UNITED UTILITIES WATER PLC

Final Drought Plan 2014

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1 EXECUTIVE SUMMARY

This drought plan has been produced by United Utilities Water PLC (UU). It updates our Final Drought Plan 2013 to include revised drought triggers and drought options for Ennerdale Water in West Cumbria. There are no other substantive changes to the previous Final Drought Plan 2013.

The plan provides a comprehensive statement of the actions that we will consider implementing during drought conditions to safeguard essential water supplies to our customers and minimise environmental impact. The security and integrity of water supplies is of the utmost importance to our customers.

Droughts do not follow any particular pattern and can occur at any time of year, exhibiting differing characteristics. Consequently, our plan sets out a range of options available in the event of drought, and the processes and timescales required for their implementation. The plan is applicable to any drought condition, including those more severe than any previously recorded.

Our plan includes lessons learnt during the 1995/96 drought as well as more recent droughts in 2003 and 2010, and takes account of the Environment Agency's Water Company Drought Plan Guideline 2011 (EA, 2011). Under Section 39B(7) of the Water Industry Act 1991, there is a statutory duty for water companies to agree publicly available drought plans following consultation. Drought plans are updated every 3½ years (or earlier in the event of a material change) and this plan updates our previous Final Drought Plan 2013. This plan incorporates views raised during a period of public consultation between 13 January 2014 and 17 February 2014 to which 22 responses were received.

UU supplies water to some 6.9 million people and 0.2 million non-household customers in Cumbria, Lancashire, Greater Manchester, Merseyside, most of Cheshire and a small part of Derbyshire. More than 90% of the water supplied by UU comes from rivers and reservoirs, with the remainder from groundwater. This contrasts with the rest of England, where an average of only 60% is supplied from rivers and reservoirs. UU's region is split into four water resource zones:

- Integrated Resource Zone – an integrated network serving south Cumbria, Lancashire, Greater Manchester, Merseyside and most of Cheshire, representing over 90% of total water supplied by UU
- West Cumbria Resource Zone – serving the areas of Workington, Whitehaven, Wigton and Solway
- Carlisle Resource Zone – serving the Carlisle area
- North Eden Resource Zone – serving the rural, northern part of the Eden district of Cumbria

The West Cumbria Resource Zone is the most sensitive to drought due to its short (2-3 months) critical period (the time taken for water sources to go from full to empty in the worst drought). Therefore decisions have to be taken quickly in this zone during a drought event but equally, following rainfall, the sources can refill in a matter of days. West Cumbria also contains a number of environmentally sensitive sites which are designated under national and EU legislation and UU is legally required to protect such sites. In drought there is a fine balance between public water supply and environmental protection.

Our water sources are managed in accordance with operating policies and control rules to provide a secure water supply to our customers. UU carries out frequent hydrological and hydrogeological monitoring in conjunction with the EA. Assessments of this data provide the basis for recognising drought conditions at an early stage and identifying the need for, and timing of, any drought management measures. Many of our drought management actions are an integral part of our normal water source operational activities. Only in serious drought conditions will the use of specific legal powers and/or other exceptional measures be required. Management of water supplies during drought conditions represents a progression of actions that reflect the severity,

geographical extent and speed of development of the drought. We will firstly take actions that are under our own control before implementing actions requiring special legal powers.

This plan presents four drought triggers for each resource zone, based on reservoir level or the proportion of annual abstraction licence that has been utilised. The triggers are decision points, to consider the measures required to address the prevailing situation. The plan includes a range of drought management actions (see Figure 1), which are linked to the drought triggers, including:

- Operational actions
- Communication actions
- Demand side actions (water efficiency campaigns, voluntary water use restrictions, statutory water use restrictions, non-essential use ban)
- Leakage control actions
- Supply side actions (contingency and non-commissioned sources; tankering)
- Drought permit/order actions

Particular actions will only be pursued if they are relevant to the prevailing drought situation. Drought actions may be applied either company wide, by resource zone or to target a specific geographic area depending on the nature of the drought event prevailing at that time.

A separate Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) of the options included in this plan have been undertaken. Any options identified as having the potential to significantly affect European designated sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and sites designated under the Ramsar Convention), have been subjected to a detailed Appropriate Assessment. A drought option that has an adverse effect on the integrity of a European site can only be included in the plan subject to there being no alternative solutions, and where the Secretary of State is satisfied that there are imperative reasons of overriding public interest for its inclusion and the adoption of suitable compensatory measures. This is the case for the Ennerdale Water drought order option included in this plan.

New legislation (Flood and Water Management Act 2010, amending the Water Industry Act 1991, and the Drought Direction 2011) has revised the ability for water companies to impose water use restrictions on customers. This drought plan takes this new legislation into account. It includes provision for voluntary water use restrictions on customers, followed by a consultation period, prior to the implementation of statutory water use restrictions, as provided for by the amendments to the Water Industry Act 1991.

For all resource zones (except Carlisle where, following infrastructure improvements and licence changes in 2003, the need for drought permits/orders is unlikely) applications for drought permits/orders would be made following the commencement of voluntary water use restrictions.

Our minimum level of service for water supply is for the implementation of statutory water use restrictions and drought permits/orders not more than once in every 20 years on average, with drought orders to restrict non-essential water use not more than once in every 35 years on average. No rota cuts or standpipes to ration essential supplies are planned (implemented through Emergency Drought Orders). This is consistent with the level of service in our Water Resources Management Plan (UU, 2009) and is a balance between customer and environmental impacts. The level of service is reviewed as part of the Water Resources Management Plan process rather than this drought plan.

Our assessment of water supply security indicates that with a repeat of the worst drought on record, even taking into account the forecast impacts of climate change, our reservoirs will not empty but will reach very low levels. Before reaching these very low levels, it is necessary to take action to conserve water supplies in case the drought is more severe than any previously recorded. Consequently, water use restrictions and drought permits/orders need to be implemented before reaching the very lowest reservoir levels to safeguard water supplies.

Figure 1: Summary of drought triggers and associated actions

Status	Summary of Normal Activity	
Normal Operation Above all drought triggers	On-going water efficiency programme to save 3 Ml/d each year	
	Leakage control to maintain leakage at the sustainable economic level	
	Optimise supply system to balance cost and risk of possible drought	
	Regular liaison with Environment Agency on water resources issues	
Status	**Summary of Additional Actions (if appropriate in specific drought)**	**Estimated time to implement**
Increased Drought Risk Below Trigger 1 for at least one source Approx 1 in 3 year frequency Approx 14 days to next trigger	Establish United Utilities' drought management structure	3 days
	Agree drought action plan with Environment Agency	1 week
	Enhanced water efficiency communications	1 week
	Fully optimise supply system to manage risk of possible drought	On-going
Possible Drought Below Trigger 2 for at least one source Approx 1 in 5 year frequency Approx 14 days to next trigger	Further enhancements to water efficiency communications – link to dry weather. Press adverts and roadshows	1 week
	Establish regular stakeholder updates	3 days
	Enhance leakage control activities	1 week
	Start process of bringing contingency sources into use	1-3 months
Drought Alert Below Trigger 3 for at least one source Approx 1 in 12 year frequency or less Approx 21-35 days to next trigger	Introduce voluntary water use restrictions with extensive communications campaign	3 days
	Commence consultation for introduction of statutory water use restrictions	3 days to start; 3-4 weeks to complete
	Start process of bringing non-commissioned sources into use	3-6 months
	Apply for drought permits / orders	1 week
Drought Below Trigger 4 for at least one source 1 in 20 year frequency or less	Introduce statutory water use restrictions with extensive communications campaign	Soon after crossing the trigger
	Start process of bringing further non-commissioned sources into use	9-12 months
	Implement powers granted under drought permits / orders	At time of crossing trigger or soon after
	Apply for and introduce non-essential use ban	Dependent on level of demand

* Note that the drought triggers and actions at Ennerdale Water in the West Cumbria Resource Zone differ from those set out in Figure 1 above. Voluntary water use restrictions will occur earlier at the "Possible Drought" status (Trigger 2) to ensure demand restrictions are in place before applying for a drought order (Trigger 3) at this sensitive site and a period of 7 days exists between Triggers 2 and 3 to allow for this. Statutory water use restrictions will be implemented on reaching "Drought" status (Trigger 4) ahead of the need to implement a drought order at Ennerdale. In addition, tankering of treated water from the Integrated Resource Zone will commence at Trigger 3

2 INTRODUCTION

The purpose of this Drought Plan, produced by United Utilities Water PLC (UU), is to provide a comprehensive statement of the actions we will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact. The security and integrity of water supplies is of the utmost importance to our customers.

Our plan includes lessons learnt during the 1995/96 drought as well as more recent drought events of 2003 and 2010. Our plan has been updated in accordance with the Environment Agency's Water Company Drought Plan Guideline 2011 (EA, 2011). Under Section 39B(7) of the Water Industry Act 1991, there is a statutory duty for water companies to agree publicly available drought plans following consultation. Drought plans are updated every 3½ years (or earlier in the event of a material change) and this plan updates UU's Final Drought Plan 2013. This plan incorporates views raised during a period of public consultation between 13 January 2014 and 17 February 2014 to which 22 responses were received.

The principal changes included in this Drought Plan (compared to our Final Drought Plan 2013) are an update of the drought triggers at Ennerdale Water in West Cumbria and the inclusion of drought options at this site. We considered these to be a material change and initiated an update of our Final Drought Plan 2013 to produce this plan. There are no other substantive changes to the previous Final Drought Plan 2013.

Droughts do not follow any particular pattern and can occur at any time of year, exhibiting differing characteristics. Consequently, our plan sets out a range of options available in the event of drought, and the processes and timescales required for their implementation. The plan is applicable to any drought condition, including those more severe than any previously recorded.

To produce our previous Final Drought Plan 2013 we undertook consultation with a range of consultees including regulators, environmental groups, local councils, businesses and local interest groups. Regular technical meetings were held with the Environment Agency (EA) to ensure consistency with the EA's own drought plan (EA, 2012). In addition, we held meetings with Natural England (NE), EA and the Countryside Council for Wales regarding the environmental aspects of the plan. Appendix 10 contains further details on the consultation undertaken.

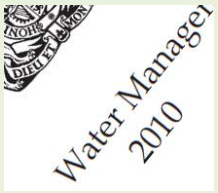
A separate Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) of the options included in this plan have been undertaken. Any options identified as having the potential to significantly affect European designated sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and sites designated under the Ramsar Convention), have been subjected to a detailed Appropriate Assessment. A drought option that has an adverse effect on the integrity of a European site can only be included in the plan subject to there being no alternative solutions, and where the Secretary of State is satisfied that there are imperative reasons of overriding public interest for its inclusion and the adoption of suitable compensatory measures. This is the case for the Ennerdale Water drought order option included in this plan.

The EA is currently revising some of our abstraction licences as part of their Review of Consents under the Conservation of Habitats and Species Regulations 2010 (as amended in 2011), which is the UK's implementation of the Habitats Directive. This will result in changes, such as increases to compensation or prescribed flow requirements and reductions to the volume of water we can abstract. Some of these changes have not been included in this plan because they are not confirmed and/or are not scheduled to be implemented until March 2015; however as the drought plan is revised every 3½ years, or earlier in the event of a material change, any changes will be included in future plans.

Several new pieces of drought legislation came in to force during 2010/11 as summarised in the following box.

