppice	No	No	No	No
Rivington Reservoirs – Brinscall Brook	No	No	No	No
Jumbles Reservoir	No	No	No	No
Delph Reservoir	No	No	No	No
Dovestone Reservoir	No	No	No	No
Lake Vyrnwy	No	No	No	No
River Lune LCUS abstraction	No	No	No	No
Lake Windermere – Scenario 1	No	No	No	No
Lake Windermere – Scenario 2	No	No	No	No
Ullswater	No	No	No	No
Swineshaw Boreholes	No	No	No	No
West Cumbria Resource Zone				
Scales boreholes	No	No	No	No
Ennerdale Water –lake drawdown to 2.5m	Yes	Yes	Yes	Yes
Crummock Water	No	No	No	No
Carlisle Resource Zone				
None	No	No	No	No
North Eden Resource Zone				
Bowscar boreholes	No	No	No	No
Gamblesby boreholes	No	No	No	No
Tarn Wood boreholes	No	No	No	No

Assessment of UU's Drought Plan with other plans and programmes, including UU's WRMP schemes that are due to be implemented within the time period of the Drought Plan, Environment Agency / NRW Drought Plans, other water company Drought Plans and National Policy Statements, concluded that no other significant cumulative, or in-combination effects are anticipated.

The only drought option which requires Appropriate Assessment is the Ennerdale Water drought order, in the West Cumbria Water Resource Zone.

4.2 METHODOLOGY FOR APPROPRIATE ASSESSMENT

As described in Section 1.5, the output of this Stage 1 Screening stage is this HRA Screening Report which identifies which drought plan options require Appropriate Assessment (Stage 2). Only those drought options that have been identified as being likely to have a significant effect (either alone or in combination) have been taken

forward to Appropriate Assessment, i.e. Ennerdale Water drought order. The following sections identify the approach used to undertake the Appropriate Assessment.

Guidance

Appropriate Assessment has been undertaken using guidance from the following policy and guidance documents:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive).
- Conservation of Habitats and Species Regulations 2010 (as amended in 2011 and 2012).
- English Nature's Habitats Regulations Guidance Note HRGN 1 (1997).
- Tyldesley, D. and Hoskin, R. (2008) *Assessing projects under the Habitats Directive: guidance for competent authorities*. Report to the Countryside Council for Wales, Bangor.
- Tyldesley, D (2012) Draft Guidance for Plan Making Authorities in Wales: The Appraisal of Plans under the Habitats Regulations for Countryside Council for Wales, CCW Bangor.
- Environment Agency (2015) *Water Company Drought Plan Guideline*. July 2015.

Countryside Council for Wales Guidance[26] states that the Habitats Directive and Habitats Regulations require the assessment of effects on a European site to be 'appropriate'. The guidance states that this is taken to be 'fit for purpose' and proportional to the scale of effects (not the scale of the project) and the risk of harm to the site. An Appropriate Assessment is not intended to be an assessment of all the scheme environmental effects or all the potential effects on biodiversity; rather it is confined to determination of potentially significant effects on the designated features of the European site (alone or in combination with other plans and projects), taking the site's conservation objectives into account.

Guidance[27,28] recommends the competent authority (in this case UU), discuss and agree the scope of the Appropriate Assessment with the nature conservation bodies (Natural England and Natural Resources Wales). The HRA Screening Assessment has highlighted which aspects of the drought option (alone or in-combination) would be likely to affect which European site features and their conservation objectives. It is this

[26] Tyldesley, D. and Hoskin, R. (2008) *Assessing projects under the Habitats Directive: guidance for competent authorities*. Report to the Countryside Council for Wales, Bangor.
[27] Tyldesley, D. and Hoskin, R. (2008) *Assessing projects under the Habitats Directive: guidance for competent authorities.* Report to the Countryside Council for Wales, Bangor.
[28] Tyldesley, D (2012) *Draft Guidance for Plan Making Authorities in Wales. The Appraisal of Plans Under the Habitats Regulations* for Countryside Council for Wales, CCW Bangor.

information which will have triggered the need for further analysis in the Appropriate Assessment.

The Appropriate Assessment is confined to assessing the potentially significant effects on the European site features. The scope and nature of Appropriate Assessment will vary considerably from case to case. It has, therefore, been important for UU, as the project promoter and the competent authority, and Natural England / Natural Resources Wales to seek agreement on the scope of the Appropriate Assessment and the information and timescale required to undertake it. Although not legally required, the Environment Agency has also been a consultee for the Appropriate Assessment.

Objective

The objective of the Appropriate Assessment is to determine if there will be a significant adverse effect on site integrity, and is dependent on site specifics, including condition status and conservation objectives. The Environmental Agency Drought Plan Guideline states: "*A likely significant effect is one where you may reasonably predict that a drought action may affect the conservation objectives of the features for which the site was designated, excluding trivial or inconsequential effects*". It is not intended that the generic impact significance criteria of major, moderate, minor as recommended in the IEMA and CIEEM Guidelines will be specified to undertake the Appropriate Assessment. Criteria have been reviewed when undertaking the Appropriate Assessment for each particular drought option, dependant on site specifics as detailed above.

The potential for adverse effect on the integrity of the site depends on the scale and magnitude of the action and its predicted impacts, taking into account the distribution of the designated features across the site in relation to the predicted impact and the location, timing and duration of the proposed activity and the level of understanding of the effect, such as whether it has been recorded before and, based on current ecological knowledge, whether it can be expected to operate at the site in question. Where this information is not available, professional judgement has been used, and it is noted that in some cases, there may not be sufficient information to undertake the assessment. Assessment of significance is based on the available information, using professional judgement and guidelines where appropriate.

The Appropriate Assessment reports set out, in sufficient detail for it to be transparent and understandable, what the effects of the drought option (alone and in-combination) are likely to be on the interest feature, referring to relevant background documents and other information on which these judgements, which are essentially ecological judgements, rely. Guidance[29] states that the size or complexity of the Appropriate

[29] Tyldesley, D. and Hoskin, R. (2008) *Assessing projects under the Habitats Directive: guidance for competent authorities*. Report to the Countryside Council for Wales, Bangor.

Assessment report will not necessarily reflect the scale of the project, but rather the complexity of potential effects. The length of the Appropriate Assessment report may not reflect the complexity of ecological judgements made to arrive at the necessary conclusions. Very complex ecological analysis and judgements may be expressed succinctly, with detailed supporting analyses contained in Appendices or clearly referenced separate documents.

Mitigation Measures

The Appropriate Assessment looks at any potential mitigation measures, that is, in addition to any which may already form part of the project specification, to determine whether any can reduce the likelihood, nature, scale, and duration of the effect to a lower level. The Appropriate Assessment seeks mitigation measures that are capable of implementation and will reduce the impact to the lowest level possible. These measures can include both avoidance and reduction measures, with the former being the preferred option.

In-Combination Assessment

An in-combination assessment has been undertaken for each drought option as part of HRA Screening to determine whether a European site's features is likely to be significantly affected in view of its conservation objectives. The findings of the HRA Screening in-combination assessment are reviewed in light of the findings of the Appropriate Assessment of the drought option to ensure they remain valid, and are revised if required.

Note that with respect to the in-combination assessment, the Drought Plan includes a range of possible drought options to allow UU to respond to a particular drought in the most appropriate way. Each drought is different in terms of severity, season, location and duration and it is, therefore, impossible to predict in advance which and how many of the drought options 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). In reality, the effects will be dependent on where the drought may occur, at what time of year, how severe or prolonged it would be and what drought options are implemented.

Integrity Test

The integrity test is the conclusion of the Appropriate Assessment and requires the competent authority (in this case UU) to ascertain whether the drought option (either alone or in-combination with other plans or projects), will not have a significant adverse effect on site integrity. The following definition of site integrity is provided by Defra; the integrity of the site is "*the coherence of its ecological structure and function,*

across its whole area, that enables it to sustain the habitat, complex of habitats and/or the level of populations of the species for which it was classified"[30].

From the evidence and assessments undertaken, a statement will be made as to whether it can be ascertained that the drought option alone, or in-combination with other plans or projects, will not adversely affect the integrity of a European site.

Monitoring

Details of any recommended monitoring are described. Monitoring could be recommended either for the purposes of validating the findings of the Appropriate Assessment, or 'early warning' monitoring which would enable any actions to be stopped, paused, reduced in scale or altered should an adverse impact be recorded when a drought option is being implemented.

Limitations

The approach to the Appropriate Assessment is considered to be as rigorous as can reasonably be undertaken, although it is accepted that there may be gaps in information which could affect the assessment process. A brief resume of any limitations associated with undertaking the Appropriate Assessment will, therefore, be discussed. The integrity test will take into account the precautionary principle which requires the competent authority to demonstrate that the plan or project, alone or in combination with other plans and projects, will not have an adverse effect on site integrity, before it may proceed. If there is insufficient information to demonstrate no adverse effect then the plan or project should not go ahead (subject to provision for over-riding public interest).

Consultation

The Appropriate Assessment report will be issued to Natural England, Natural Resources Wales (if appropriate) and the Environment Agency for comment. It is recommended that the Appropriate Assessment report is agreed with and signed-off by these parties to bolster its provenance at any potential future Public Inquiry or hearing. The Appropriate Assessment may also aid the Environment Agency/ Secretary of State /Welsh Ministers when carrying out the Appropriate Assessment of any future drought permit/order applications. The report could also be used as the basis of wider consultation, should that be required.

Inclusion of drought options in the Drought Plan

The findings of Appropriate Assessment and the SEA will inform revision and selection of final options to be included in UU's Final Drought Plan. Where an Appropriate

[30] Defra Circular 01/2005.

Assessment of a drought option concludes that effects on site integrity cannot be ruled out, the drought option should only be included in the Final Drought Plan subject to the provisions in respect of there being no alternative solutions and imperative reasons of overriding public interest and the adoption of suitable compensatory measures (Article 6(4) of the Habitats Directive).

4.3 CONSULTATION ON THE HRA SCREENING REPORT

The HRA Screening Report was be consulted upon alongside UU's Draft Drought Plan 2016.

This report has identified only one option as requiring Appropriate Assessment, i.e. Ennerdale Water. This was prepared and consulted on in 2013/14[31].

[31] Cascade Consulting (2014) Appropriate Assessment of Ennerdale Water Drought Order – final report. Prepared by Cascade Consulting for United Utilities. April 2014.

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 maintenance	Activity Ref (see Table A2)
Integrated Resource Zone												
Belle Vale	Diversion to Netherly borehole.		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	3No. borehole pumps rated at 1 Ml/d each, 150m total of borehole rising main,	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 maintenance	Activity Ref (see Table A2)
	new M&E starter panel equipment for 3 borehole pumps											
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						X	X				7,8

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 maintenance	Activity Ref (see Table A2)
	filter plant at the front of the works											

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

Activity Ref	Activity	Scope	Traffic	Materials
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
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

Activity Ref	Activity	Scope	Traffic	Materials
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 -TBC HGV visits Concrete delivery: 6 - TBC HGV visits Pipe/fittings delivery: 12 –TBC visits	

APPENDIX B

ENVIRONMENT AGENCY DROUGHT MANAGEMENT OPTION FORMS

Environment Agency Drought Plan Guideline: Demand-Side Drought Management Actions

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 Actions

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		
Environmental 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

EUROPEAN DESIGNATION SUMMARIES

Site Name	Reason for Designation	Site Vulnerability
Asby Complex Moss SAC	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)** (* important orchid sites) Asby contains extensive examples of CG9 Sesleria albicans – *Galium sterneri* grassland in south Cumbria on Carboniferous Limestone hills at altitudes between 230 and 470 m. The grassland occurs in a mosaic with a wide range of other habitats, including 8240 limestone pavements, 7230 alkaline fens, 6410 Molinia meadows and 4030 European dry heaths. A number of rare species are associated with the sub-montane semi-natural dry grassland, including bird's-foot sedge Carex ornithopoda and dwarf milkwort Polygala amarella. **6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)** Asby is one of three sites in northern England selected for Molinia meadows, and contains examples of M26 *Molinia caerulea – Crepis paludosa* mire. The community occurs in extensive pastures in association with 7230 alkaline fen and 6210 semi-natural dry grassland communities, as well as locally in hydroseral transitions on lake margins. **7220 Petrifying springs with tufa formation (Cratoneurion) * Priority feature** Asby is one of three sites selected on Carboniferous limestone in northern England. Sunbiggin Tarn and Moors is considered to be the most important site in Britain for petrifying springs with tufa formation, owing to the extent of the habitat type and the degree of conservation of spring-head structures. Nearby, Crosby Gill has areas of tufa with transitions to 7230 Alkaline fens and holds good populations of alpine bartsia *Bartsia alpina*. Large tufa mounds formed around spring-heads are frequent. There are transitions to a range of 7230 Alkaline fens, calcareous grasslands and acid heath. **7230 Alkaline fens** Asby is one of two upland sites in northern England where there are extensive flushes of M10 *Carex dioica – Pinguicula vulgaris* mire amidst moorland and grassland. An important example in the fen SAC series of hydroseral fen community occurs on the lake margins in the vicinity of Sunbiggin Tarn. There are also lake-side transitions to reedswamp vegetation. Away from the lake the site has an exceptionally rich flora and contains a number of rare and local northern plant species, such as bird's-eye primrose Primula farinosa. **8240 Limestone pavements * Priority feature**	Limestone pavements have been extensively damaged in the past for supply of decorative rockery stone. The damage has been reduced in recent years by protective Limestone Pavement Orders. Unauthorised damage still continues as a minor and local problem. Asby Complex cSAC suffers from overgrazing. The limestone pavement flora and the dry heathland are particularly affected, though the fen and spring habitats appear tolerant of the grazing levels. Management agreements are being sought but may be difficult to achieve on common land. There has been some agricultural pressure on the fen and tufa springs but damage from drainage and fertiliser application is being addressed through management agreements on some parts of the site

Site Name	Reason for Designation	Site Vulnerability
	Asby is one of four sites representing Limestone pavements in the north of England. It has been selected because of its size and its well-developed flora of species typical of more montane pavements and sheep-grazed pastures. Most of the pavements contain dog's mercury *Mercurialis perennis* and wall lettuce *Mycelis muralis*, but in the main the herb flora is restricted, perhaps reflecting exposure to grazing sheep over many decades. The grikes provide a niche for a varied assemblage of ferns. Green spleenwort *Asplenium viride*, wall-rue *Asplenium ruta-muraria*, maidenhair spleenwort *Asplenium trichomanes*, brittle bladder-fern Cystopteris fragilis, male-fern Dryopteris filix-mas, hard shield-fern *Polystichum aculeatum* and hart's-tongue *Phyllitis scolopendrium* occur in most pavements, with limestone fern Gymnocarpium robertianum and rigid buckler-fern *Dryopteris submontana* in some pavements. Where grazing is less intensive, the flora is more diverse and trees and shrubs grow beyond the confines of the grikes. **1013 Geyer`s whorl snail Vertigo geyeri** Sunbiggin Tarn represents Geyer's whorl snail *Vertigo geyeri* in north-west England. It supports a large population of this species in upland calcareous flushes with a rich assemblage of arctic-alpine plants. **1393 Slender green feather-moss Drepanocladus (Hamatocaulis)** vernicosus Sunbiggin Tarn is an upland locality in north-west England supporting slender green feather-moss *Drepanocladus vernicosus*. The site contains a large population of this species in extensive upland flush systems and wet calcareous sedge fen on Carboniferous limestone. D. vernicosus grows here with black bog-rush Schoenus nigricans and the liverwort *Leiocolea bantriensis*. **<u>Qualifying Features</u>** **3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.** **4030 European dry heaths** **7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* * Priority feature**	
Berwyn and South Clwyd Mountains SAC	***<u>Primary Habitats and Species</u>*** **4030 European dry heaths -** Berwyn contains the largest stands of upland European dry heath in Wales and consists principally of NVC type H12 *Calluna vulgaris – Vaccinium myrtillus* heath, with frequent crowberry *Empetrum nigrum* and occasional cowberry *Vaccinium vitis-idaea*. Other heath vegetation present includes areas of H18	The blanket bog, heaths, fens, and grasslands have been threatened by inappropriate agricultural development including drainage, reseeding, application of fertilisers, burning, track construction and the adoption of damaging grazing regimes. Some areas of grassland and heath are also threatened by the encroachment of bracken.

Site Name	Reason for Designation	Site Vulnerability
	Vaccinium myrtillus – Deschampsia flexuosa heath and in some areas stands of damp H21 *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heath. **7130 Blanket bogs***Priority feature* - Berwyn supports the most extensive tract of near-natural blanket bog in Wales and is dominated by NVC type M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire, with crowberry *Empetrum nigrum*. and extensive hypnoid moss cover. There are smaller stands of M18 *Erica tetralix – Sphagnum papillosum* mire on deeper peats, some of which exhibit distinctive surface patterning. ***Qualifying Features*** **6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia)** **7140 Transition mires and quaking bogs** **8120 Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)** **8210 Calcareous rocky slopes with chasmophytic vegetation**	These problems are being addressed successfully by means of management agreements with owners and occupiers and through joint agreements with the Tir Gofal scheme. Local tourist pressure and damage by recreational vehicles can cause erosion problems. This is being addressed by visitor management and wardening as well as positive management works of vegetation reinstatement on eroded areas.
Berwyn SPA	**Article 4.1** During the breeding season, the site regularly supports *Circus cyaneus, Falco columbarius, Falco peregrinus, Milvus milvus*.	The breeding habitats of the hen harrier, merlin, red kite and peregrine are threatened by inappropriate agricultural operations such as drainage and reseeding, application of fertilisers and the adoption of damaging grazing regimes. These problems are being addressed successfully by means of management agreements with owners and occupiers and through joint agreement via the Tir Cymen Scheme, an agri-environment scheme. The breeding productivity of the ground nesting hen harriers and merlins is vulnerable to high levels of predation by species such as the fox and carrion crow. Landowners are encouraged to use appropriate measures to control pest species. All the qualifying species are vulnerable to human persecution, by disturbance or destruction of nests, eggs or young; as well as illegal killing of adult birds. Liaison with owners, the police and the Royal Society for the Protection of Birds, as well as improving public understanding is attempting to address this problem.
Lake District High Fells SAC	**Primary Habitats and Species** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea** Lake District High Fells has many upland tarns throughout, representing the habitat type in the uplands of north-west England. The	The European habitats on this site, other than acidic scree, are threatened by grazing and more locally grazing combined with visitor pressure. A very high proportion of the site occurs on unfenced common land where control of grazing is difficult to achieve and pressure of sheep threatens to destroy or prevent favourable condition from being achieved. These pressures

Site Name	Reason for Designation	Site Vulnerability
	tarns are typically species-poor, but species occurring throughout include water-starwort *Callitriche hamulata*, quillwort *Isoetes lacustris*, shoreweed *Littorella uniflora*, water lobelia *Lobelia dortmanna* and floating bur-weed *Sparganium angustifolium*. Awlwort *Subularia aquatica*, a locally rare species, occurs in Sprinkling and Styhead Tarns (Scafell Pikes), Dock and Blea Tarns (Armboth Fells). The rare powan *Coregonus lavaretus* (locally called 'schelly') occurs in Red Tarn in Helvellyn and Fairfield. **4010 Northern Atlantic wet heaths with Erica tetralix** Lake District High Fells is representative of wet heath in the uplands of north-west England. The habitat generally occurs throughout the complex in a mosaic of other habitats such as **7130 Blanket bogs** and **4030 European dry heaths**. Armboth Fells, Shap Fells, Skiddaw Group and the Buttermere Fells have good examples of M15 *Scirpus cespitosus – Erica tetralix* wet heath characteristic of the north and west. Shap Fells also has an area of M16 *Erica tetralix – Sphagnum compactum* wet heath. Heather *Calluna vulgaris* is dominant, with cross-leaved heath *Erica tetralix* and *Sphagnum* species. Purple moor-grass *Molinia caerulea* can be locally abundant. **4030 European dry heaths** The Lake District High Fells complex is representative of European dry heaths in north-west England. The site comprises of acidic rocks, predominantly of the Borrowdale Volcanic Series and Skiddaw Slates. Dry heath occurs throughout the site, and it is very extensive on a number of component SSSI such as Buttermere Fells, Skiddaw Group, Armboth Fells and to a lesser extent Pillar and Ennerdale Fells. Smaller areas are found throughout the other sites. The principal NVC types present is H12 *Calluna vulgaris – Vaccinium myrtillus* heath, however at higher altitudes the subalpine H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath is present. There are good transitions to **4060 Alpine and Boreal heaths** and grasslands on many sites. Smaller amounts of H9 *Calluna vulgaris – Deschampsia flexuosa* and H10 *Calluna vulgaris – Erica cinerea* heath and H21 *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heath are found at Scafell Pikes and Pillar and Ennerdale Fells. Heather *Calluna vulgaris* and locally bilberry *Vaccinium myrtillus* are the dominant species present. Associated species include cowberry *V. vitis-idaea*, and locally bearberry *Arctostaphylos uva-ursi* and crowberry *Empetrum nigrum*. Pillar and Ennerdale Fells is bryophyte-rich with a number of oceanic species present including *Anastrepta orcadensis*, *Herbertus aduncus*, *Bazzania tricrenata*, *Lepidozia pearsonii* and *Ptilidium ciliare* in	have been significantly reduced over much of the site by entry into the Lake District ESA scheme, but this largely only slows or possibly arrests decline. Siliceous scree is possibly the least-threatened habitat and is widespread, albeit in a modified state.