Box – water use restriction legislation explained

In 2010/11 three new pieces of legislation covering water use restrictions were introduced by the Government, which altered water use restriction legislation. A summary of water use restrictions legislation is given below. Further information can be found in Section 8.3.2



Flood and Water Management Act 2010	Introduced a new Section 76 within the Water Industry Act 1991 and allows water companies to temporarily restrict a range of water uses by customers. It allows companies to restrict a greater range of water uses than before (the powers under the original Section 76 were generally referred to as a "hosepipe ban") however it also requires companies to publicly consult before such restrictions are imposed
Water Use (Temporary Bans) Order 2010	Provides definitions of words/phrases used in the Flood and Water Management Act 2010 as well as providing for exceptions to water use restrictions
Drought Direction 2011	Revokes the Drought Direction 1991 and sets out the range of water uses that can be restricted under an Ordinary Drought Order (commonly known as a non-essential use ban)
Water Resources Act 1991	Emergency Drought Orders give the water company discretion on the uses of water to prohibit/limit and can also authorise the use of standpipes and rota cuts. Our plan does not include recourse to such emergency actions

This plan takes this new legislation into account. It includes provision for voluntary water use restrictions on customers, followed by a consultation period, prior to the implementation of statutory water use restrictions, as provided for by the amendments to the Water Industry Act 1991. For all resource zones (except Carlisle where, following infrastructure improvements and licence changes in 2003, the need for drought permits/orders is unlikely) applications for drought permits/orders would be made following the commencement of voluntary water use restrictions.

This plan presents drought triggers for each resource zone, based on reservoir level or the proportion of annual abstraction licence that has been utilised. The triggers are decision points, rather than action points, to consider the measures required to address the prevailing situation.

UU supplies water to some 6.9 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. More than 90% of the water supplied by UU comes from rivers and reservoirs, with the remainder from groundwater. This contrasts with the rest of England, where an average of only 60% is supplied from rivers and reservoirs. 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:

- Integrated Resource Zone, 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 100 Ml/d bi-directional pipeline between Liverpool and Manchester was constructed following the 1995/6 drought. A new 55km bi-directional pipe, the West-East link, commissioned in 2012, to allow up to 100 Ml/d of water to be transferred between Cheshire/Merseyside and Manchester. This pipeline provides wider benefits through making the supply system more flexible and resilient. It also enables us to carry out aqueduct cleaning by providing a second pipeline

- West Cumbria Resource Zone, serving the areas of Workington, Whitehaven, Wigton and Solway. There is some limited connectivity between the sources in this zone
- Carlisle Resource Zone, serving the Carlisle area
- North Eden Resource Zone, comprising 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

Figure 2 shows these resource zones for which information is presented in this plan. The same resource zones are used for both drought and water resources planning.

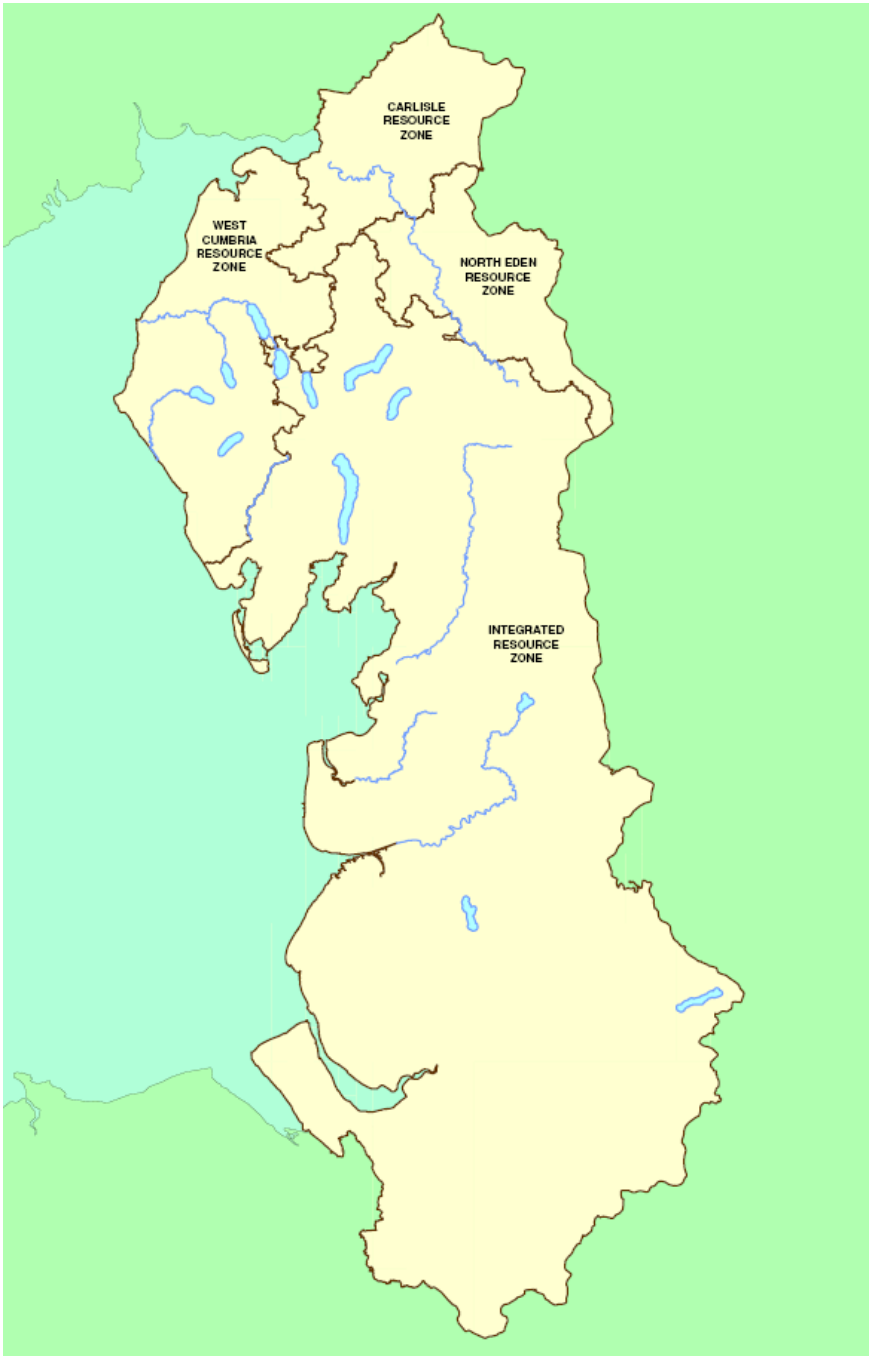
Our water sources are managed in accordance with operating policies and control rules to provide a secure water supply to our customers. UU carries out frequent hydrological and hydrogeological monitoring; in conjunction with the EA. Assessments of this data provide the basis for recognising drought conditions at an early stage and identifying the need for, and timing of, any drought management measures. Many of our drought management actions are an integral part of our normal water source operational activities. Only in serious drought conditions will the use of specific legal powers and/or other exceptional measures be required.

Our assessment of water supply security indicates that with a repeat of the worst drought on record, our reservoirs will not empty but will reach very low levels (with the remaining storage equivalent to a minimum of 30 days of supply). However, before reaching these very low levels, it is necessary to take action to conserve water supplies in case the drought is more severe than any previously recorded. Consequently, water use restrictions and drought permits/orders need to be implemented before reaching the very lowest reservoir levels to safeguard water supplies. UU consider that it is unacceptable to plan for the introduction of rota cuts or standpipes (implemented through Emergency Drought Orders), even during extreme drought conditions, as these would have serious public health implications and result in severe social and economic disruption. If such measures are required they would be undertaken in the context of plans developed by UU with Local Resilience Forums for emergency water distribution and sanitation arrangements under the Civil Contingencies Act (2004) and the Security and Emergency Measures Direction (1998).

The following chapter provides further information on how we manage water resources.

This document has been reviewed to assess the sensitivity of information from a national security perspective and it was not deemed necessary to exclude any information from this public version of the plan.

Figure 2: United Utilities water supply area & resource zones



3 WATER RESOURCES MANAGEMENT

3.1 LEVEL OF SERVICE

Our minimum level of service for water supply is for the implementation of statutory water use restrictions and drought permits/orders not more than once in every 20 years on average, with drought orders to restrict non-essential water use not more than once in every 35 years on average. No rota cuts or standpipes to ration essential supplies during drought are planned. This is consistent with the level of service in our Water Resources Management Plan (UU, 2009) and is a balance between customer and environmental impacts. A Willingness to Pay survey, conducted for our Water Resources Management Plan, indicated that this level of service was acceptable to our customers. The level of service is reviewed as part of the Water Resources Management Plan (WRMP) process. To provide a higher level of service, i.e. less frequent restrictions or drought permits/orders, would require a greater investment in water supplies or more extensive demand management.

Our customer standards of service state that if a customers' water supply is cut off because of emergency drought restrictions, we will pay £10 for each day (or part day) that the supply is interrupted up to a maximum amount equal to the average household water bill for the previous year. This commitment does not refer to voluntary or statutory water use restrictions or non-essential use bans. The commitment refers to the need to implement Emergency Drought Orders authorising the use of standpipes or rota cuts, and our plan does not include the need to implement such measures.

3.2 LINK TO WATER RESOURCES MANAGEMENT PLAN

UU last published its WRMP in 2009 and it is updated every 5 years. We are currently updating our WRMP 2009 and consulted on an updated Draft WRMP during the period 14 May to 6 August 2013. Following the consultation, we submitted a Revised Draft WRMP to Defra on 12 November 2013 and are awaiting permission to publish it.

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 into account, as well as any changes to our abstraction licences (e.g. the EA's review of our abstraction licences under the Habitats Directive). The WRMP also makes allowance for parts of the water supply system being out of service for maintenance. The WRMP 2009 identified the preferred solutions for dealing with forecast deficits over the 2010-2035 period and these were included in our subsequent business plan submission to Ofwat. UU is implementing the following supply-demand schemes during the 2010-15 period:

- Completion of a new West-East link between Cheshire/Merseyside and Manchester in the Integrated Resource Zone
- New boreholes in West Cumbria, to offset the loss of water supply arising due to the EA's alterations to our Ennerdale Water abstraction licence as part of their licence reviews under the Habitats Directive
- Water network reinforcement to enable extra water to be sent to North Allerdale, West Cumbria, to offset the impact of the EA's alterations to our Dash Beck abstraction licence as part of their licence reviews under the Habitats Directive
- Extensive leakage control in all resource zones
- Water efficiency research and water efficiency promotion, with free water savers packs offered to customers
- Free installation of water meters for those customers who wish to move to a measured tariff

This drought plan is consistent with the WRMP 2009 and also with the Revised Draft WRMP submitted to Defra on 12 November 2013. The drought triggers in this plan take account of the new West-East link which was commissioned in 2012; however the West Cumbria schemes are not included as they will not be in operation until 2015, by which time the next drought plan cycle will have commenced. UU must submit its next Draft Drought Plan to the Secretary of State within 3½ years of the publication of its previous Final Drought Plan, unless a material change requires an earlier review.

3.3 AGREEMENTS WITH OTHER LICENSED WATER SUPPLIERS / WATER UNDERTAKERS

There are no licensed water suppliers within UU's area. Within UU's area, Peel Water Networks Limited (PWNL) operates as an Inset Appointee for the Media City development in Salford, Greater Manchester. During times of drought and water use restriction, PWNL will mirror the same restrictions which UU will be intending to put in place.

UU shares three water resources with other water undertakers:

- The River Dee
- Lake Vyrnwy
- Burnhope Reservoir

UU abstracts water from the River Dee at various locations to supply both potable and non-potable customers. In addition to UU, other abstractors from the River Dee include Dŵr Cymru Welsh Water, Dee Valley Water PLC and the Canal and River Trust. The River Dee is managed by Natural Resources Wales through a regulation scheme. UU's abstractions are governed by the River Dee General Directions (EA, 2013) which set out rules for abstraction during drought conditions and are approved by the statutory Dee Consultative Committee. If storage in the River Dee regulation reservoirs falls to the drought action trigger level, a meeting of the Committee will take place to discuss the introduction of drought alleviation measures as enshrined in the Dee General Directions. To conserve water supplies and ensure efficiency of operation, UU provides a weekly abstraction forecast to Natural Resources Wales to assist in calculating the required releases from the reservoirs and Llyn Tegid (Bala Lake).

Lake Vyrnwy is owned by Severn Trent Water Ltd. However, UU have an abstraction licence allowing us to abstract water from the reservoir to supply customers in Merseyside and parts of Cheshire. Lake Vyrnwy is also used to regulate the River Severn, from which other water companies abstract including Severn Trent Water, South Staffordshire Water and Bristol Water. The EA, working with Severn Trent Water, manage the River Severn regulation system. The EA is responsible for applying for drought orders to increase releases from Vyrnwy to the River Severn system for ecological reasons and they reviewed the process for such applications in 2005, in consultation with all relevant water companies. This ensures that water company drought plans and the EA's plans are aligned. During drought conditions, UU will liaise with the EA to discuss potential management actions for the River Severn system.

Severn Trent Water Ltd. has a bulk supply agreement with UU to receive up to 16 Ml/d of treated water sourced from Vyrnwy. However this is for emergency use only up to a maximum period of 28 days in any instance.

UU has a bulk supply agreement with Northumbrian Water Ltd. to supply treated water to the Alston area of Cumbria (North Eden Resource Zone). Northumbrian Water's Burnhope reservoir supplies raw water to its Wear Valley Water Treatment Works, which supplies drinking water to Northumbrian Water as well as the small export into UU's supply area. The agreement is for Northumbrian Water to provide a bulk supply of non-fluoridated, potable water up to a maximum of 1.3 Ml/d. The maximum import volume provides sufficient headroom to meet demand in drought conditions. Discussions with Northumbrian Water have confirmed that the full import volume is reliably available under drought conditions.

3.4 NORMAL MONITORING ARRANGEMENTS

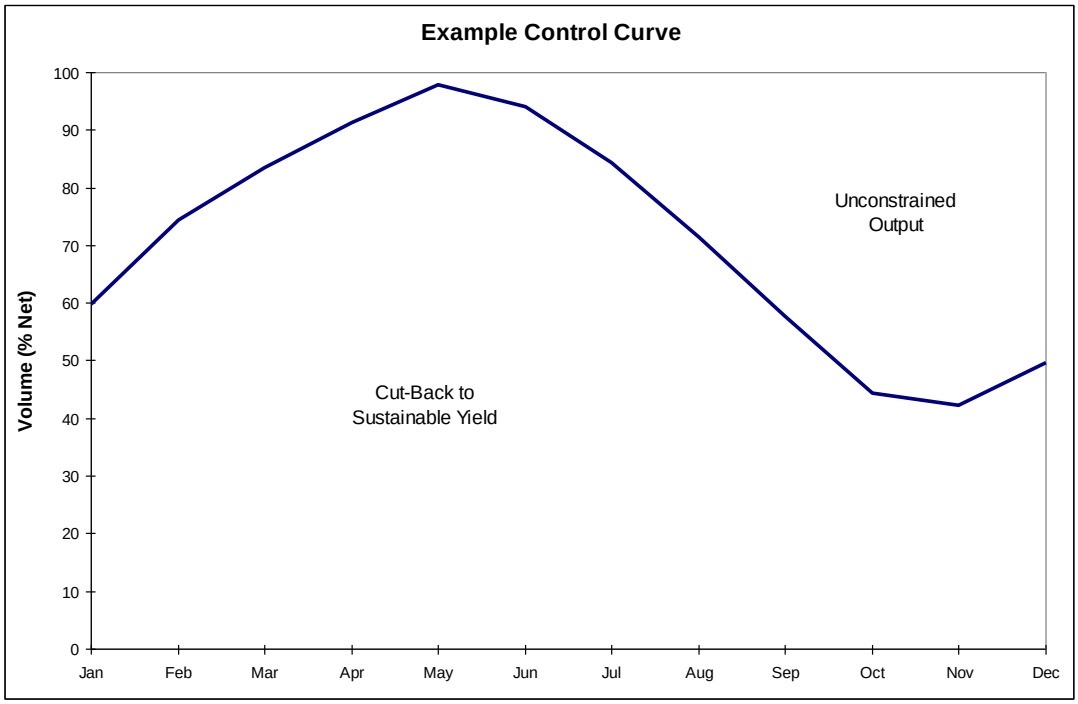
Data such as reservoir levels, groundwater levels, river flows, abstraction rates, compensation flow releases, leakage and water demand, are retrieved weekly from our company data management system. This data is used to produce a range of routine water resources reports. UU provides information on the current water resources situation to the EA on a weekly basis, and also sends information to the Centre for Ecology and Hydrology for national reporting. UU produces a written report for the EA on a bi-monthly basis which includes information on the current water resources position and this report is discussed with the EA at bi-monthly meetings. Information on the current water resource situation is published weekly on UU's website.

Our water sources are managed in accordance with operating policies and control rules, such as pumping from rivers or lakes when river flows are high enough to conserve water stored in reservoirs, to provide a secure water supply to our customers. UU carries out frequent hydrological and hydrogeological monitoring, in conjunction with the EA. This data is used by UU in water resource simulation models to ensure sources are operated sustainably and to identify any actions required to manage water supplies. These assessments provide the basis for recognising drought conditions at an early stage and identifying the need for, and timing of, any drought management measures.

Many of our reservoirs provide releases of water into rivers or streams to provide sufficient flows for the environment. These are called compensation flows and a minimum flow rate is usually required under abstraction licence conditions. Compensation flows are regularly checked for under or over releases.

Our normal assessments include comparison of actual reservoir storage or abstracted volumes against the drought triggers included in this plan. In addition we use reservoir control curves (Figure 3) to assess the sustainability of water abstractions during times of drought, and aid decisions to reduce or increase abstraction rates.

Figure 3: Example reservoir control curve



Under normal operation UU balances abstraction across various reservoir, river and groundwater sources. This forms part of the normal weekly water resources risk management and production planning process. Should reservoir storage in local areas be lower than normal, then abstraction from these reservoirs is reduced and abstraction from other sources increased to balance overall supply and demand. This system optimisation can involve re-zoning of the water supply network.

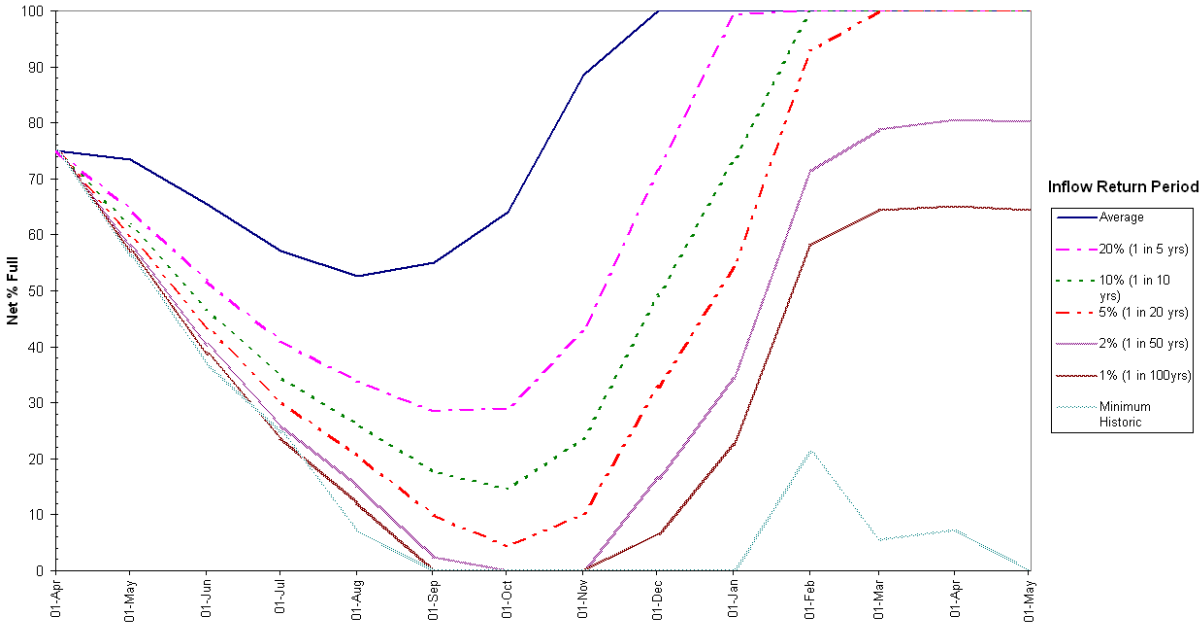
3.5 DROUGHT FORECASTING

As explained above, UU undertakes regular assessments of the security of water supplies in discussion with the EA. These assessments provide the basis for recognising drought conditions at an early stage and to assess the extent and magnitude of drought alongside the use of our drought triggers. Our assessments take account of a range of water resource indicators including:

- High probability of sources failing to meet demand or failing to refill sufficiently
- Storage in reservoirs below control curve levels
- Rapid weekly decline in stocks (or slow recovery of stocks during winter) in key reservoirs and/or reservoir groups
- Low, and declining, river flows at our river sources resulting in abstraction being limited
- Significant reduction in the output from spring and/or groundwater sources, or significant decline in groundwater levels as measured at key observation boreholes in the major aquifers
- Magnitude and duration of peak demands significantly higher than normal for the time of year
- Rainfall significantly below average and/or soil moisture deficits significantly above average for periods of 2 months or longer

We utilise a range of modelling tools in our water resource assessments. A tool called Droughtwatch is used on a weekly basis to assess a range of scenarios for individual reservoirs to assess their risk of failing to meet demand (Figure 4). In support of this, UU also utilises the MISER supply system model for the larger, complex Integrated Resource Zone to guide regional level operating decisions and to assess risk across the whole water resource zone. Both these systems use the same 'probabilistic' (return-period) inflows to simulate how reservoirs or the system would perform over the coming year, and beyond, under a range of scenarios. The results from these assessments are used to assess the risks to reservoirs both in terms of drawdown and refill prospects. The interpretation of these results aids decisions on how the water supply system is managed.

Figure 4: Example droughtwatch plot, showing reservoir emptying under minimum historic inflows, but recovering under average inflows.



As drought intensifies we would also seek to use our Aquator water resources model, which represents key components of our raw water system in greater detail, to simulate how the system would behave under a repeat of historic inflows (as used for the drought trigger assessments in this plan), which would in turn guide drought actions.

UU and the EA have joint ownership of Droughtwatch and the EA have been consulted closely on the development of our Aquator water resources model. Water resources information, such as control curves, is shared between the organisations to ensure consistency. The EA periodically update historic inflow series and these are used to update our control curves and models including Droughtwatch, MISER and Aquator.

UU also has river recession curves which allow estimates of the time period that a river is predicted to remain available for abstraction i.e. until a set prescribed flow or hands-off flow is reached and abstraction is curtailed.

UU will liaise fully with the EA to discuss water resource modelling data and modelling approaches to ensure that decisions are made using robust and jointly agreed approaches.

3.6 HISTORIC DROUGHTS

The following historic droughts were the most severe within the UU supply area:

- 1933/4: a two season drought event concentrated in the south of UU's region
- 1963: a two month drought event affecting the West Cumbria Resource Zone
- 1975/6: a two season drought event that particularly affected the south of UU's region
- 1984: a single season summer drought event that particularly affected the north of UU's region including the Pennines
- 1995/6: a two season drought event that affected the whole of UU's region

Following customer experience of the drought event in 1995/6 UU introduced an improved level of service for water supply, with implementation of statutory water use restrictions and drought permits/orders not more than once in every 20 years on average. This improved level of service was effective from the year 2000 onwards. Since then there have been no drought permits/orders implemented and one hosepipe ban implemented for eight weeks during summer 2010.

Two more recent drought events, in 2003 and 2010, were not as severe as those listed above. In both these years UU implemented drought plans and applied for drought permits/orders, but the powers were never implemented because of subsequent rainfall. Figure 5 lists the Drought Permits and Orders that have been granted since 2000. Further information on drought permits and drought orders can be found in Section 8.6 including an explanation of the difference.

Dry weather during the autumn of 2002 and into 2003, caused reservoirs to not refill sufficiently over the winter. This in turn led to low reservoir storage later in 2003 which resulted in the need for UU to apply for three drought permits and one drought order at Windermere and Ullswater. These were granted just before Christmas 2003 following a 2-day Public Hearing. These powers were a contingency against continuing dry weather and allowed abstraction from Lake Windermere and Ullswater to continue at lower river flows than normally permitted. However due to rainfall in December 2003 and January 2004, none of the powers were implemented. The experience in 2003 shows that applications for drought permits/orders are often a precaution against continuing dry weather, but due to the length of time required for applications to be granted, applications are often made but are withdrawn or not actually implemented as weather conditions improve.