Site Name	Reason for Designation	Site Vulnerability
	higher altitude dry heath. Dwarf juniper *Juniperus communis* ssp. *nana* is found in some of the heaths on Buttermere Fells. **4060 Alpine and Boreal heaths** Alpine and boreal heaths form an important component of the Lake District High Fells. Whilst they cannot be compared to those of the Scottish Highlands in terms of diversity and development they are an important geographical element, representing some of the most southerly examples of this vegetation type in Britain. The main NVC type present is H19 *Vaccinium myrtillus – Cladonia arbuscula* heath, a very local type south of Scotland. H19 tends to occur on the steeply-sloping, less-exposed ground below some of the summits of the Fells, mainly within the Buttermere Fells and Skiddaw Group. There are good transitions to the subalpine heath community H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath and at lower altitudes to H12 *Calluna vulgaris – Vaccinium myrtillus* heath, as well as to U10 *Carex bigelowii – Racomitrium lanuginosum* alpine grasslands on the summits. **5130 Juniperus communis formations on heaths or calcareous grasslands** The Lake District High Fells represents *Juniperus communis* formations on upland acid substrates in north-west England. Three of the component upland SSSIs have extensive areas of juniper *Juniperus communis*, whilst scattered juniper occurs on many of the inaccessible cliffs and slopes throughout the complex. The NVC type is W19 *Juniperus communis* ssp. communis – *Oxalis acetosella* juniper woodland. Birk Fell supports the most extensive stand of juniper in the Lake District. The juniper is associated with open silver birch *Betula pendula* woods with scattered rowan *Sorbus aucuparia*, ash *Fraxinus excelsior*, bird cherry *Prunus padus*, holly *Ilex aquifolium*, hawthorn *Crataegus monogyna* and dog rose *Rosa canina*. Bracken *Pteridium aquilinum* or fescue – bent grassland with bryophytes and wood sorrel *Oxalis acetosella* predominate over the woodland floor, although locally there are richer areas. There are good transitions to upland oak woodland and upland habitats such as dry heath and blanket bog. Helvellyn and Fairfield and Skiddaw Group support extensive stands of juniper. Associated species here include ash *F. excelsior*, sessile oak *Quercus petraea*, birch *B. pendula* and rowan *S. aucuparia*. The ground flora is either *Nardus – Festuca – Agrostis* grassland or dry heath. **6150 Siliceous alpine and boreal grasslands**	

Site Name	Reason for Designation	Site Vulnerability
	Siliceous alpine and boreal grasslands are widely distributed through the Lake District High Fells above 700 m. The acidic rocks are of the Borrowdale Volcanic series and Skiddaw Slates. Some of the summits (particularly Helvellyn and Skiddaw) have frequent areas of disturbed ground due to frost-heave and solifluction. The NVC type present is the species-poor U10 *Carex bigelowii – Racomitrium lanuginosum* moss-heath. Wavy hair-grass *Deschampsia flexuosa* and sheep's fescue *Festuca ovina* dominate the sward, with bilberry *Vaccinium myrtillus*, woolly fringe-moss *Racomitrium lanuginosum*, stiff sedge *Carex bigelowii*, fir clubmoss *Huperzia selago* and the lichens *Cladonia uncialis*, *C. coccifera*, *C. squamosa*, *C. subcervicornis*, *Cornicularia aculeata* and *Cetraria islandica*. Dwarf willow *Salix herbacea*, *R. lanuginosum* and alpine clubmoss *Diphasiastrum alpinum* can be locally abundant, the latter particularly where there is late snow-lie. **6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels** This site is representative of **hydrophilous tall herb fringe communities** in England. Although the communities are not as rich in species as high-altitude sites in the Scottish Highlands, a representative montane flora is present including a number of rare arctic-alpine species. The Lake District High Fells include the largest continuous areas of land above 760 m in the Lake District. Rocks of the Borrowdale Volcanic Series form the underlying geology of much of the area. Although these rocks are generally acidic, many cliffs are particularly rich in base minerals and weather to produce pockets of fertile soil. Many of the high-altitude gills also support this vegetation type. It is these areas of moist, basic soils that support species-rich tall herb vegetation. It is these areas of moist, basic soils that support species-rich tall herb vegetation. Tall herb ledge communities are mainly found in Helvellyn and Fairfield (probably one of the most important areas in England for calcareous montane flora found on the extensive cliff ledges), Honister Crag, Scafell Pikes, Pillar and Ennerdale Fells and Wasdale Screes, with scattered species rich ledges elsewhere. The tall herb communities are characterised by wood crane's-bill *Geranium sylvaticum*, wild angelica *Angelica sylvestris*, water avens *Geum rivale*, and globeflower *Trollius europaeus*. Often associated with these ledges but also found on the bare outcrops and ledges are many montane and northern species such as roseroot *Sedum rosea* and mountain sorrel *Oxyria digyna*. Scarcer plants that occasionally occur throughout include alpine saw-wort *Saussurea alpina*, alpine meadow rue *Thalictrum alpinum*. The gill ledges support	

Site Name	Reason for Designation	Site Vulnerability
	a wide range of ferns including lemon-scented fern *Oreopteris limbosperma*, beech fern *Phegopteris connectilis* and oak fern *Gymnocarpium dryopteris*. A number of rare arctic-alpine species occur, including alpine cinquefoil *Potentilla crantzii* and alpine meadow grass *Poa alpina*, black alpine sedge *Carex atrata* and alpine saxifrage Saxifraga *nivalis* at Helvellyn and Fairfield. Buttermere Fells is also a locality for the rare alpine catchfly *Lychnis alpina*. **7130 Blanket bogs (* if active bog)** Lake District High Fells represents **blanket bog** in north-west England. Blanket bogs are generally scarce in the cSAC as there is so little flat land where peat can form; however there are relatively extensive areas of blanket bog in a number of the component SSSI (Armboth Fells, Shap Fells and Skiddaw Group) with smaller areas in Buttermere Fells and Birk Fell. The main NVC type present is M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire but M18 *Erica tetralix – Sphagnum papillosum* raised and blanket bog is also present at Shap Fells and M17 *Scirpus cespitosus – Eriophorum vaginatum* blanket mire is found in Buttermere Fells. Much of the bog is dominated by heather *Calluna vulgaris* and hare's-tail cottongrass *Eriophorum vaginatum* with varying amounts of cross-leaved heath *Erica tetralix*, deer-grass *Trichophorum cespitosum* and crowberry *Empetrum nigrum*. There are often carpets of *Sphagnum* and *Sphagnum*-filled hollows with species such as *S. papillosum* and *S. magellanicum*. Other species found locally in the bogs include bog rosemary *Andromeda polifolia* and cloudberry *Rubus chamaemorus*, particularly on the higher ground. On some bogs purple moor grass *Molinia caerulea* and bog myrtle *Myrica gale* can be locally abundant and are typical of bogs in the western part of their range. The site also has transitions to many other upland habitats including dry heath, rock and lake habitats. **8110 Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)** This complex is representative of **siliceous scree** communities found at high altitude in north-west England. The site has the most extensive development of screes with parsley fern *Cryptogramma crispa* in the UK. The main rock, the Borrowdale Volcanic Series (but more locally Skiddaw Slates), varies much in base-status, but the screes are chiefly base-poor. Siliceous screes are one of the most extensive habitats within the Lake District High Fells, covering large areas on moderately steep ground, always interspersed with other habitats. The screes vary from recently-formed loose scree in lower sections of gullies and below	

Site Name	Reason for Designation	Site Vulnerability
	cliffs to stable areas colonised by grasses, bryophytes and ferns. The main scree NVC type present is U21 *Cryptogramma crispa – Deschampsia flexuosa* community. It is found throughout the complex, but major scree areas occur in Wasdale Screes, Helvellyn and Fairfield, Buttermere Fells, Scafell Pikes, Pillar and Ennerdale Fells and Skiddaw Group. The communities are well-developed and diverse with a wide range of characteristic species, including an abundance of parsley fern *Cryptogramma crispa* with associated species such as alpine lady's mantle *Alchemilla alpina*, stone bramble *Rubus saxatilis*, heath bedstraw *Galium saxatile*, sheep's fescue *Festuca ovina* and common bent *Agrostis capillaris*. Lemon-scented fern *Oreopteris limbosperma* is also found on the screes within Pillar and Ennerdale Fells. Bryophytes such as woolly hair-moss *Racomitrium lanuginosum*, *R. fasciculare*, *Rhytidiadelphus loreus* and *R. squarrosus* can be frequent. The screes provide a suitable microclimate for many oceanic moss and liverwort species such as *Scapania ornithopiodes* and *Kiaeria starkei*, found in Helvellyn and Fairfield. **8220 Siliceous rocky slopes with chasmophytic vegetation** Lake District High Fells represent high-altitude siliceous slopes with chasmophytic vegetation in northern England. These communities are found throughout the complex, but predominantly in Helvellyn and Fairfield, Wasdale Screes, Scafell Pikes, Pillar and Ennerdale Fells, Honister Crag, Buttermere Fells and Armboth Fells. The communities have developed on long lines of cliffs and coves formed largely of acidic rocks of the Borrowdale Volcanic Series, with considerable amounts of calcite in the eroding gullies. On the predominantly acid crags, there are extensive communities of silicicolous vegetation. The species present are characteristic of north-west England and include alpine lady's mantle *Alchemilla alpina*, starry saxifrage *Saxifraga stellaris* and stiff sedge *Carex bigelowii*. Crevices and wet rock faces support a number of uncommon ferns including green spleenwort *Asplenium viride*, brittle bladder fern *Cystopteris fragilis* and Wilson's filmy fern *Hymenophyllum wilsonii*. Scattered trees on crags include aspen *Populus tremula* and rock whitebeam *Sorbus rupicola*. Wasdale Screes also has many more typical lowland species such as royal fern *Osmunda regalis*. **91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles** This site includes Side Wood, Ennerdale, an example of **old sessile oak woods** with rich bryophyte and lichen communities. There are large tussocks of the moss *Polytrichum strictum* mixed with bog-moss	

Site Name	Reason for Designation	Site Vulnerability
	Sphagnum spp. Birkrigg and Keskadale Oaks and Young Wood are also included within the site. These are on steep south-facing slopes near the altitudinal limit for oak in Cumbria. In Birkrigg and Keskadale bryophytes and lichens are abundant and include species such as *Hedwigia integrifolia*. Birk Fell also includes substantial areas of bryophyte- and fern-rich oak woodland. Notable bryophyte species include *Breutelia chrysocoma*, *Saccogyna viticulosa* and *Pleurozia purpurea*. Fragments of this habitat also occur elsewhere throughout the site, mostly in gills or other areas less accessible to grazing animals. **Qualifying Features** **6230 Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)** **7230 Alkaline fens** **8210 Calcareous rocky slopes with chasmophytic vegetation** **1393 Slender green feather-moss Drepanocladus (Hamatocaulis) vernicosus**	
Manchester Mosses SAC	***Primary Habitats and Species*** **7120 Degraded raised bogs still capable of natural regeneration -** Mossland formerly covered a very large part of low-lying Greater Manchester, Merseyside and southern Lancashire. Most has been converted to agriculture or lost to development, however several examples have survived as degraded raised bog. Past drainage has produced dominant purple moor grass (*Molinia caerulea)*, bracken (*Pteridium aquilinum*) and birch (*Betula spp.*) scrub or woodland, wetter pockets have enabled the peat-forming species to survive.	Manchester Mosses SAC consists of three sites (Risley Moss, Holcroft Moss and Astley and Bedford Mosses). Risley Moss is owned and managed by Warrington Borough Council, while Holcroft Moss is owned and managed by Cheshire Wildlife Trust. Both of these sites are undergoing restoration. Part of Astley and Bedford Mosses is owned and managed by Lancashire Wildlife Trust and is undergoing restoration, but the remainder (approximately 50%) is in private ownership. Management agreements or purchase of the land will be necessary for restoration on these areas. All three sites have suffered from drainage in the past and are affected by continued, if reduced, drainage, particularly from boundary ditches. Agricultural land forms a significant part of the adjacent land on all three sites, which will have implications for restoration, particularly as re-wetting is one of the key requirements. Adjacent land will need to be taken into consideration and possibly placed under suitable management. All three sites are affected by scrub invasion, which is being controlled in some areas but will need further attention. Impacts on groundwater will need to be investigated, such as water abstraction, mineral extraction and waste management (landfill). The sites are located close to heavy industry (Greater