A dry spring and early summer in 2010 led to low reservoir storages in the West Cumbria and Integrated Resource Zones. A hosepipe ban was introduced on 9 July 2010 across the Integrated Resource Zone. The hosepipe ban was lifted on 19 August 2010 (note that "hosepipe bans" have now been replaced by new water use restrictions following new legislation. See the Introduction for

further detail). In addition, UU applied for the following four drought permits as a precaution against continuing dry conditions:

- Ennerdale (West Cumbria Resource Zone). A drought permit application to allow abstraction down to a lake level of 1.7 m was made to the EA on 24 June 2010. A Public Hearing date was being arranged when it rained, resulting in Ennerdale refilling in approximately three days. UU withdrew the application on 12 July 2010
- Windermere (Integrated Resource Zone). A drought permit application to reduce the hands-off flow to 95 Ml/d and to relax the rolling annual licence limit was made to the EA on 7 July 2010. However an improvement in weather conditions meant that the permit was no longer required. UU withdrew the application on 26 July 2010
- Rivington reservoirs (Integrated Resource Zone). A drought permit application to reduce compensation flows to Brinscall Brook and White Coppice to 2Ml/d each was made to the EA on 7 July 2010. However it then rained and the associated reservoirs refilled very quickly. UU withdrew the application on 2 August 2010
- Longdendale reservoirs (Integrated Resource Zone). A drought permit application to reduce the compensation flow to 22.5 Ml/d was made to the EA on 7 July 2010. As the south of the region remained very dry, the application was not withdrawn. The EA granted the drought permit on 29 July 2010, however, it was not implemented as the reservoirs never fell low enough, and the permit expired on 29 Jan 2011

The experiences in 2010 again show that applying for drought permit/orders is a precautionary approach, particularly in West Cumbria where the reservoirs are very flashy and can refill in a matter of days. Because of the time needed to determine applications for drought permits/orders, UU needs to make applications at reservoir storage levels higher than the point where the powers will be implemented. This means that UU will apply for drought permits/orders more frequently than they will be used.

Figure 5: Drought Permit/Orders UU have been granted since 2000

Date Granted	Location and Type	Order/ Permit	Details	Implemented
22 Dec 2003	Ullswater	Order	Temporary weir on River Eamont up to 145.12 m AOD, subject to maintaining a flow of 91 Ml/day. No powers sought to lower lake level	Not implemented
12 Dec 2003	Ullswater	Permit	Disregard overall limit of 45633 Ml a year	Not implemented
12 Dec 2003	Ullswater	Permit	Reduce prescribed flow to 169 Ml/d in Dec 2003 & Jan 2004	Not implemented
12 Dec 2003	Windermere	Permit	Disregard overall limit of 36505 Ml a year. Abstract up to 205 Ml/d providing flow to R Leven is at least 91 Ml/d. No powers sought to lower lake level.	Not implemented
29 July 2010	Longdendale	Permit	Reduce compensation water from Bottoms Lodge Reservoir into the River Etherow to 22.5 Ml/d.	Not implemented

3.7 LESSONS LEARNT FROM PREVIOUS DROUGHTS

As each drought has different characteristics, such as the area affected and the water sources at risk, UU has learnt lessons from each drought event that has been experienced. Following the 2010 drought event, UU and the EA undertook a joint “lessons learnt” exercise identifying improvements in the areas of governance and resilience; communications, communities and

partners; environment; drought plans, drought permits and orders. Progress is tracked at each UU-EA bi-monthly water resources meeting. The key lessons learnt were:

- UU's weekly multi-agency drought communication telephone conference call and weekly update reports were very successful
- Closer working relationships needed between UU, EA, Natural England, Canal and River Trust, National Farmers Union and other partners at all levels
- The need for earlier proactive communication with customers about the evolving water resources situation
- A process for managing compensation-only reservoirs during drought is needed
- Develop further the sensitivity analysis for bringing contingent and non-commissioned water sources on line (e.g. time, volume, quality, treatment needs etc.)
- Environmental monitoring arrangements for drought, especially for drought permits and orders, need to be clear and up to date
- Biennial drought exercises to test the drought plan and drought readiness checks. A joint UU-EA drought exercise was held on 9 October 2013 and future events are planned every other year

Where appropriate these lessons have been incorporated in to this drought plan. The lesson captured in the latter two bullets was the need to ensure we are "drought ready" for drought permit/orders, because of the burden of collating and agreeing large amounts of information in a short period of time. UU has collated information for all drought permit/order sites included in this plan (Figure 6). In 2013 we agreed Environmental Monitoring Plans for all drought permit/order sites included in this plan with the EA, Natural England and Natural Resources Wales (as appropriate). It has been agreed that in the future the EA will be responsible for making drought permit/order applications for compensation-only reservoirs. These are reservoirs from which UU do not abstract and whose purpose is to release water to a downstream river and they include Hollingworth Lake, Belmont and Walverden.

Drought option forms have also been included in this plan for contingent and non-commissioned sources that explain the issues associated with bringing these water sources in to operation.

The lessons learnt exercise also highlighted a need for effective maintenance of particular abstraction points ahead of drought events. UU has developed a strategy to ensure activities such as gravel clearance around intakes and compensation points occurs regularly and therefore do not result in issues during drought periods.

Figure 6: Example drought permit/order application information

For each drought permit/order site, United Utilities is collating the following information to ensure we are in a state of readiness in the event of needing to make an application in an actual drought event. The need for such documentation was a key lesson learnt from the 2010 drought experience	
1	Application for the Drought Permit/Order
2	Draft of the Drought Permit/Order
3	Draft Statement in Support of the Drought Permit/Order Application
4	Location Map
5	Draft Notice of Application for the Drought Permit/Order
6	Draft Notices to Relevant Parties, and details of those on whom notice would be served
7	Abstraction Licence
8	Relevant Act(s) of Parliament
9	Environmental Report
10	Draft of Press Notice, and details of local newspapers for published notices
11	Local venues suitable for the public to view a copy of the application

3.8 STANDING DOWN OF DROUGHT MEASURES

This plan outlines drought triggers and other indicators for assessing the onset and progression of drought in each of our resource zones. Specific triggers for defining the exiting or end of drought have not been developed as the end of drought depends upon the level of risk of re-crossing triggers at a later date, and such risks need to be considered at a resource zone level. Instead, a range of indicators will be assessed to identify the end of drought status, including:

- Level of storage compared to drought triggers in key reservoirs
- Relative storage position across the resource zone
- Current levels of demand compared to normal levels
- Rainfall and weather forecasts for the next 7-30 days
- Previous rainfall against return-period and an assessment of whether soil moisture deficits have returned to normal for the time of year
- Status of groundwater sources and/or levels at observation boreholes
- Availability of pumping from lakes/rivers to assist further recovery of reservoir storage

Continual assessments of supply security will form the basis of UU's decisions relating to the standing-down of drought measures. As with the implementation of drought measures, the standing-down of drought measures will be fully discussed with the EA. Even though recovery in water resources may result in a drought trigger being reached again, the decision to stand down drought measures will also be based on factors such as future prospects for water supplies. The rate at which measures are relaxed will depend upon this assessment of supply security. In general, those measures that have the greatest adverse effect on customers and the environment will be relaxed first.

Communications with customers, EA, Natural England, Ofwat, Consumer Council for Water and other interested parties will continue during the period of water resource recovery to explain our actions and to thank customers for their help in conserving water.

3.9 POST-DROUGHT ACTIONS

Following a drought event, UU will undertake a review of the drought management process jointly with the EA and Natural Resources Wales to highlight lessons learnt. If appropriate, discussions will also be held with other stakeholders (see table in Appendix A9.5) to review lessons learnt. Any issues arising will be implemented as soon as practical and will be incorporated into the next update of our drought plan. UU regularly reviews its drought plan, in consultation with the EA, and the full plan is revised every 3½ years, or earlier in the event of a material change, and undergoes a public consultation.

Following the 2010 drought, UU and the EA jointly reviewed the drought event and produced a joint lessons learnt paper (see Section 3.7). This covered the following key areas: governance and resilience; communications, communities and partners; incidents, monitoring and enforcement; permits, orders and hearings. For each lesson, specific actions, responsible person and due dates were identified and progress was reviewed at the regular UU-EA bi-monthly water resources meetings.

3.10 DROUGHT MANAGEMENT STRUCTURE

In the event of drought, UU will determine the most appropriate management structure to deal with the developing situation considering the severity and extent of the drought. Figure 7 shows a typical management structure which may be adopted.

Decisions on all drought management actions will be taken by UU at a regional level. Actions will be introduced in those areas where they are considered appropriate and this will depend on the measure under consideration and the prevailing circumstances. The following chapters of this plan provide details of the range of potential drought management actions specific to each of our four water resource zones. It will not always be the case that a measure will be applied across the whole of a resource zone or across all resource zones.

The following chapters outline the drought triggers that have been developed for each of UU's four water resource zones. Drought actions are linked to these drought triggers.

Figure 7: UU drought management structure

Responsibility	Group
Overall responsibility for drought policy and management decisions (including decisions on water use restrictions and applications for drought permits/orders)	United Utilities Water PLC Board
Responsibility for implementing drought management strategy This group will be established at Drought Trigger 1 and typically meet weekly below Drought Trigger 2	Executive Drought Management Group, comprising: Managing Director (Chair) Corporate Affairs Director Customer Services Director Water Services Director Head of Strategic Asset Planning - Water
Day-to-day responsibility for managing and implementing the drought plan This group will be established at Drought Trigger 1 and meet more frequently than the Executive Drought Management Group	Drought Coordination Group, comprising senior managers from Water Services (Chair) Water Network Operations Strategic Asset Planning Capital Delivery Emergency Planning and Response Customer Operations Customer Communications

4 INTEGRATED RESOURCE ZONE DROUGHT TRIGGERS

4.1 ASSESSMENT OF DROUGHT

UU undertakes regular assessments of the security of water supplies, in discussion with EA water resources staff where appropriate. These assessments provide the basis for recognising drought conditions at an early stage. Our assessments in the Integrated Resource Zone will take account of a range of water resource indicators, including:

- High probability of sources failing to meet demand or failing to refill sufficiently
- Substantial numbers of local reservoir sources in the Pennines and south Lakes well below control curve for the time of year
- Rapid decline in stocks (or slow rise in stocks during winter) of key strategic reservoirs
- Magnitude and duration of peak demands significantly higher than normal for time of year
- Storage in the River Dee Regulating Reservoirs falling towards the drought trigger level and/or releases to the River Dee are required outside of the “normal” regulation period
- Rainfall significantly below average for periods of 3 months and longer
- Soil moisture deficits significantly above average for periods of 3 months or longer
- Prolonged low flow conditions on the River Lune, Eamont and Leven preventing abstraction from the River Lune, Ullswater and Windermere
- Significant decline in groundwater levels as measured at key observation boreholes in the major aquifers (Fylde, Cheshire and Merseyside)

4.2 DROUGHT TRIGGERS

4.2.1 Introduction

The management of water supplies during drought conditions represents a progression of actions that reflect the severity, geographical extent and speed of development of the drought. UU has identified four triggers that act as decision-points for drought management actions. For the Integrated Resource Zone, these triggers have been developed in consultation with the EA based on storage in our large reservoir systems using experience from past drought events. There is no drought trigger for the Pennines reservoir group, which comprises over 100 reservoirs, as this would mask local issues.

Movement between triggers, and therefore drought management actions, will occur when the regular assessments of supply security indicate that further measures are required to safeguard essential water supplies. The nature of the triggers varies for each resource zone. Drought actions may be applied either company wide, by resource zone or to target a specific geographic area. This drought plan contains a range of potential drought management options available to UU. In the event of a drought, a specific set of actions will be implemented depending on the prevailing situation which will be set out in a Drought Action Plan produced at the time.