Site Name	Reason for Designation	Site Vulnerability
		Manchester, Merseyside). Air quality may therefore have an impact on Sphagnum regeneration and will need investigating.
Mersey Estuary SPA	**Article 4.1** Over winter the area regularly supports: Golden plover *Pluvialis apricaria* (1.2% of the GB population) **Article 4.2** Over winter the area regularly supports: Norther pintail *Anas acuta* (1.9% of the population), teal *Anas crecca* (2.9% of the population), wigeon *Anas penelope* (4.2% of the population in Great Britain), dunlin *Calidris alpina alpina* (3.6% of the population), black-tailed godwit *Limosa limosa islandica* (1.6% of the population), curlew *Numenius arquata* (1.1% of the population in Great Britain), grey plover *Pluvialis squatarola* (2.3% of the population in Great Britain), great crested grebe *Podiceps cristatus* (1.4% of the population in Great Britain), shelduck *Tadorna tadorna* (2.2% of the population), redshank *Tringa totanus* (2.8% of the population), lapwing *Vanellus vanellus* (0.7% of the population in Great Britain). On passage the area regularly supports: Ringed plover *Charadrius hiaticula* (1.7% of the population in Great Britain), redshank *Tringa totanus* (3.8% of the population)	Wintering bird numbers and associated intertidal flats are robust to day-to-day change. Nevertheless, the estuary is subject to multiple uses; it is heavily industrialised, a substantial urban conurbation, has multiple transport requirements and increasing recreational activities. The site is vulnerable to physical loss through land-claim and development, physical damage caused by navigation capital and maintenance dredging, agricultural requirements, non-physical loss, toxic and non-toxic contamination and biological disturbance by wildfowling. The Special Protection Area status, requirements for Environmental Impact Assessment and the estuary management plan should, however, safeguard the site.
Mersey Estuary Ramsar Site	**Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter 89,576 waterfowl. **Ramsar Criterion 6** Species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: Common shelduck *Tadorna tadorna* (4.2% of the population), black-tailed godwit *Limosa limosa islandica* (5.7% of the population), common redshank *Tringa totanus totanus* (2.6% of the population). Species with peak counts in winter: Eurasian teal *Anas crecca* (2.6% of the population), Northern pintail *Anas acuta* (2% of the GB population), dunlin *Calidris alpina alpina* (3.6% of the population)	No factors adversely affecting the site's ecological character have been reported.
Midland Meres and Mosses Phase 1 Ramsar	**Ramsar Criterion 1** The site comprises a diverse range of habitats from open water to raised bog. **Ramsar Criterion 2** Supports a number of rare species of plants associated with wetlands including five nationally scarce species together with an assemblage of	The site is vulnerable to eutrophication and the introduction/invasion of non-native plant species.

Site Name	Reason for Designation	Site Vulnerability
	rare wetland invertebrates (three endangered insects and five other British Red Data Book species of invertebrates).	
Montgomery Canal SAC	**Primary Species** **1831 Floating water-plantain *Luronium natans*** - This is the largest and the most extensive population of floating water-plantain *Luronium natans* in Britain and is a highly significant lowland population. In favourable management conditions the species can be dominant over kilometre lengths of canal, carpeting the shallow bed and flowering and setting seed in abundance. This is a semi-natural population, having colonised from drift material or seed but needing periodic human disturbance for continued growth; in this respect the canal is a substitute for the species' former slow-moving, mesotrophic river niche, which has been largely destroyed in lowland Britain.	Enrichment through agricultural or domestic nutrient inputs is a likely threat as this could affect the populations of floating water-plantain. Several sections of canal currently suffer from lack of management. CCW will liaise with owners and occupiers to achieve an appropriately scaled and timed management. To ensure that bank protection and other engineering works are undertaken in a sensitive manner, CCW will liaise with competent and relevant authorities to agree on appropriate methods and practices. For example, the mowing of terrestrial and marginal vegetation would not harm aquatic plants but herbicide run-off from the towpath could be a problem. The effects of boat traffic on populations of floating water plantain are uncertain and are being investigated by British Waterways. It is certain that the species will be detrimentally affected above a certain point as the actions of propeller/wash will detach floating leaves and create turbidity which will reduce light transfer to submerged leaves. The population of floating water-plantain is vulnerable to colonisation by aggressive species which can have an impact on the canal's ecology, through blanket coverage of the canal channel and increased nutrient input because of a large leaf biomass. The introduction of certain fish species could also damage aquatic plant populations.
Morecambe Bay SAC	***Primary Habitats and Species*** **1130 Estuaries -** Morecambe Bay in north-west England is the confluence of four principal estuaries, the Leven, Kent, Lune and Wyre. Most of the saltmarshes are grazed, a characteristic feature of north-west England. In the upper levels of the saltmarshes there are still important transitions from saltmarsh to freshwater and grassland vegetation. **1140 Mudflats and sandflats not covered by seawater at low tide –** The largest single area of continuous intertidal mudflats and sandflats in the UK and the best example of muddy sandflats on the west coast. **1160 Large shallow inlets and bays** - A large, very shallow, predominantly sandy bay. Mobile sediments support a range of community types, from those typical of open coasts (mobile, well-sorted fine sands), through to sheltered sandy sediments to low-salinity sands and muds in the upper reaches. Common species include large	There is a wide range of pressures on Morecambe Bay but the site is relatively robust and many of these pressures have only slight or local effects on its interests. The interests depend largely upon the coastal processes operating within the Bay, which have been affected historically by human activities including coastal protection and flood defence works. Opportunities to reverse coastal squeeze are being explored. The saltmarsh is traditionally grazed and is generally in favourable condition for its bird interest. Most of the saltmarsh is utilised by breeding, wintering and migrating birds for feeding, roosting and nesting purposes. Positive management is being secured through NGO reserve management plans, Natural England's Site Management Statements and Coastal Wildlife Enhancement Scheme, the European Marine Site Management Schemes for the Duddon Estuary and Morecambe Bay, and the Duddon Estuary and Morecambe Bay

Site Name	Reason for Designation	Site Vulnerability
	beds of mussels (*Mytilus edulis*) on exposed 'scars' of boulder and cobble. **1170 Reefs** with fucoid algal communities and other associated fauna on tide-swept pebbles and cobbles at the southern end of Walney Channel. **1220 Perennial vegetation of stony banks -** Walney Island on the shores of Morecambe Bay is a barrier island fringed by shingle with a partial sand covering. Two areas of exposed vegetated shingle occur at the extremes of the barrier. Common species include Perennial rye-grass (*Lolium perenne*), common chickweed *(Stellaria media)* and biting stonecrop (*Sedum acre*) and more unusually, but still importantly, dove's-foot crane's-bill (*Geranium molle*). **1310 Salicornia and other annuals colonising mud and sand –** There are two types of pioneer saltmarsh in Morecambe Bay. Pioneer glasswort (Salicornia spp.) saltmarsh occurs intermittently along the coastline of the bay and the sea pearlwort (*Sagina maritime*) community occurs in open pans on the upper marsh. **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) –** The majority (1,000 ha) of mid-upper marsh vegetation is saltmarsh-grass/fescue (*Puccinellia/Festuca*) communities. NVC type SM18 *Juncus maritimus* community is more common here than elsewhere in England. Other plant species include both southern elements, *Centaurium pulchellum*, and northern elements, saltmarsh flat-sedge *(Blysmus rufus)*, and few-flowered spike-rush (*Eleocharis quinqueflora)*. **2120 Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`) -** Shifting dune vegetation forms a major component of the active sand dune systems at the entrance to Morecambe Bay. In some areas, transitions to **2010 Embryonic Shifting Dunes** are observed. Common species include sea holly (*Eryngium maritimum*), sea spurge (*Euphorbia paralias*), Portland spurge (*Euphorbia portlandica*) and sea bindweed (*Calystegia soldanella*). **2130 Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature -** Sandscale Haws at the entrance to the Duddon Estuary supports the largest area of calcareous fixed dunes in Cumbria. There are also several smaller areas of fixed dune across the SAC. Common species include wild pansy (*Viola tricolor*), lady's bedstraw (*Galium verum*), common restharrow (*Ononis repens*) and the uncommon dune fescue (*Vulpia membranacea*) and dune helleborine (*Epipactis dunensis*).	Partnerships. These aim for sustainable use of the site, taking account of other potential threats including commercial fisheries, aggregate extraction, gas exploration, recreation and other activities.

Site Name	Reason for Designation	Site Vulnerability
	2190 Humid dune slacks – These areas support a high variety of vegetation communities and have a rich diversity of species, including some uncommon species such as marsh helleborine (*Epipactis palustris*), dune helleborine (*Epipactis dunensis*) and coralroot orchid (*Corallorhiza trifida).* **1166 Great crested newt (*Triturus cristatus)* -** The Duddon estuary in north-west England, consists of a large sand dune system with both permanent and ephemeral waterbodies and man-made scrapes present. Breeding colonies of great-created newts are known in approximately 20 of these ponds, and are believed to utilise 200 ha of the 282 ha site. ***Qualifying Features*** **1110 Sandbanks which are slightly covered by sea water all the time** **1150 Coastal lagoons* *Priority feature*** **1170 Reefs** **2110 Embryonic shifting dunes** **2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)* *Priority feature*** **2170 Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*)**	
Morecambe Bay SPA	**Article 4.1** Over winter the site supports Bar-tailed godwit (*Limosa lapponica)* and Golden plover (*Pluvialis apricaria).* During breeding season the site supports Little tern (*Sterna albifrons)* and Sandwich tern (*Sterna sandvicensis).* **Article 4.2** Over winter the site supports Curlew (*Numenius arquata),* Dunlin (*Calidris alpina alpine),* Grey plover (*Pluvialis squatarola),* Knot (*Calidris canutus),* Oystercatcher (*Haematopus ostralegus),* Pink-footed goose (*Anser brachyrhynchus),* Pintail (*Anas acuta),* Redshank (T*ringa tetanus),* Shelduck (*Tadorna tadorna)* and Turnstone (*Arenaria interpres)* and on passage Ringed plover *(Charadrius hiaticula*) and Sanderling *(Calidris alba*). During breeding season the site supports Herring gull (*Larus argentatus)* and Lesser black-backed gull (*Larus fuscus).* The site regularly supports important assemblages of at least 20,000 waterfowl and 20,000 seabirds.	The site is subject to a wide range of pressures such as land-claim for agriculture, overgrazing, dredging, overfishing, industrial uses and unspecified pollution. However, overall the site is relatively robust and many of those pressures have only slight to local effects and are being addressed thorough Management Plans. The breeding tern interest is very vulnerable and the colony has recently moved to the adjacent Duddon Estuary. Positive management is being secured through management plans for non-governmental organisation reserves, Natural England Site Management Statements, European Marine Site Management Scheme, and the Morecambe Bay Partnership.
Morecambe Bay Ramsar site	**Ramsar Criterion 4**	The site is subject to a wide range of pressures such as land-claim for agriculture, overgrazing, dredging, overfishing,