The triggers vary from month to month reflecting differing seasonal hydrological drought patterns. UU has undertaken modelling using the Aquator water resource modelling package to derive the trigger curves using a range of historic drought events.

The Integrated Resource Zone drought triggers presented in the Final Drought Plan 2013 have not been altered for this plan.

4.2.2 Haweswater Drought Triggers

The drought triggers for Haweswater in UU's 2008 Final Statutory Drought Plan were updated for our Final Drought Plan 2013 (see Figure 9) to reflect recent drought experience, consultation responses and the implementation of new legislation and guidance, and to reflect changes to UU's supply system. The triggers include an enhanced monitoring period between February and May to reflect the enhanced attention to the water resources situation during this period when the drought triggers are at their highest.

The number and location of drought permit/order applications is largely dependent on the time of year and the prevailing water resources situation (i.e. drought severity). Applications are also likely to be phased in priority order as the drought progresses. For these reasons, an explicit trigger marking the point of application is not included. Figure 9 includes an indicative storage curve showing when the first drought permit/order applications are likely to be made. This is expected to be at least 1 week after the first actions associated with Trigger 3.

4.2.3 Dee Drought Triggers

The drought triggers for the Dee in UU's 2008 Final Statutory Drought Plan were updated for our Final Drought Plan 2013 to reflect recent drought experience, consultation responses, the implementation of new legislation and guidance, and to reflect changes to UU's supply system as well as to ensure compliance with the Dee General Directions (see Figure 10). Like Haweswater, the Dee triggers include an enhanced monitoring period between February and May to reflect the enhanced attention to the water resources situation during this period.

The background to the Dee General Directions can be found in Section 3.3. UU manages its abstraction from the River Dee in line with these directions, including reducing abstraction according to the various drought stages in the Dee General Directions.

UU operates its abstractions from the River Dee in an integrated manner with other supplies in the Integrated Resource Zone. This requires UU to take action earlier than specified in the Dee General Directions and therefore UU's Dee drought trigger curves are set at higher storage levels than the three stages specified in the Dee General Directions. UU has undertaken modelling using the Aquator water resources modelling package (the Dee component was developed in conjunction with Environment Agency Wales to derive its Dee drought triggers (see Figure 10).

The relationship between UU's four Dee triggers and the EA's three Dee General Direction stages is:

- UU Drought Trigger 1 is positioned above the Stage 1 Dee General Directions curve in order to conserve storage in the Dee reservoirs during a potential drought event. The average difference is 9% of gross storage.
- UU Drought Triggers 2 and 3 are positioned above the Stage 2 Dee General Directions curve. Trigger 3 would see UU consider implementing voluntary water use restrictions and the average difference between UU Drought Trigger 2 and the Stage 2 Dee General Directions curve is 4% of gross storage.
- UU Drought Trigger 4 is the trigger where statutory water use restrictions would be considered. Water use restrictions might not be imposed if regulation releases were not required from the Dee reservoirs to support abstraction as there would be no benefit from imposing water use restrictions. However if there were wider zonal benefits, or a forecast that Dee regulation may be imposed, we might implement water use restrictions. UU Drought Trigger 4 is positioned above the Stage 3 Dee General Directions curve which requires water companies to impose water use restrictions and a non-essential use ban. The average difference is 6% of gross storage.

By positioning the UU Drought Triggers at higher levels than Stages 1-3 of the Dee General Directions, modelling has shown that storage would not fall below Stage 3 with a repeat of any of the drought events over the modelled record period (commencing 1927).

4.3 DROUGHT TRIGGER TESTING

To prove the robustness of the Integrated Resource Zone drought triggers, they have been tested using the Aquator water resources simulation package. The Integrated Resource Zone model uses dry weather demands and water supply system arrangements to reflect the period covered by this plan, including the new West-East link. It therefore shows how UU's current system would cope with a repeat of historic drought events. The model has been developed in close consultation with the EA and the model's performance verified.

In accordance with EA guidance, a wide range of drought events have been used to test the robustness of the drought triggers. This modelling exercise covers the period 1927 to 2010 and includes a wide range of historic drought events including the single season 1984 and 2010 events, as well as a range of two-season events in 1995/96, 1933/34 and 1975/76. In terms of criticality, both the 1995/96 and 1984 events are considered to be the most severe droughts for the Integrated Resource Zone supply system.

A range of sensitivity tests have been completed within the models, and in accordance with EA guidance, more severe droughts than those on record have been used to verify drought trigger robustness. In particular longer, three-season drought events have been examined based on extending the 1995/96 drought sequence with a repeat of the inflows for 1995 and 1996 in a third drought year. These have shown the triggers to be robust.

Figure 8 shows the estimated frequency of crossing the Haweswater and Dee drought triggers based on the 84-year record (1927 to 2010):

Figure 8: Estimated average frequency of crossing Haweswater and Dee drought triggers

Trigger	Haweswater	Dee
Trigger 1	1 in 3 years	1 in 8 years
Trigger 2	1 in 5 years	1 in 14 years
Trigger 3	1 in 12 years	1 in 28 years
Trigger 4	1 in 28 years	1 in 42 years

The frequency of crossing drought triggers is considered to be an acceptable balance to allow sufficient time for actions during severe drought events. The results show that UU's level of service of 1 in 20 years (as in the Water Resources Management Plan 2009) is met for crossing Trigger 4 when statutory water use restrictions are expected to be imposed. Trigger 4 is crossed in four events over the 84-year record, approximately a 1 in 20 year frequency:

- Haweswater and River Dee Trigger 4 crossed in 1984 (1 event)
- Haweswater Trigger 4 also crossed in 1976 and 1995/96 (2 events)
- River Dee Trigger 4 also crossed in 1933/4 (1 event)

The 2010 drought does not appear in this list, predominantly due to the benefit of the new West-East link which is included in the model. If, in 2010, the West-East link had been available to move water from sources in the South and West of UU's area to areas normally supplied by Haweswater, we would have approached Trigger 3 and then seen a recovery due to rainfall. This would have avoided the need to apply for drought permits to protect water supplies in the Integrated Zone.

Although Trigger 1 is crossed relatively frequently, approximately 1 in 3 years, at this point we will not be experiencing widespread drought conditions. At this stage it simply means that there is a

heightened risk of drought. Trigger 1 is the time to start taking actions as a precaution against the risk of continued dry weather.

Example outputs from scenario modelling to compare modelled storage to the drought triggers for key drought events are shown for Haweswater (Figure 11) and Dee (Figure 12). The low levels of storage reached in these severe drought events emphasises the need for drought permits/orders to be implemented at around the same frequency as statutory water use restrictions (i.e. once in every 20 years), represented by Trigger 4.

Our models reflect current infrastructure arrangements and demand levels. For the Integrated Resource Zone this includes the West to East link main which was commissioned in 2012 that allows us to provide greater support to the demand areas supplied by Haweswater (i.e. Manchester). The model also uses current dry year demands which are significantly lower than historic demand levels due to higher levels of leakage in the past. Therefore modelled storages in Haweswater are greater than the actual storages seen during historic drought events. For example, in September 1995 the actual minimum storage reached in Haweswater was 0.35% but the modelled minimum storage is higher at 22% (see Figure 11) as the model uses current infrastructure arrangements and demand levels. Similarly in September 1976 the actual Haweswater minimum storage was 27% but the modelled minimum is 33% (see Figure 11). The benefit of the current infrastructure varies for each historic drought depending on its nature, for example the geographical areas affected.

Figure 9: Haweswater drought triggers

Note that the drought triggers show the indicative point of commencing drought permit/order applications approximately one week after Trigger 3 is reached

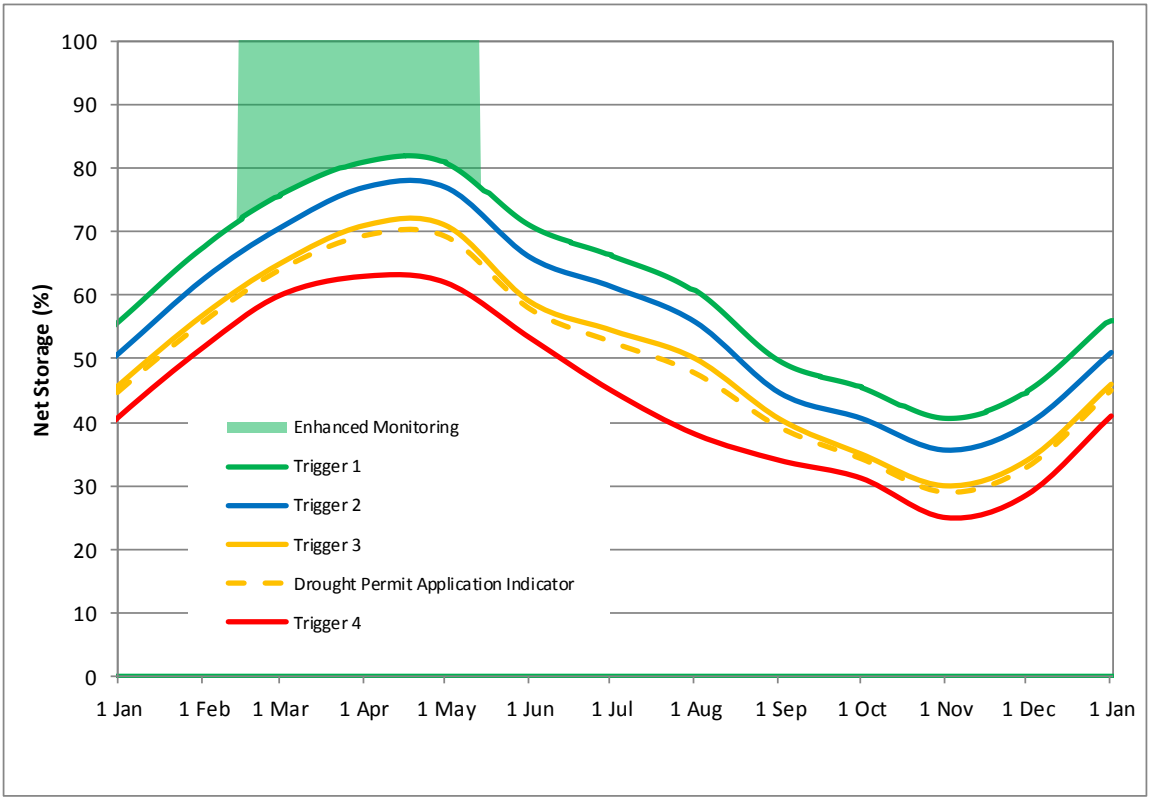


Figure 10: UU Dee drought triggers

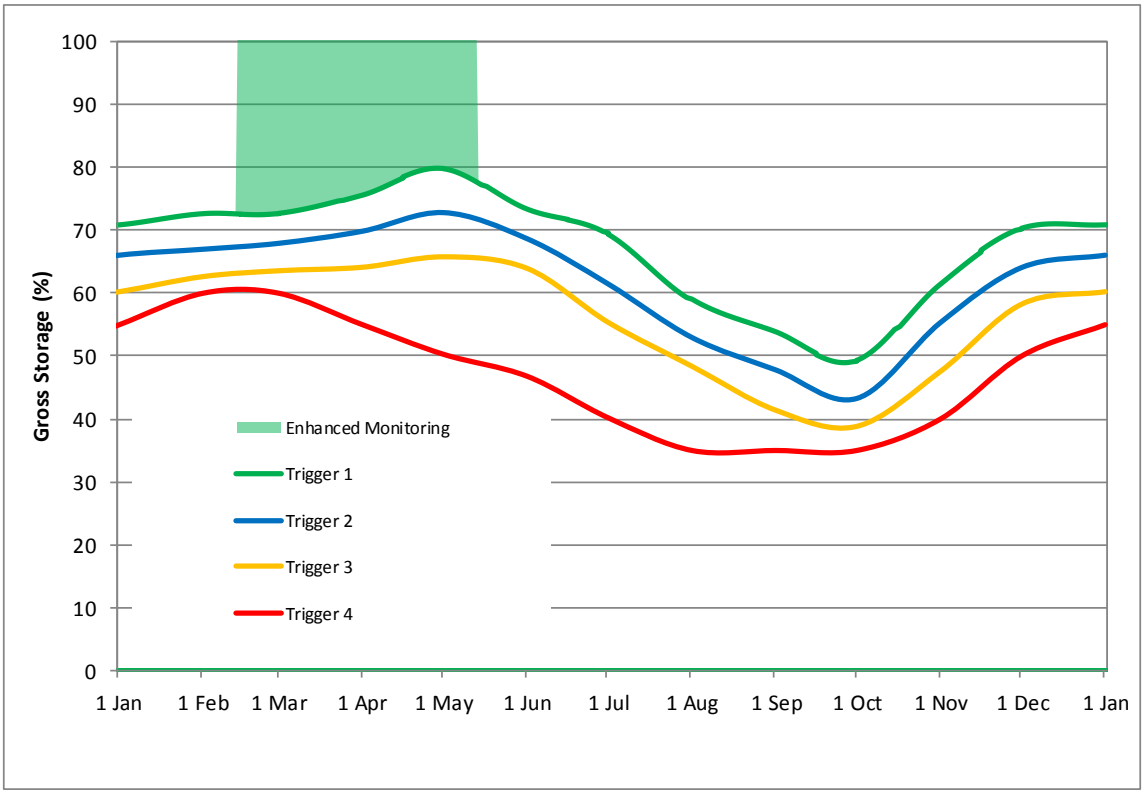


Figure 11: Example Haweswater drawdown scenarios in 1976, 1984 and 1995/96 against drought triggers

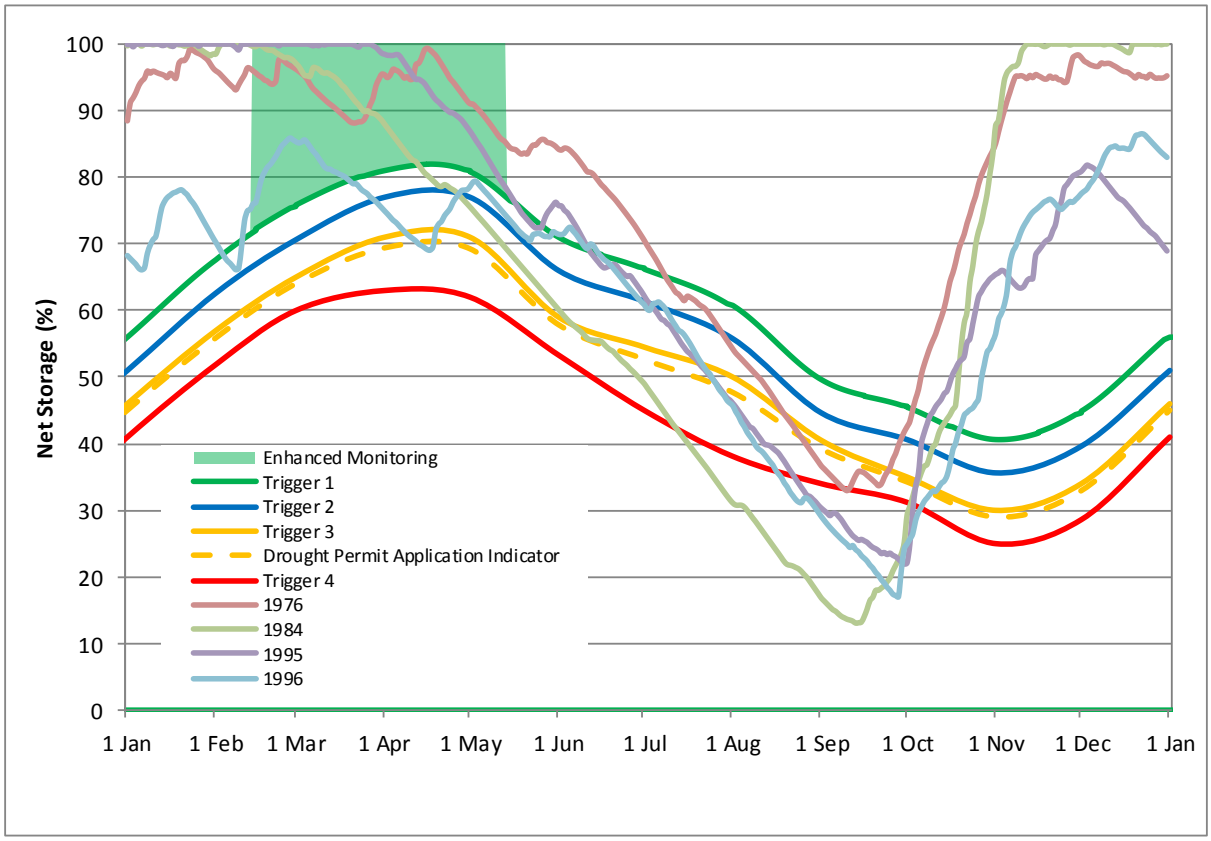
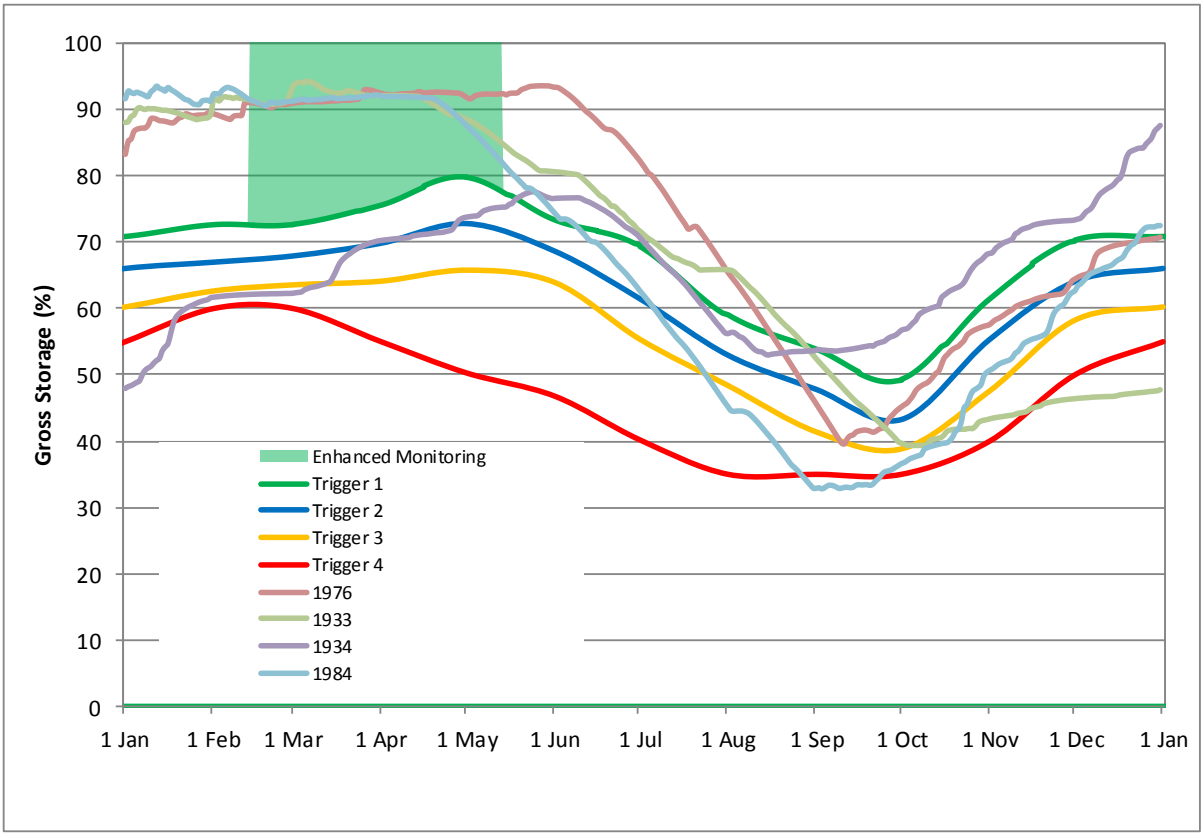


Figure 12: Example Dee drawdown scenarios in 1933/34 and 1984 against drought triggers



5 WEST CUMBRIA RESOURCE ZONE DROUGHT TRIGGERS

5.1 ASSESSMENT OF DROUGHT

UU undertakes regular assessments of the security of water supplies, in discussion with EA water resources staff where appropriate. These assessments provide the basis for recognising drought conditions at an early stage. Our assessments in the West Cumbria Resource Zone will take account of a range of water resource indicators, including:

- High probability of sources failing to meet demand or failing to refill sufficiently
- Rainfall significantly below average for 2 months or more
- Ennerdale Water and Crummock Water lake levels approaching their drought triggers and consistently falling
- Storage at Chapel House and Overwater reservoirs at or below 50% full and falling
- Scales boreholes operating at a high level of abstraction
- River flows at Aughertree Springs, Hause Gill, Dash Beck and River Ellen at low levels and continuing to decline
- Rapid decline in storage (or slow rise in storage during winter) of Chapel House and Overwater reservoirs, Ennerdale Water and Crummock Water
- Magnitude and duration of peak demands significantly higher than normal for the time of year

5.2 DROUGHT TRIGGERS

5.2.1 Introduction

The management of water supplies during drought conditions represents a progression of actions that reflect the severity, geographical extent and speed of development of the drought. UU has identified four triggers that act as decision-points for drought management actions. Drought triggers for the West Cumbria Resource Zone have been developed in consultation with the EA based on storage in Ennerdale and Crummock. Drought triggers have also been developed for the Scales boreholes based on actual abstraction compared to the annual licence limit.

Movement between triggers, and therefore drought management actions, will occur when the regular assessments of supply security indicate that further measures are required to safeguard essential water supplies. The nature of the triggers varies for each resource zone and source. Drought actions may be applied either company wide, by resource zone or to target a specific geographic area. This drought plan contains a range of potential drought management options available to UU. In the event of a drought, a specific set of actions will be implemented depending on the prevailing situation which will be set out in a Drought Action Plan produced at the time.

Both Ennerdale Water and Crummock Water have high levels of environmental designation. Ennerdale Water is a Site of Special Scientific Interest (SSSI) and, downstream of the lake, the River Ehen is both a SSSI and a Special Area of Conservation (SAC). Crummock Water and the River Cocker are both part of a SSSI and a SAC. This makes the selection of drought options difficult and this is discussed in Section 8.8. At Ennerdale Water, we have sought to provide 28 days between Trigger 3 and reaching the hands-off lake level of 1.7m below weir crest to allow time for Defra to determine any drought order applications. We recognise that this is less than the typical 56 day application period for Drought Orders. At Crummock, which is less sensitive to drought than Ennerdale, there is at least 35 days between Triggers 3 and 4.

5.2.2 Ennerdale Water and Crummock Water Drought Triggers

Drought triggers have been produced for key stored water resources in the West Cumbria Resource Zone: Ennerdale Water and Crummock Water. The triggers are shown in Figure 13a

including a comparison between the 2013 Final Drought Plan and 2014 Final Drought Plan triggers for Ennerdale. The intervals between the Final Drought Plan 2014 Ennerdale triggers is shown in Figure 13b – the intervals with both average and worst case drawdown rates are given to show the impact that drought severity can have on the time available to implement actions.