Site Name	Reason for Designation	Site Vulnerability
	The site is a staging area for migratory waterfowl including internationally important numbers of passage ringed plover (*Charadrius hiaticula*). **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 6** During breeding season, the site supports populations of Lesser black-backed gull (*Larus fuscus graellsii*), Herring gull (*Larus argentatus argentatus*) and Sandwich tern (*Sterna*). Over winter the site supports populations of Great crested grebe (*Podiceps cristatus Cristatus*), Pink-footed goose (*Anser brachyrhynchus*), Eurasian wigeon (*Anas Penelope*), Common goldeneye (*Bucephala clangula clangula*), Red-breasted merganser (*Mergus serrator*), European golden plover (*Pluvialis apricaria apricaria*), Northern lapwing (*Vanellus vanellus*), Red knot (*Calidris canutus islandica*), Dunlin (*Calidris alpina alpine*) and Bar-tailed godwit (*Limosa lapponica lapponica*). Over Spring/Autumn, the site supports populations of Great cormorant (*Phalacrocorax carbo carbo*), Common shelduck (*Tadorna tadorna*), Northern pintail (*Anas acuta*), Common eider (*Somateria mollissima mollissima*), Eurasian oystercatcher (*Haematopus ostralegus ostralegus),* Ringed plover (*Charadrius hiaticula*), Grey plover (*Pluvialis squatarola*), Sanderling (*Calidris alba*), Eurasian curlew (*Numenius arquata arquata*), Common redshank (*Tringa totanus tetanus*), Ruddy turnstone (*Arenaria interpres interpres*) and Lesser black-backed gull (*Larus fuscus graellsii*).	industrial uses and unspecified pollution. However, overall the site is relatively robust and many of those pressures have only slight to local effects and are being addressed thorough Management Plans. The breeding tern interest is very vulnerable and the colony has recently moved to the adjacent Duddon Estuary. Positive management is being secured through management plans for non-governmental organisation reserves, Natural England Site Management Statements, European Marine Site Management Scheme, and the Morecambe Bay Partnership.
North Pennine Moors SAC	**4030 European dry heaths** The North Pennine Moors (along with the North York Moors) hold much of the upland heathland of northern England. At higher altitudes and to the wetter west and north of the site complex, the heaths grade into extensive areas of **7130 blanket bogs**. The most abundant heath communities are H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. There are also examples of H18 *Vaccinium myrtillus – Deschampsia flexuosa*, H10 *Calluna vulgaris – Erica cinerea* and H21 *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heaths. **5130 *Juniperus communis* formations on heaths or calcareous grasslands**	All interest features have been affected by excessive livestock grazing levels across parts of the site. These have been, and are still, encouraged by headage payments, but agreements with graziers and moorland owners, including those in Wildlife Enhancement and Countryside Stewardship schemes, are starting to overcome the problems of overgrazing. In places, the difficulty of reaching agreements on commons, which cover much of the site, means that successes are limited at present, and continues to prevent restoration. Drainage of wet areas can also be a problem; drains have been cut across many areas of blanket bog, disrupting the hydrology and causing erosion, but in most parts these are being blocked and the habitat restored under agreements. Burning is a traditional

Site Name	Reason for Designation	Site Vulnerability
	The North Pennine Moors includes one major stand of juniper scrub in Swaledale as well as a number of small and isolated localities. The Swaledale site grades into heathland and bracken *Pteridium aquilinum* but the core area of juniper is of W19 *Juniperus communis – Oxalis acetosella* woodland with scattered rowan *Sorbus aucuparia* and birch *Betula* spp. **7130 Blanket bogs** The North Pennine Moors hold the major area of blanket bog in England. A significant proportion remains active with accumulating peat, although these areas are often bounded by sizeable zones of currently non-active bog, albeit on deep peat. The main NVC type is M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire, but there is also representation of M18 *Erica tetralix – Sphagnum papillosum* blanket mire and some western localities support M17 *Scirpus cespitosus – Eriophorum vaginatum* blanket mire. Forms of M20 *Eriophorum vaginatum* blanket mire predominate on many areas of non-active bog. **7220 Petrifying springs with tufa formation (*Cratoneurion*)** The petrifying spring's habitat is very localised in occurrence within the North Pennine Moors, but where it does occur it is species-rich with abundant bryophytes, sedges and herbs including bird's-eye primrose *Primula farinosa* and marsh valerian *Valeriana dioica*. **8220 Siliceous rocky slopes with chasmophytic vegetation** Acidic rock outcrops and screes are well-scattered across the North Pennine Moors and support vegetation typical of Siliceous rocky slopes with chasmophytic vegetation in England, including a range of lichens and bryophytes, such as *Racomitrium lanuginosum*, and species like stiff sedge *Carex bigelowii* and fir clubmoss *Huperzia selago*. **91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles** Birk Gill Wood is an example of old sessile oak woods well to the east of the habitat's main distribution in the UK. However, this sheltered river valley shows the characteristic rich bryophyte and lichen communities of the type under a canopy of oak, birch *Betula* sp. and rowan *Sorbus aucuparia*. The slopes are boulder-strewn, with mixtures of heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus* and moss carpets in the ground flora. **4010 Northern Atlantic wet heaths with *Erica tetralix*** (qualifying feature but not primary reason for selection)	management tool on these moorlands, which contributes to maintaining high populations of SPA breeding birds. However, over-intensive and inappropriate burning is damaging to heath and blanket bog and further agreements are needed with the landowners to achieve sympathetic burning regimes. Restoration, to some degree, of a mosaic of more natural habitats across parts of the site is desirable. Acid and nitrogen deposition continue to have damaging effects on the site.

Site Name	Reason for Designation	Site Vulnerability
	6130 Calaminarian grasslands of the *Violetalia calaminariae* (qualifying feature but not primary reason for selection) **6150 Siliceous alpine and boreal grasslands** (qualifying feature but not primary reason for selection) **6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)** (qualifying feature but not primary reason for selection) **7230 Alkaline fens** (qualifying feature but not primary reason for selection) **8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)** (qualifying feature but not primary reason for selection) **8210 Calcareous rocky slopes with chasmophytic vegetation** (qualifying feature but not primary reason for selection) **1528 Marsh saxifrage (*Saxifraga hirculus*)** (qualifying feature but not primary reason for selection)	
North Pennine Moors SPA	**Article 4.1** During the breeding season the area regularly supports: Hen harrier *Circus cyaneus* (2.2% of GB breeding population) Merlin *Falco columbarius* (10.5% of GB breeding population) Peregrine falcon *Falco peregrinus* (1.3% of GB breeding population) Golden plover *Pluvialis apricaria* (6.2% of GB breeding population)	The North Pennine Moors covers nearly 150,000 hectares and is largely heather moorland, either as blanket bog or drier heathland, with smaller associated areas of wetland, grassland, bracken, scrub, woodland and cliff. The habitats and qualifying breeding bird populations are mostly dependent upon stock grazing and burning at sympathetic levels. The continuation of these practices relies on their profitability, including any subsidy or incentive payments. Over-grazing, over-burning and other forms of intensive agricultural or sporting management (e.g. drainage) may be damaging. These issues are being partly addressed through management agreements and related incentives. Further legislation relating to Common land and reform of The Common Agricultural Policy would achieve sustainable solutions. Recreational activity may be problematic but is addressed through Site Management Statements and through continuing working with Local Authorities to manage access. There is evidence that acidic and nitrogen deposition are having damaging effects on the vegetation and hence on the bird populations. Such issues are being addressed through existing pollution control mechanisms. Within this large site there is

Site Name	Reason for Designation	Site Vulnerability
		scope to enhance many of the more natural habitats and species whilst maintaining the core SPA interests.
Peak District Moors (South Pennine Moors Phase 1) SPA	**Article 4.1** During the breeding season, the site regularly supports *Asio flammeus, Falco columbarius* and *Pluvialis apricaria* (North-western Europe - breeding)	Major urban and industrial centres near to the Peak District Moors provide significant visitor pressure and approximately two-thirds of the moorlands are open to public access. Habitat damage through physical erosion or fire, combined with disturbance of breeding birds, can be significant. Initiatives for sustainable recreation are being developed. Many habitats are sub-optimal (in vegetation terms) as a consequence of historic air pollution, high grazing pressure and wildfire burns. Grazing pressure is generally being lowered and appropriate burning encouraged by two separate ESAs which encourage and support habitat restoration. Notwithstanding these schemes, evidence suggests that breeding birds in the south-west of the area may be declining on both open moorland and enclosed rough grazing land, possibly due to general agricultural improvement of the surrounding areas which are used by some species for some of their habitat requirements e.g. golden plovers feed on in-bye land off the moor. It is also worth noting that the site has been identified as a possible SAC for habitats such as blanket bog and there will be a need to balance the management of the different interests across the whole site.
River Derwent and Bassenthwaite Lake SAC	***Primary Habitats and Species*** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea -** Bassenthwaite Lake is a mesotrophic waterbody, which is unusual in mountain areas. A wide variety of pondweeds (*Potamogeton spp*.) are found along with uncommon species such as autumnal water-starwort (*Callitriche hermaphroditica*) and six-stamened waterwort (*Elatine hexandra*). The lake also supports one of only two surviving UK populations of a rare fish, vendace (*Coregonus albula*). Several sedge species are found along the shingle/gravel shores of the lake, including a local northern species, water sedge (*Carex aquatilis*). On stony shores common spike-rush (*Eleocharis palustris*) is locally abundant amongst species such as globeflower (*Trollius europaeus*), saw-wort (*Serratula tinctoria*) and the nationally rare thread rush (*Juncus filiformis*). **1065 Marsh fritillary butterfly (*Euphydryas (Eurodryas, Hypodryas) aurinia*) –** The largest area *of Molinia caerulea –*	The wildlife of the River Derwent system is dependent upon the maintenance of high water quality, particularly its naturally low level of nutrients. There are problems with sewage, acidification (from rainfall) and pollution with synthetic pyrethroid sheep dips (leading to losses of insect life, the food of the Annex II fish species). Flow regimes and sedimentation patterns in the rivers are important, not least in providing suitable spawning grounds for fish. These are affected by flood defence works and abstraction for water supplies. The management of the land in the catchment is also important. Much of the land is heavily drained for agriculture or forestry, which results in increased run-off. As many of the surrounding hills are ecologically overgrazed, soil erosion can cause high sediment loads in the streams and river entering the lakes. Sediment and nutrients from such sources, as well as possibly point sources, have affected plant communities in the lakes. Phosphorous stripping

Site Name	Reason for Designation	Site Vulnerability
	Potentilla erecta mire habitat in Cumbria supports a moderate sized but stable population of Marsh fritillary butterfly. **1095 Sea lamprey (*Petromyzon marinus*) –** The River Derwent is a high quality oligotrophic river in northern England. High levels of silt and gravels in middle to lower river reaches support a large population of Sea lamprey. **1096 Brook lamprey (*Lampetra planeri*) 1099 River lamprey (*Lampetra fluviatilis*) -** Extensive gravel shoals, good water quality and areas of marginal silt provide the conditions required for both spawning and nursery areas for Brook and River lamprey. **1106 Atlantic salmon (*Salmo salar*) –** The River Derwent is a large oligotrophic river flowing over base-poor geology. Low intensity land use means that water quality is generally good throughout the catchment. This, combined with extensive gravel shoals, provide a suitable breeding site to support a large population of Atlantic salmon. **1355 Otter (*Lutra lutra*) -** The River Derwent and Bassenthwaite Lake provide a range of suitable conditions in an upland environment that are examples of good quality otter (*Lutra lutra*) habitat in north-west England. **1831 Floating water-plantain (*Luronium natans*) –** Bassenthwaite Lake has a large population of this species in extensive, species-rich beds of aquatic macrophytes. They also occur on muddy lake-shores. Bassenthwaite Lake, along with Derwent Water, are the only two known sites for *Luronium* in the Lake District. ***Qualifying Features*** **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**	is being undertaken on part of the site, although it is expected that full recovery may take a decade or more. The above issues are all recognised in the joint Natural England/Environment Agency Conservation Strategy for the river system, and all licensed activities which may be contributing to such problems will be addressed through the review process under the Habitats Regulations.
River Eden SAC	***Primary Habitats and Species*** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea –** Ullswater is the second largest lake in Cumbria and is an example of a relatively deep lake with both oligotrophic and mesotrophic flora and fauna species. The lake has an extremely rich aquatic flora, including eight species of *Potamogeton*. These include various-leaved pondweed (*P. gramineus*), red pondweed (*P. alpinus*) and long-stalked pondweed (*P. praelongus*). The nationally scarce six-stamened waterwort (*Elatine hexandra*) is also found in some of the bays. One of the few populations of powan (*Coregonus lavaretus*) in the UK is supported by Ullswater.	The maintenance of breeding and nursery areas for the species on this site depends on the habitat quality of streams and their margins. Many of the streams within the site suffer from overgrazing of riverbanks and nutrient run-off. This is being addressed by a number of measures, including a conservation strategy with actions to address river quality issues, and a partnership approach to funding habitat improvements. The water-crowfoot communities as well as the species are sensitive to water quality, particularly eutrophication. Again, actions have been identified for getting improvements in water quality and they will be carried forward in the periodic reviews of water company expenditure and reviews of consents under the