Figure 13a: Ennerdale and Crummock drought triggers

Trigger	Ennerdale Water level (m below weir crest)		Crummock Water level (m below weir crest)
	2013 Final Plan	2014 Final Plan	
Trigger 1	0.55	0.55	0.26
Trigger 2*	0.86	0.92	0.44
Trigger 3*	1.14	1.05	0.63
Trigger 4†	1.65	1.65	1.1

* Note some of the actions associated with Trigger 3 at Ennerdale Water in the Final Drought Plan 2013 have moved up to Trigger 2 in this plan

† Note that to abstract below Trigger 4 at Crummock Water and below 1.7m at Ennerdale Water would require a drought permit/order to be in force

Figure 13b: Ennerdale drought trigger intervals

Trigger	Average drawdown	Worst case drawdown
Trigger 1-2	18	13
Trigger 2-3	7	5
Trigger 3-4	26+	22+
Trigger 4 – drought order implementation	2+	2+

+ The water resource model shows that Ennerdale Water never reaches Trigger 4 and so the time interval between Triggers 3 and 4 and between Trigger 4 and 1.7m below weir crest level (when a drought order is needed) is estimated using the drawdown rate. For “average” a drawdown rate of 2.3cm/day is used and for the “worst case” a drawdown rate of 2.7cm/day is used. The table shows that for the “average” drawdown rate there are 28 days between Trigger 3 and drought order implementation. The “average” drawdown rate is the average drawdown rate in the 28 days before reaching the minimum modelled lake level in the three worst drought years on record (1976, 1978 and 1963). The “worst case” drawdown rate is the fastest drawdown rate seen over a 7 day period in the same three worst drought years of 1976, 1978 and 1963

The drought triggers for Ennerdale Water and Crummock Water in our 2008 Final Statutory Drought Plan were updated for the Final Drought Plan 2013 to rebalance the time interval between Triggers 1 and 3 to provide more time for management actions between Triggers 1 and 2. In addition, the Ennerdale Water triggers were revised to take account of the Environmental Damage Regulations notice issued by the Environment Agency (in consultation with Natural England) in December 2012 which required higher compensation flows to the downstream River Ehen and allowed abstraction to continue down to 1.7m below the weir crest (see Section 8.8 for further information).

Our previous Final Drought Plan 2013 provided 21 days between Triggers 3 and 4 at Ennerdale Water to allow for the implementation of statutory water use restrictions - there were no drought permit/order options for Ennerdale Water in the Final Drought Plan 2013. Following subsequent discussions with Defra about actions required to further protect the River Ehen SAC, drought options at Ennerdale have now been included in this plan; including a drought order, earlier and more frequent restrictions on customers’ water use and tankering of treated water to help support Ennerdale Water at times of drought. To allow time for Defra to determine a drought order application we have also revised the drought triggers to provide 28 days between Trigger 3 and

reaching the hands-off lake level limit of 1.7m; this timescale is only a guide and the actual determination duration could exceed this.

We also revised the actions associated with drought triggers at Ennerdale Water to reflect the nature of this sensitive site. We have moved implementation of voluntary water use restrictions up from Trigger 3 to Trigger 2 to allow these restrictions to be in place for an average of 7 days prior to a drought order application at Trigger 3. Statutory water use restrictions will occur at Trigger 4 ahead of the need to implement a drought order at Ennerdale Water. On reaching Trigger 3 we have also included the commencement of tankering of treated water to the service reservoirs associated with Ennerdale Water. Tankering will increase if a drought order is implemented. This ensures that all feasible demand management and supply measures are adopted ahead of a drought order application at Ennerdale Water.

As part of our review of the Ennerdale triggers for this plan we have also updated the Aquator water resource model to take account of the updated Environmental Damage notice issued by the EA in May 2013 (which replaced the December 2012 version) and an updated Ennerdale inflow series produced by the EA.

These changes have resulted in Trigger 2 moving from 0.86m to 0.92m below weir crest level and Trigger 3 moving from 1.14m to 1.05m below weir crest level. Trigger 3 has had to move up to provide more time before reaching the hands-off lake level of 1.7m below weir crest to allow 28 days on average for Defra to consider a drought order application before its implementation is required. Trigger 2 has moved down slightly as the duration between Triggers 2 and 3 has reduced from 14 days to 7 days as Trigger 2 now represents implementation of voluntary water use restrictions at Ennerdale and this allows, on average, for these to be in place for 7 days before a drought order application is made. The lowering of Trigger 2 has consequently increased the time between Triggers 1 and 2 allowing more time for the associated drought management actions. Triggers 1 and 4 remain at the same position as in the Final Drought Plan 2013.

The drought triggers presented for Crummock Water in the Final Drought Plan 2013 have not been altered for this plan although the frequency of trigger crossing and the time intervals between the triggers has changed. This is because the West Cumbria Aquator water resource model used for both the Ennerdale Water and Crummock Water drought trigger assessment has been updated as explained above and this affects the results for Crummock Water.

Like Haweswater and the Dee, the Ennerdale Water and Crummock Water triggers include an enhanced monitoring period above Trigger 1 to reflect the need to closely monitor the water resources situation at all times given the rapid response of these sources to drought.

Both Ennerdale Water and Crummock Water are natural lakes raised by weirs constructed at the outlet into the downstream river. Both lakes extend for a significant depth beyond the level at which UU ceases abstraction.

The catchments of Ennerdale Water and Crummock Water are generally wet, with around 1,800 mm of rainfall in a typical year. The catchments are steep and rocky in nature and therefore exhibit rapid run-off of rainfall into the lakes – this means that there is little retention of water in the catchment. During even relatively short periods of dry weather there can be very little flow into the lakes and the lake levels can therefore drop rapidly. Such short periods of dry weather could occur during both summer and winter, with the latter potentially occurring during prolonged sub-zero temperatures.

In normal circumstances there is plenty of water for the environment and public water supply as the lakes will be full and spilling over the weirs. Once the weather stays dry and the lake levels drop, there is a fine balance between the flow released down the rivers, the water abstracted for public water supply and the rate of decline in lake level. Low lake levels have a visual impact because of exposed shoreline and ecological impacts because of exposed plants (macrophytes) and low river flows can also have ecological impacts.

The generally wet climate in West Cumbria means that it is extremely unlikely that the period of lake drawdown is more than around 60-90 days. However, during this period the lakes could reach historically low levels and reach the point where abstraction for public water supply is not currently licensed. Under the Ennerdale Environmental Damage Regulation notice UU are able to draw the lake down to 1.7m (see Section 8.8 for further detail). Trigger 4 for Ennerdale Water has been placed so that it meets UU's level of service for statutory water use restrictions of once in 20 years (or less) and is located just above the drawdown limit of 1.7m when a drought order would be required to lower the lake further. Trigger 4 at Crummock Water is set at 1.1m below weir crest level, which is the lake level at which the ability to release the compensation flow to the River Cocker by gravity is lost. Below this lake level the compensation flow release has to be pumped which requires a drought permit/order to be in place. Given the short critical periods at Ennerdale Water and Crummock Water, winter droughts are an equal risk as summer droughts. Therefore, flat trigger levels throughout the year are appropriate.

There is a history of drought orders for Ennerdale Water, particularly in the 1970s and 1980s. A change in the abstraction licence in the early 1990s, and a substantial decrease in industrial demand for water in the area, has reduced the need for drought powers in recent years. No drought permits/orders have been implemented at Crummock Water. Due to the short critical period of the West Cumbria Resource Zone there is only a limited range of drought management options available and these are discussed in Section 8.8.

5.2.3 Scales Boreholes Drought Triggers

The drought triggers for Scales in the Final Drought Plan 2013 (see Figure 14) rebalanced the time interval between Triggers 1 and 3 to provide more time for management actions between Triggers 1 and 2 and to increase the time interval between Triggers 3 and 4. The triggers presented for Scales boreholes in the Final Drought Plan 2013 have not been altered for this plan.

Chapel House reservoir is a balancing reservoir as it does not have its own catchment area but is supplied by abstractions from nearby sources that are transferred into the reservoir. Abstractions from Hause Gill, Dash Beck, the River Ellen, Longlands mine adit and Overwater reservoir all feed into Chapel House reservoir. These sources, together with abstraction from Aughertree Springs, supply the Quarry Hill water treatment works.

Maximum storage in Chapel House reservoir is less than 10 days water supply and so it is inappropriate to devise drought triggers for the Quarry Hill sources, including Scales boreholes, based on Chapel House reservoir storage. However, drought triggers have been developed for the Scales boreholes based on actual abstraction compared to the annual licence limit.

Initially during a drought event, the abstraction from the Scales boreholes would be increased within the daily abstraction licence limit (6 Ml/d) to enable the abstraction from Chapel House and Overwater reservoirs to be reduced. The need for a drought permit/order to vary the Scales boreholes annual licence limit (365 Ml) would be triggered by a prolonged period of very low inflows from the surface water sources to Chapel House reservoir, resulting in the need to increase our abstraction from the Scales boreholes to maintain supplies.

UU regularly monitors actual abstraction against the annual licence limit, and the decision to apply for a drought permit/order at Scales boreholes would be based on the year-to-date actual abstraction being at such a level that it is not practicable to adhere to the annual licence limit. A drought permit/order can only be applied for if there has been an exceptional shortage of rainfall, and therefore this criteria needs to be proved prior to an application being made.

The drought triggers in Figure 14 for Scales boreholes are based on a comparison of cumulative actual abstraction against the annual licence limit of 365 Ml/yr. As for the other sources in the West Cumbria Resource Zone, Ennerdale and Crummock, the triggers have a flat profile throughout the year.

Figure 14: Scales Boreholes drought triggers. Note that to abstract beyond Trigger 4 would require a drought permit/order.

Trigger	Cumulative Annual Abstraction (1 April – 31 March period)
Trigger 1	265 Ml
Trigger 2	287 Ml
Trigger 3	309 Ml
Trigger 4	365 Ml

5.3 DROUGHT TRIGGER TESTING

5.3.1 Ennerdale Water and Crummock Water Drought Triggers

To prove the robustness of the drought triggers for Ennerdale Water and Crummock Water (see Figure 13), they have been tested using the water resources simulation package, Aquator. The West Cumbria Resource Zone model uses dry weather demands and water supply system arrangements to reflect the period covered by this plan. It therefore shows how UU's current system would cope with a repeat of historic hydrological drought events.

In accordance with EA guidance, a wide range of drought events have been used to test the robustness of the drought triggers. This modelling exercise covers the period 1961 to 2010 and includes a wide range of historic drought events including 1963, 1978, 1980, 1983, 1995 and 2010. Given the nature of the resource zone these are all single season events. The 1978 drought event is the most severe event for Ennerdale Water over its modelled period of 50 years, closely followed by 1963, 1976 and 1984. For Crummock Water, the 1995/6 drought event is the most severe over its modelled record period of 50 years, with the 1983 and 1989 drought events close behind.

A range of tests have been carried out on the Aquator model run outputs to investigate the sensitivity of Ennerdale Water and Crummock Water to longer duration droughts and more intense drawdown rates than those seen in the historic record. These tests showed that Crummock Water is resilient to a more severe drought and would require approximately a doubling of the length of the worst drought on record to reach Trigger 4. However, Ennerdale Water is sensitive to both a longer duration drought and a more intense drawdown rate – a drought of only a few days longer than the worst on record would result in Ennerdale Water reaching Trigger 4 where a drought order is required to allow abstraction to continue.

Figure 15 shows the estimated frequency of crossing the Ennerdale Water and Crummock Water drought triggers based on the 50-year record (1961 to 2010).

Figure 15: Estimated average frequency of crossing Ennerdale Water and Crummock Water drought triggers

Trigger	Ennerdale Water	Crummock Water
Trigger 1	1 in 1.4 years	1 in 3.8 years
Trigger 2	1 in 2.6 years	1 in 12.5 years
Trigger 3	1 in 3.6 years	Less than 1 in 50 years
Trigger 4	1 in 25 years	Less than 1 in 50 years

The Aquator water resource model simulation run (see Figure 16) shows that based on the historic record period of 1961-2010, Trigger 4 at Ennerdale Water is never reached. However for our draft Water Resource Management Plan 2013 we undertook deployable output modelling in Aquator and this showed Trigger 4 crossing twice, giving a frequency of once in 25 years over the 50 year

record period – it is this frequency which is reported against Trigger 4 at Ennerdale Water in Figure 15. In Water Resources Management Plan modelling higher demands are used, which include a "headroom" allowance for uncertainty.