Site Name	Reason for Designation	Site Vulnerability
	3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation - The River Eden flows over both calcareous limestone and sandstone, which creates a wide diversity of ecological conditions, ranging from oligotrophic to mesotrophic. This river has 184 recorded plant species, more than any other river in the UK. Species of the river system include stream water-crowfoot (*Ranunculus penicillatus ssp. Penicillatus*) and others, such as *R. penicillatus ssp. pseudofluitans* and river water-crowfoot (*R. fluitans*). **91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* Priority feature –** Along the length of the River Eden, stands of alder (*Alnus glutinosa*) and willow (*Salix spp.*) can be found, associated with backwaters and seasonally-flooded channels. Ground flora includes common nettle (*Urtica dioica*), butterbur (*Petasites hybridus*) and hogweed (*Heracleum sphondylium*) that grade into hollows with greater tussock-sedge (*Carex paniculata*). **1092 White-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes)* –** High water quality in the River Eden allows it to support a large population of White-clawed crayfish. **1095 Sea lamprey (*Petromyzon marinus*) 1096 Brook lamprey (*Lampetra planeri*)** **1099 River lamprey (*Lampetra fluviatilis*) -** An extensive river system on a varied and base-rich geology with highly erodible rock results in extensive areas of gravel and finer silts being deposited throughout the system, which provide suitable conditions for spawning and nursery areas, supporting a large population of Sea, Brook and River lamprey. **1106 Atlantic salmon (*Salmo salar*)** The large river system flowing over varied, base-rich geology, coupled with a large range in altitude, results in the development of distinct habitat types, supporting diverse plant and invertebrate communities. The high ecological value of the River Eden across a large area of the catchment, means a high population of salmon can be supported. **1163 Bullhead (*Cottus gobio*) –** The River Eden is relatively unmodified, in the northern part of its range, with extensive areas of gravel and generally good water quality across the catchment, providing good habitat for bullheads. **1355 Otter (*Lutra lutra*) –** The River Eden is an example of a lowland otter habitats in north-west England.	Habitats Regulations. Practices associated with sheep-dipping pose a potential threat at this site, and are currently under investigation. Much of the alluvial forest cover is fragmented and/or in poor condition. It is hoped to address this through management agreements or Woodland Grant Schemes with individual owners.

Site Name	Reason for Designation	Site Vulnerability
River Ehen SAC	***Primary Habitats and Species*** **1029 Freshwater mussel (*Margaritifera margaritifera*) -** The River Ehen supports the largest freshwater mussel (*Margaritifera margaritifera*) population in England, with population estimates for the entire river exceeding 100,000. The river has high conservation importance due to the presence of juvenile mussels, indicating recruitment since 1990. ***Qualifying Features*** **1106 Atlantic salmon (*Salmo salar*)**	The mussels are likely to be adversely affected by the apparent decline in salmonid fish populations and by major eutrophication of the river from sewage works and agricultural run-off. Water quality issues will be addressed through the review process under the Habitats Regulations and at a catchment level by local Environment Action Plans. Practices associated with sheep-dipping pose a potential threat at this site, and are currently under investigation. Further research is required to determine the extent of any problems arising from pearl fishing. Possible concerns over the flows within the river will also be addressed through reviews of abstraction licences where these are considered to be causing a problem.
River Kent SAC	**Primary Habitats and Species** **1092 White-clawed (or Atlantic stream) crayfish** The Kent is a river of upland character in southern Cumbria. Densities of white-clawed crayfish Austropotamobius pallipes are very high throughout much of the Kent system (particularly in the tributaries), perhaps higher than anywhere else in England. **Qualifying Features** **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation** **1029 Freshwater mussel (*Margaritifera margaritifera*)** **1163 Bullhead**	The maintenance of breeding and nursery areas for the species on this site depends on the habitat quality of streams and their margins. Some areas of the site suffer from poor habitat quality. The intention is to address this through implementation of habitat improvement schemes. The impact of point-discharges on water quality will be reviewed and action proposed where necessary. A particular problem on this site and affecting white-clawed crayfish is incidents of pyrethroid sheep-dip pollution of watercourses. These are currently under investigation. The dwindling population of freshwater mussels needs to be investigated in relation to the factors affecting its recruitment and structure. A management plan will be developed for the part of the catchment supporting this species.
Rixton Clay Pits SAC	***Primary Habitats and Species*** **1166 Great crested newt Triturus cristatus -** The excavation of disused brickworks in glacial boulder clay has left a series of hollows, which have filled with water leading to a variety of pond sizes. New ponds have also been created more recently for wildlife and amenity purposes. Great crested newt (*Triturus cristatus*) are known to occur in at least 20 ponds across the site. The site also supports species-rich grassland, scrub and mature secondary woodland.	The site comprises parts of an extensive disused brickworks quarry excavated in glacial boulder-clay deposits east of Warrington. It is of importance for its calcareous grassland communities and because the site supports a large breeding population of great crested newts. Extraction of clay at different periods up to 1965 has left a mosaic of water-filled hollows and clay banks which now support a diversity of habitats of varying maturity. Warrington Borough Council owns and manages the site, and has a ranger based on-site. A possible conflict between grassland management and great crested newts has been identified. This is being addressed through contract research

Site Name	Reason for Designation	Site Vulnerability
		on the site. However, the great crested newt population is increasing at the site.
Rochdale Canal SAC	***Primary Habitats and Species*** **1831 Floating water-plantain Luronium natans -** The canal has predominantly mesotrophic water and supports a large population of floating water-plantain within a diverse waterplant community containing a wide range of other species such as pondweeds (*Potamogeton spp.*).	This partially restored section of the Rochdale Canal extends approximately 20 km from Littleborough to Failsworth, passing through urban and industrialised parts of Rochdale and Oldham and the intervening areas of agricultural land (mostly pasture). The canal contains important habitats for submerged aquatic plants and emergent vegetation, including extensive colonies of *Luronium natans*. The canal is to be subject to a major restoration scheme to open it up for full navigation from Manchester to Yorkshire, including the SSSI / pSAC section. Natural England is working together with partners to ensure the restoration is sensitively done in order to preserve the interest of the site. However, there are concerns about future boat movements as the possible impacts are not fully known at this stage.
Rostherne Mere Ramsar	**Ramsar Criterion 1** Rostherne Mere is one of the deepest and largest of the meres of the Shropshire-Cheshire Plain. Its shoreline is fringed with common reed *Phragmites australis*.	The site is vulnerable to eutrophication and the introduction/invasion of non-native plant species.
Severn Estuary SAC	***Primary Habitats and Species*** **1130 Estuaries** **1140 Mudflats and sandflats not covered by seawater at low tide** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*e)** **1095 Sea lamprey (*Petromyzon marinus*)** **1099 River lamprey (*Lampetra fluviatilis)*** **1103 Twaite shad (*Alosa fallax*)** ***Qualifying Features*** **1110 Sandbanks which are slightly covered by sea water all the time** **1170 Reefs**	Natura 2000 data form not available from JNCC website. However, within literature (*Severn Estuary SAC, SPA and Ramsar Site: Regulation 33 Advice from CCW and Natural England, June 2009*) the vulnerability of the site to physical, chemical and biological changes is discussed. SAC features such as estuaries, subtidal sandbanks, mudflats and sandflats and Atlantic saltmeadow are highly vulnerable to physical damage from changes in water flow rate, wave exposure and changes in grazing management. Vulnerability to toxic contamination from the introduction of synthetic and non-synthetic compounds is an issue for the site. The site is vulnerable to non-toxic contamination, such as changes in water quality from changes in nutrient loading, salinity and oxygenation. Estuaries, subtidal sandbanks, mudflats and sandflats are vulnerable to the introduction of invasive species and microbial pathogens.
Severn Estuary SPA	**Article 4.1** Over winter the area supports Bewick's swan (*Cygnus columbianus bewickii)*. **Article 4.2**	The conservation of the site features is dependent on the tidal regime. The range is the second highest in the world and the scouring of the seabed and strong tidal streams result in natural erosion of the habitats. As such, the estuary is

Site Name	Reason for Designation	Site Vulnerability
	Over winter the area supports Curlew (*Numenius arquata),* Dunlin (*Calidris alpina alpine),* Pintail (*Anas acuta),* Redshank (*Tringa tetanus),* Shelduck (*Tadorna tadorna)* and on passage Ringed Plover (*Charadrius hiaticula)*. The site regularly supports an important assemblage of at least 20,000 waterfowl.	vulnerable to large scale interference, including that from human actions. These include land-claim, aggregate extraction/dredging, physical developments such as barrage construction flood defences, pollution (industrial, oil spillage), eutrophication and tourism based activities and disturbance. These issues are being addressed through existing control measures and as part of the Severn Estuary Strategy. Since June 1995 the Severn Estuary Strategy has been working towards the sustainable management of the site, through the involvement of local authorities, interested parties and local people. This integrated approach is being further developed in conjunction with the SAC management scheme for the nature conservation interest of the estuary.
Severn Estuary Ramsar Site	**Ramsar Criterion 1** Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities. **Ramsar Criterion 3** Due to unusual estuarine communities, reduced diversity and high productivity. **Ramsar Criterion 4** This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon (*Salmo salar*), sea trout (*S. trutta*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), allis shad (*Alosa alosa*), twaite shad (*A. fallax*) and eel (*Anguilla anguilla*). It is also of particular importance for migratory birds during spring and autumn. **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 6** Over winter the site supports populations of Tundra swan (*Cygnus columbianus bewickii*), Greater white-fronted goose (*Anser albifrons albifrons*), Gadwall (*Anas strepera strepera*), Dunlin (*Calidris alpina alpina*) and Common redshank (*Tringa totanus tetanus*). **Ramsar Criterion 8** The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon (*Salmo salar*), sea trout (*S. trutta*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), allis shad (*Alosa alosa*), twaite shad (*A. fallax*), and eel (*Anguilla anguilla*) use the Severn Estuary as a key migration route to their spawning grounds. The site is important as a	No factors are reported to be adversely affecting the site's ecological character.

Site Name	Reason for Designation	Site Vulnerability
	feeding and nursery ground for many fish species particularly allis shad (*Alosa alosa*) and twaite shad (*A. fallax*).	
Solway Firth SAC	***Primary Habitats and Species*** **1110 Sandbanks which are slightly covered by sea water all the time** The Solway is representative of sublittoral sandbanks on the coast of north-west England/south-west Scotland. Owing to the very dynamic nature of the high energy system, gravel and sands are prominent, with a transition to typical low energy environments in the outer estuary. The dominant species of the infaunal communities comprise different annelid worms, crustaceans, molluscs and echinoderms, depending on the nature of the substrate. **1130 Estuaries** The Solway is a large, complex estuary on the west coast of Britain. It is one of the least-industrialised and most natural large estuaries in Europe. The sediment habitats present are mainly dynamic sandflats and subtidal sediment banks. Sublittoral sediment communities are typically sparse in the inner estuary. Communities become richer towards the outer estuary, where there are less extreme environmental conditions and more varied substrates. The dominant species of bivalve molluscs, polychaete worms, crustaceans and echinoderms vary, depending on location within the estuary. **1140 Mudflats and sandflats not covered by seawater at low tide** The Solway Firth is representative of highly mobile, predominantly sandy intertidal flats on the west coast. It contains the third-largest area of continuous littoral mudflats and sandflats in the UK. The Solway is an unusually dynamic estuarine system, with mobile channels and banks. Salinity ranges from fully marine to estuarine in character, and these gradients in physical conditions add to the ecological diversity within the site. **1310 Salicornia and other annuals colonising mud and sand** The pioneer glasswort Salicornia spp. saltmarsh in the Solway is part of a complete sequence of saltmarsh types, from pioneer communities through extensive mid-to high saltmarsh and transitions to tidal grazing marsh. It represents Salicornia and other annuals colonising mud and sand in north-west England and south-west Scotland. **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** The Solway Firth demonstrates unusually large areas of upper marsh and transitions to freshwater grassland communities. There is a greater	This large site is subject to a number of activities. These include flood defence and coastal erosion work, fishing and shellfisheries (including a cockle fishery which is currently closed to allow stocks to recover), saltmarsh/merse grazing, oil and gas exploration (outwith the site), and industrial development. A management strategy to consider and co-ordinate these activities is being produced by the Solway Firth Partnership. This will set out the means by which it is proposed to secure the sustainable use of the estuary.

Site Name	Reason for Designation	Site Vulnerability
	proportion of sand in the substrate than is found in more southern saltmarshes. The mid-upper marsh is heavily dominated by saltmarsh rush (*Juncus gerardii*) community with smaller areas of the saltmarsh-grass/fescue (*Puccinellia/Festuca*) communities. The site has been selected because of its large size and uninterrupted transitions. Some of the species present, for example sea-purslane (*Atriplex portulacoides*), common sea-lavender (*Limonium vulgareand*) and lax-flowered sea-lavender (*Limonium humile*), are at their northern limit in the UK. **1095 Sea lamprey *Petromyzon marinus*** The Solway Firth provides migratory passage for sea lamprey (*Petromyzon marinus*) to and from spawning and nursery grounds in a number of rivers, including the Eden. **1099 River lamprey *Lampetra fluviatilis*** The Solway Firth provides migratory passage for river lamprey (*Lampetra fluviatilis)* to and from spawning and nursery grounds in a number of rivers, including the Eden. ***Qualifying Features*** **1170 Reefs** **1220 Perennial vegetation of stony banks** **2130 Fixed dunes with herbaceous vegetation (`grey dunes`)*** *Priority feature*	
South Pennine Moors SAC	***Primary Habitats and Species*** **4030 European dry heaths -** upland heath of the South Pennines is strongly dominated by heather (*Calluna vulgaris*). Its main NVC types are H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. More rarely H8 *Calluna vulgaris – Ulex gallii* heath and H10 *Calluna vulgaris – Erica cinerea* heath are found. On the higher, more exposed ground H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath becomes more prominent. The moors also support a rich invertebrate fauna, especially moths, and important bird assemblages. **7130 Blanket bogs***Priority feature* - Hare's-tail cottongrass (*Eriophorum vaginatum*) is often overwhelmingly dominant and the usual bog-building *Sphagnum mosses* are scarce. Where the blanket peats are slightly drier, heather (*Calluna vulgaris*), crowberry (*Empetrum nigrum*) and bilberry (*Vaccinium myrtillus*) become more prominent. The uncommon cloudberry (*Rubus chamaemorus*) is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass (*E. angustifolium*).	The South Pennine Moors SAC is largely enclosed on two sides by large industrial urban areas, which means that large numbers of people use the area for recreational activities. Around two-thirds are within the Peak District National Park. Land management is primarily driven by agriculture, rough grazing for sheep, and grouse-shooting. Access management has been a key issue, and with proposals under the Countryside and Rights of Way Act, will continue as such. Mechanisms for addressing access management issues include a range of flora, research and the role of organisations such as the Peak District National Park and its Ranger Service. Accidental fires can cause extensive damage to vegetation. The National Park Authority has produced a strategic Fire Plan and areas are closed to the public at times of high fire risk. Maintenance of the ecosystems relies primarily on appropriate grazing levels and burning regimes. There are a number of key pressures upon the site; these include overgrazing by sheep,

Site Name	Reason for Designation	Site Vulnerability
	91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles – Located around the fringes of the upland heath and bog of the south Pennines are blocks of old sessile oak woods, usually on slopes. Ground flora such as grasses, dwarf shrubs and ferns are common. Small areas of alder woodland along stream-sides add to the overall richness and diversity of the woods. ***Qualifying Features*** **4010 Northern Atlantic wet heaths with Erica tetralix** **7140 Transition mires and quaking bogs**	burning as a tool for grouse moor management and inappropriate drainage through moor-gripping. All these issues are being tackled, and an integrated management strategy and conservation action programme has been produced as part of an EU funded LIFE project for the area to the north of the National Park. Management of the site, especially north of the National Park, is complicated by the large number of commons. The National Park Authority owns a significant area of moorland, as does the National Trust. Atmospheric pollution over the last few hundred years has depleted the lichen and bryophyte flora and may be affecting dwarf-shrubs. The impact has arguably been greatest on blanket bog, wet heath and transition mire where the bog-building Sphagnum mosses have been largely lost. Combined with historical overgrazing, burning (accidental and deliberate), drainage and locally trampling, large areas of blanket bog have become de-vegetated and eroded. It is unclear at this stage whether the effects are irreversible. Attempts over recent decades to reverse these processes have achieved mixed and limited results. The combination of these effects means that most if not all of the blanket bog will not be classed as favourable according to Natural England's condition assessment criteria. Whilst all efforts can be made to control current factors such as current grazing and burning patterns, current atmospheric pollutant levels and access impacts, it is unclear whether this can fully mitigate the long-term influence of the historical factors such as atmospheric pollution, past burning and overgrazing. The situation is further complicated by a view that some erosion features can be considered natural phenomena of intrinsic interest. It may not therefore always be appropriate to try and revegetate bare peat even if suitable techniques exist. The former extensive cover of woodland has declined over many centuries to the point that it is fragmented, relatively small-scale and largely restricted to steeper valley sides. There is no woodland included in the site to the north of the National Park. Remaining woods are often unfenced and open to grazing which restricts tree regeneration. In some, Rhododendron has invaded, choking out native flora. These issues are being

Site Name	Reason for Designation	Site Vulnerability
		tackled through the Forestry Commission's Woodland Grant Scheme and Challenge Fund for creating new native woodland, MAFF's North Peak ESA and Natural England's WES though more incentive and resources are needed. As well as restoring existing stands of woodland there is an emphasis on re-creation to expand and link fragments which inevitably involves changing existing habitats. This will raise questions over the balance of vegetation types seen on the site but given woodland would naturally have covered much of the area there is a need to treat its expansion seriously. The flora of woodlands, quality as with bog and heath, has suffered from poor air quality. Again, it is less clear what can be done to reverse this situation other than to try and ensure continued improvements in air quality to allow affected species to recolonise if they can.
South Pennine Moors Phase 2 SPA	**Article 4.1** During the breeding season, the site regularly supports *Asio flammeus, Falco columbarius,* and *Pluvialis apricaria* (North-western Europe - breeding). **Article 4.2** During the breeding season, the site regularly supports *Actitis hypoleucos, Calidris alpina schinzii, Carduelis flavirostris, Gallinago gallinago, Numenius arquata ,* *Oenanthe oenanthe, Saxicola rubetra, Tringa totanus, Turdus torquatus and Vanellus vanellus.*	The South Pennine Moors SPA (Phase 2) is flanked two sides by large industrial urban areas, which means that large numbers of people use the area for recreational activities. Maintenance of the ecosystems on which the birds depend relies on appropriate grazing levels and burning regimes, and overgrazing by sheep is a key pressure on the site. Management of grazing is further complicated by the presence of a large number of commons within the SPA. Pressures outside the site, in particular the loss of bird feeding areas through agricultural intensification, increase the vulnerability of the bird populations. All these issues are being tackled through the production of an integrated management strategy and conservation action programme as part of EU-funded LIFE project, which has brought together statutory and voluntary bodies and the private sector in a wide-ranging partnership.
South Solway Mosses SAC	***Primary Habitats and Species*** **7110 Active raised bogs** *Priority feature This is a complex of estuarine raised bogs to the south of the Solway, and is comprised of Wedholme Flow, Bowness Common, Drumburgh Moss and Glasson Moss. At 759 ha, Bowness Common is one of the largest Active raised bogs remaining in the UK. These sites support typical bog vegetation, including bog rosemary (*Andromeda polifolia*), cranberry (*Vaccinium oxycoccos*) and great sundew (*Drosera anglica*). The central part of Glasson Moss displays some of the most diverse raised bog vegetation in the UK today, with bog-moss species including abundant *Sphagnum pulchrum* as well as *S. fuscum*.	The site has been modified in the past by extensive drainage associated with agricultural reclamation and/or peat extraction. Additionally, parts of the site have suffered from uncontrolled fires. Management problems including those arising from drainage systems are being addressed through Site Management Statements, management agreements, acquisition, and through implementation of a National Nature Reserve Management Plan in part of the area, including a major programme of installation of drains to raise water levels. This is proving effective in re-establishing mire conditions.

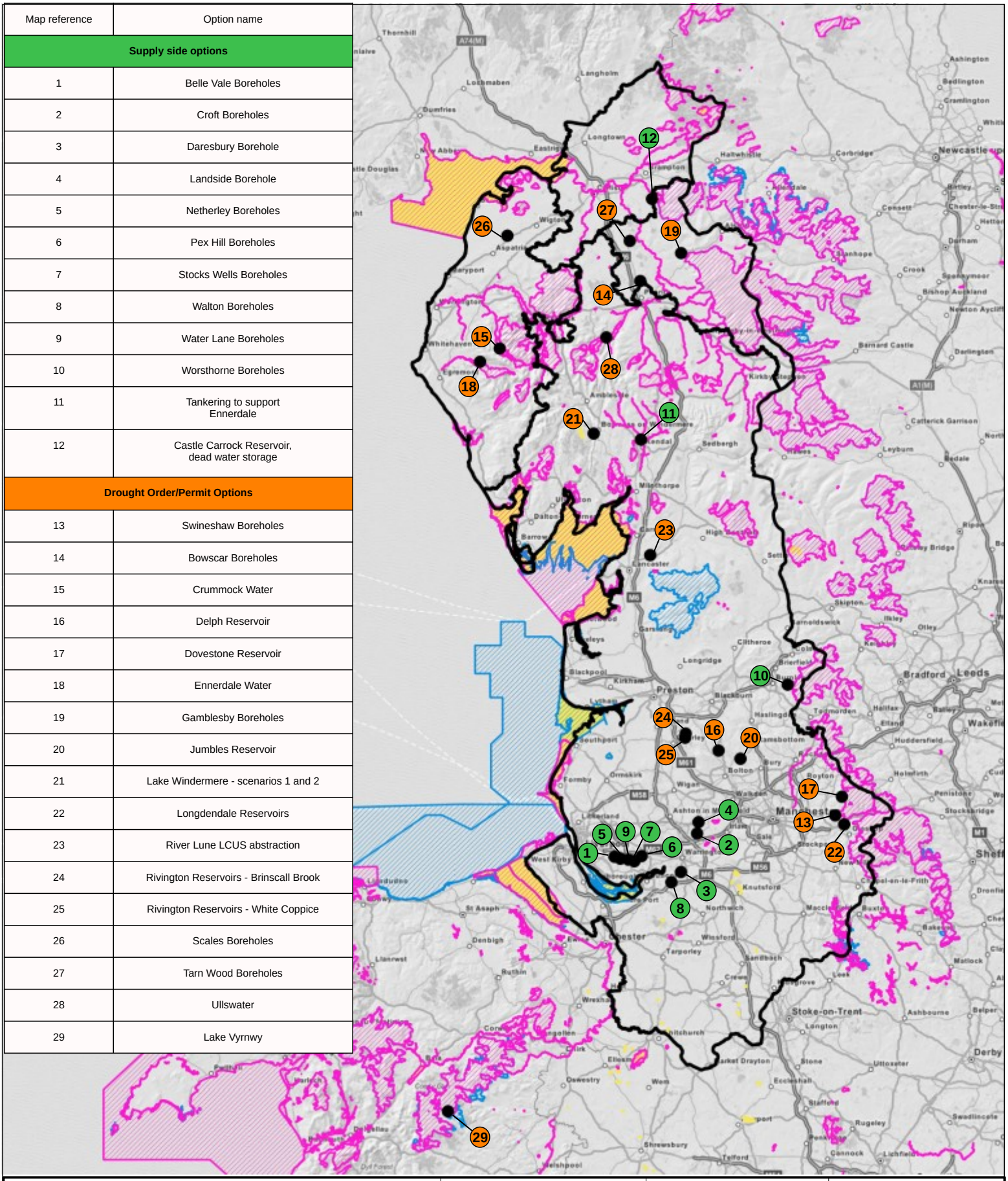
Site Name	Reason for Designation	Site Vulnerability
		Part of the peat body at Wedholme Flow has been subject to peat extraction, though this has now ceased.
Tarn Moss SAC	**Primary Habitats and Species** **7140 Transition mires and quaking bogs** This basin mire has developed in a shallow, elongated hollow in acidic glacial drift. The mire communities are of special interest comprising areas of typical acid bog within a matrix of poor-fen. In comparison to other Cumbrian basin mires, Tarn Moss is remarkable in being almost entirely devoid of tree or scrub cover, as well as being little disturbed with no obvious signs of past peat-cutting. The poor-fen is the most extensive and best developed community at Tarn Moss. It is characterised by the dominance of Sphagnum bog-mosses and sedges *Carex* species, the latter including *C. curta*, *C. echinata*, *C. rostrata* and the very local northern species, C. magellanica. Other species include *Hydrocotyle vulgaris*, marsh cinquefoil *Potentilla palustris*, water horsetail *Equisetum fluviatile*, lesser bladderwort *Utricularia minor*, marsh violet *Viola palustris*, common marsh-bedstraw *Galium palustre*, lesser spearwort *Ranunculus flammula*, bog asphodel *Narthecium ossifragum* and cranberry *Vaccinium oxycoccos*. Small nuclei of more acid vegetation occur throughout the surface and in places merge to form larger patches of acid mire, dominated by heather *Calluna vulgaris* and cross-leaved heath *Erica tetralix* over bog mosses. Other species include bog-rosemary *Andromeda polifolia* and crowberry *Empetrum nigrum*.	Water quantity and quality is subject to influence by activities in the catchment. There is a conifer plantation to the south of the site. Felling of the trees could potentially change the quantity and quality of the water inputs. It is expected that English Nature would be consulted in advance of felling. To the north of the site is an area of siltation and slight enrichment. The source of this water is not known and will be the subject of further investigations.
Upper Solway Flats and Marshes SPA	**Article 4.1** Over winter the area regularly supports *Branta leucopsis*, *Cygnus Cygnus*, *Limosa lapponica* and *Pluvialis apricaria*. **Article 4.2** Over winter the area regularly supports *Anas acuta, Anas clypeata, Anas crecca, Anser brachyrhynchus, Arenaria interpres, Aythya marila, Bucephala clangula, Calidris alb, Calidris alpina alpin*, *Calidris canutus*, *Haematopus ostralegu*, *Numenius arquata*, *Tadorna tadorn*, *Pluvialis squatarol* and *Tringa tetanus*. The area also supports a large population of waterfowl.	A management strategy for the site has been produced by the Solway Firth Partnership. The strategy addresses threats to the SPA interest on the site and sets out the means by which it is proposed to secure the sustainable use of the Firth. There has been relatively little land claim compared with most other estuaries in the UK but some established and new flood defence and coastal erosion works may exacerbate erosion elsewhere within the site. The cockle fishery has been closed for a number of years due to overexploitation and the other commercial, traditional and shell fisheries are regulated by Government to ensure that they are carried out in a sustainable way and that their impact on bird feeding areas are not significant. Roosts and feeding areas are vulnerable to disturbance and the management strategy addresses the planning of recreational and development activities to avoid disturbance to roosts and feeding area.

Site Name	Reason for Designation	Site Vulnerability
Upper Solway Flats and Marshes Ramsar Site	**Ramsar Criterion 2** The site supports over 10% of the British population of natterjack toad (*Bufo calamita*) (Habitats Directive Annex IV species (S1202)). **Ramsar Criterion 5** Over winter, the site supports a large waterfowl assemblage of international importance. **Ramsar Criterion 6** In spring/autumn the site supports populations of Eurasian oystercatcher (*Haematopus ostralegus ostralegus*). Over winter the site supports Whooper swan (Cygnus Cygnus), Pink-footed goose (*Anser brachyrhynchus*), Barnacle goose (*Branta leucopsis*), Northern pintail (*Anas acuta*), Greater scaup (*Aythya marila marila*), Red knot (*Calidris canutus islandica*), Bar-tailed godwit (*Limosa lapponica lapponica*), Eurasian curlew (*Numenius arquata arquata*) and Common redshank (*Tringa totanus totanu*).	
West Midland Mosses SAC	**3160 Natural dystrophic lakes and ponds** West Midlands Mosses contains three pools, one at Clarepool Moss and two at Abbots Moss, that are examples of dystrophic lakes and ponds in the lowlands of England and Wales, where this habitat type is rare. The lake at Clarepool Moss is unusual as a dystrophic type on account of its relatively base-rich character, which is reflected in the presence of a diverse fauna and flora. The two at Abbots Moss are more typical, base-poor examples. The dystrophic lakes and ponds at this site are associated with Schwingmoor development, a characteristic of this habitat type in the West Midlands. Schwingmoor is an advancing floating raft of bog-moss *Sphagnum*, often containing NVC type M3 *Eriophorum angustifolium* bog pool community, which grows from the edge of the pool and can completely cover over the pool; the site has also been selected for this Annex I feature (**7140 Transition mires and quaking bogs)** **7140 Transition mires and quaking bogs** West Midlands Mosses represents Schwingmoor vegetation. Floating rafts of *Sphagnum*-dominated vegetation have developed over semi-liquid substrates within basins. In the UK this type of *Sphagnum*-dominated vegetation with a scatter of sedges *Carex* species and cranberry *Vaccinium oxycoccos* is confined to this part of England and mid-Wales.	Colonisation of open schwingmoors or Sphagnum lawns and rafts in the West Midland Mosses by birch and pine is controlled by works under Management Agreement or by National Nature Reserve management, and in liaison with the local wildlife trust at Abbots Moss. Several sources of nutrient enrichment, including atmospheric deposition of nutrients, pose a potential threat at these sites. A Management Agreement controls agricultural run-off at Chartley Moss. Trees at this site trap airborne nutrients and provide roost areas for birds, but the enrichment effect of both is only localised. At Abbots Moss the threat of enrichment from atmospheric sources has been reduced by clear-felling of basin slopes adjacent to the mires. All parts of that site are vulnerable to recreational disturbance, particularly the northern portion which is a scout camp.

APPENDIX D

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



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

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CASCADE

United Utilities

Project:

HRA of United Utilities Drought Plan 2017:

Screening Report

Figure Title:

United Utilities Water Resource Zones and Drought Options

Figure D1

Map reference	Option name
Supply side options	
1	Belle Vale Boreholes
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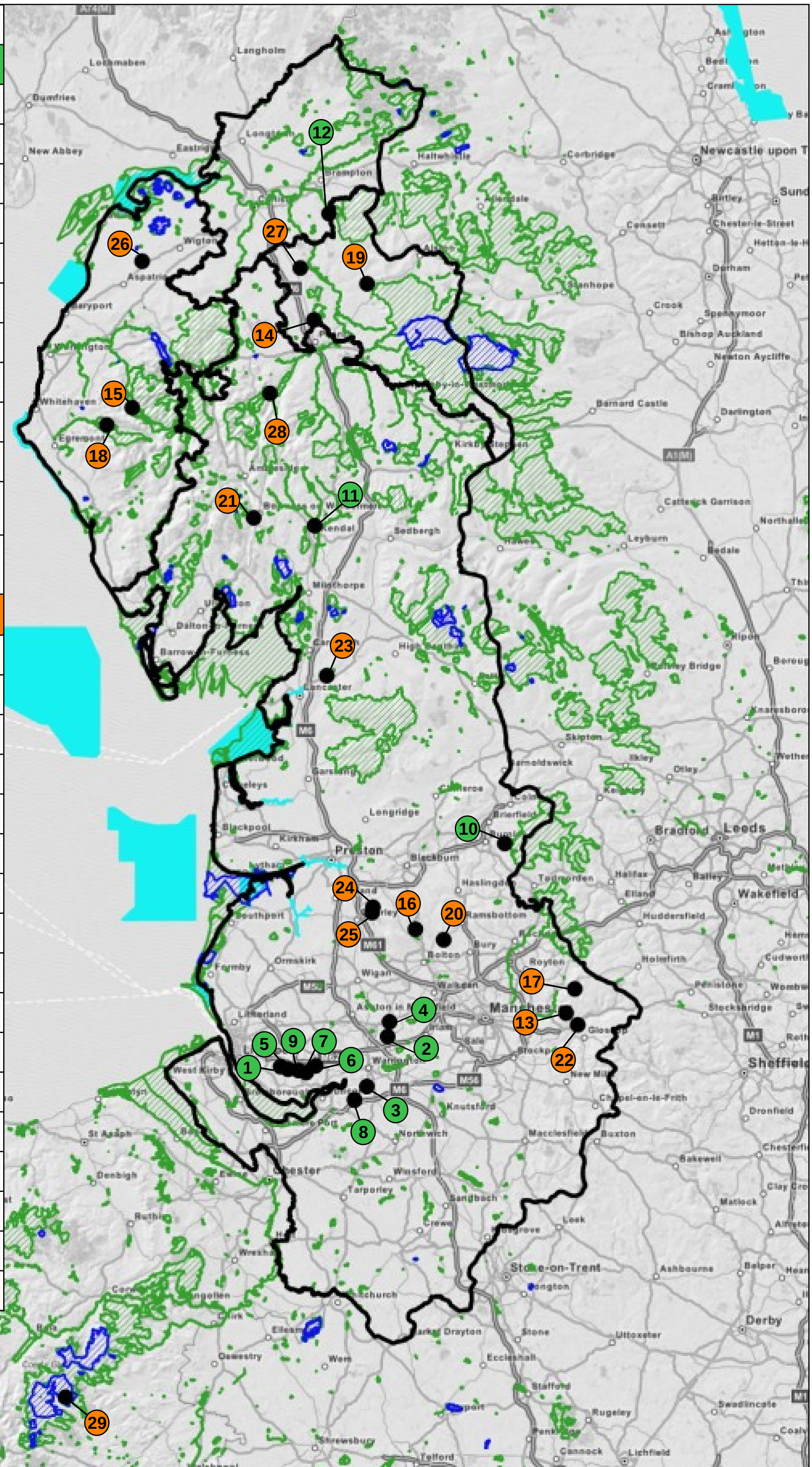
27	Tarn Wood Boreholes
28	Ullswater
29	Lake Vyrnwy



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:

HRA of United Utilities Drought Plan 2017:

Screening Report

Figure Title:

United Utilities Water Resource Zones and Drought Options

Figure D2