The frequency of crossing drought triggers is considered to be an acceptable balance to allow sufficient time for actions during severe drought events.

The results show that UU's level of service of 1 in 20 years is met for crossing Trigger 4 when statutory water use restrictions are expected to be imposed.

Example outputs from scenario modelling to compare modelled storage to the drought triggers for key drought events are shown for Ennerdale Water (Figure 16) and Crummock Water (Figure 17).

5.3.2 Scales Boreholes Drought Triggers

As with the Ennerdale Water and Crummock Water drought triggers, Aquator modelling was used initially to undertake an assessment of the frequency with which the drought triggers are crossed for the Scales boreholes. In this modelling the lower triggers were not crossed, and therefore a further assessment was carried out using historic abstraction volumes. This exercise compared actual historic abstraction volumes for the Scales boreholes during key drought events with the drought triggers (see Figure 18) showing that Trigger 4 was reached in 1995, 1996 and 2003. As abstraction from the Scales boreholes only commenced in 1989 there are no data available for drought events prior to this date.

UU has not previously sought a drought permit/order for the Scales boreholes. The abstraction licence was granted in 1997 and prior to this abstraction from this source was under a pump test consent with an annual limit of 1,460 Ml (significantly higher than the limit granted by the EA on the abstraction licence of 365 Ml). Therefore actual abstraction data for the 1995/6 drought event shows abstraction levels exceeding the current annual licence limit.

Figure 18 also shows the abstraction licence limit of 365 Ml being exceeded in 2003. A new abstraction licence was issued by the EA for Scales which came into effect on 1 April 2013; this altered the period to which the 365 Ml annual licence limit applies from 1 January – 31 December to 1 April – 31 March. For the period 1 January – 31 December 2003 the annual limit is not exceeded; however for the period 1 April 2003 – 31 March 2004 it is.

In recent years abstraction from the Scales boreholes has reduced significantly with all years from 2006 seeing less than half the annual licence limit being abstracted. Based on this the frequency with which drought powers would be implemented is expected to be less than once in 20 years.

Figure 16: Example Ennerdale Water drawdown scenarios for key drought events against drought triggers

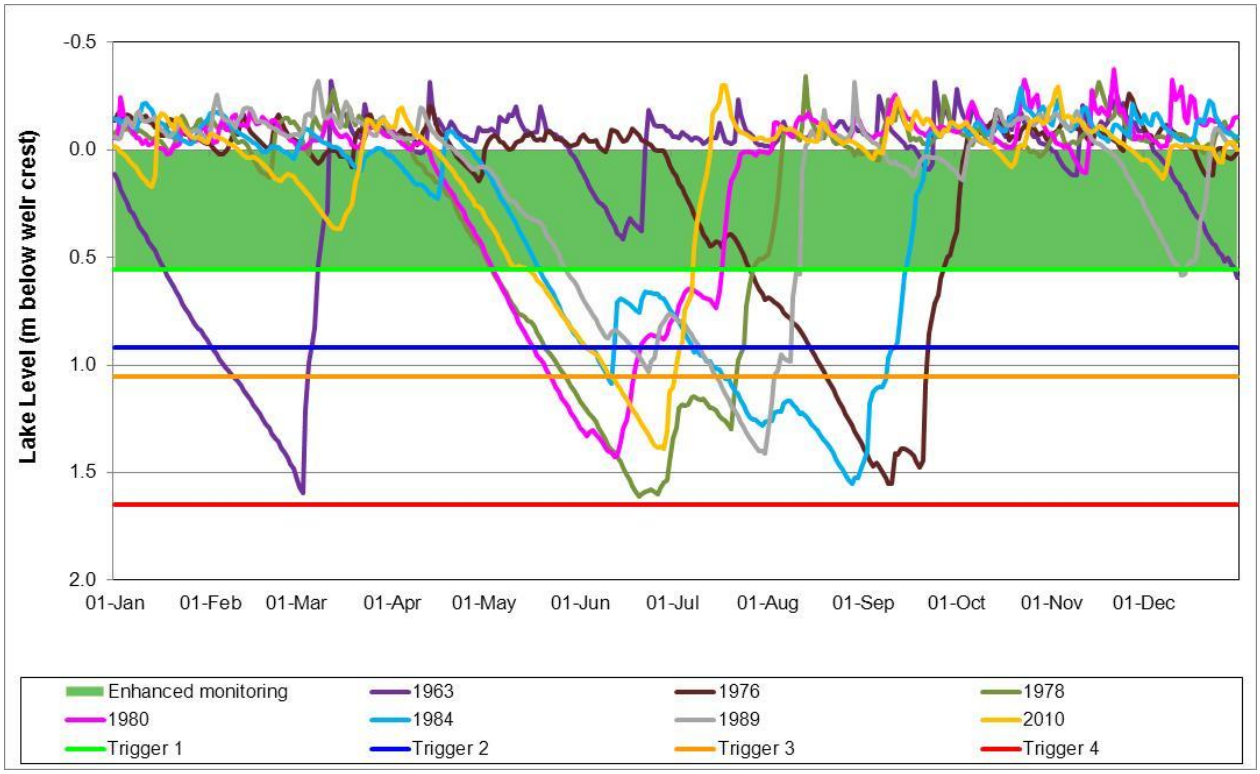


Figure 17: Example Crummock Water drawdown scenarios for key drought events against drought triggers

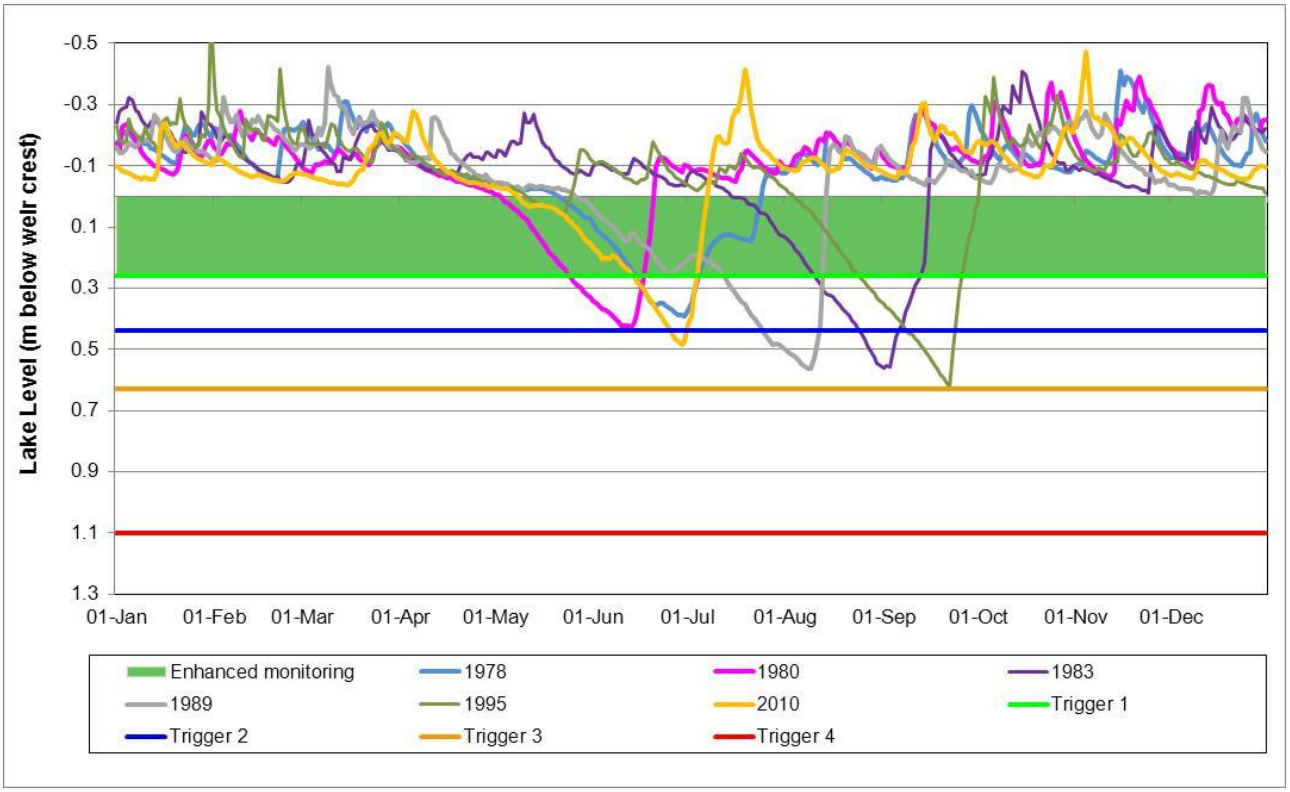
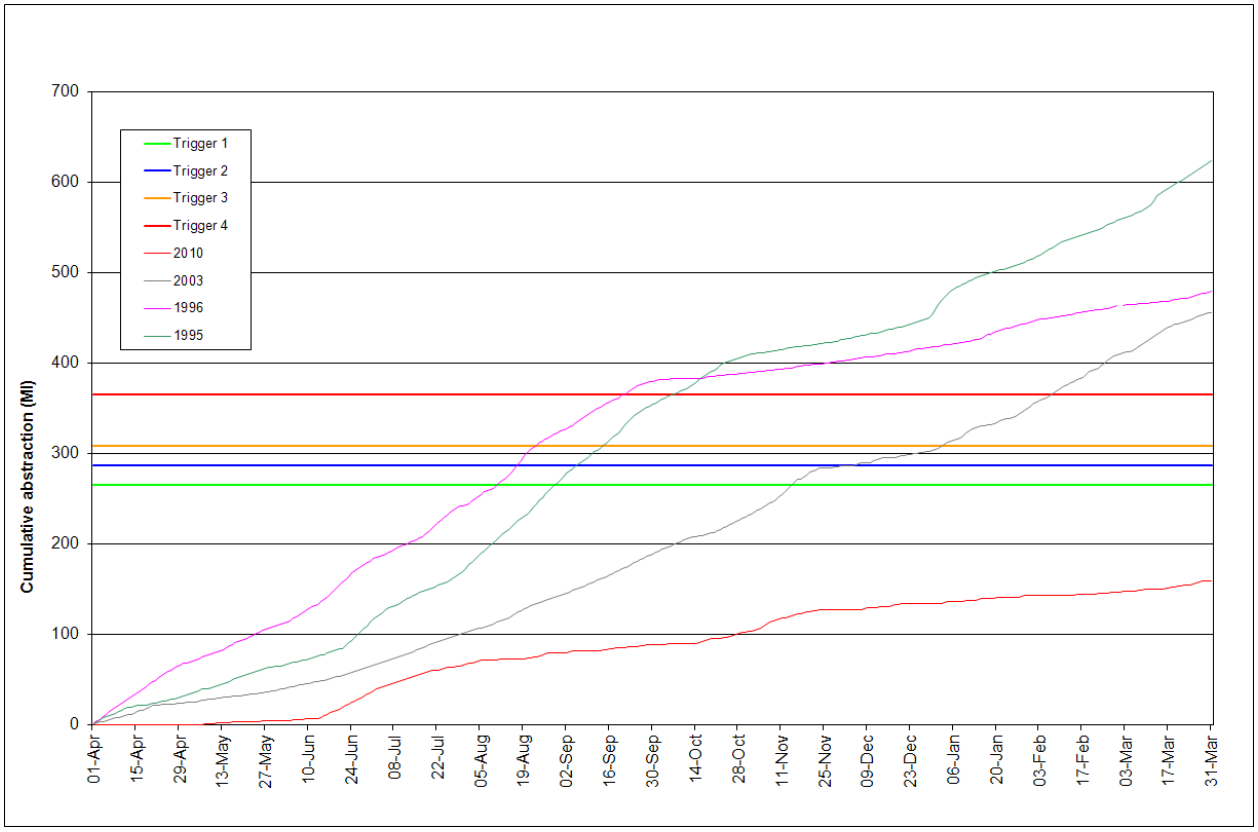


Figure 18: Scales Boreholes actual abstraction scenarios for key drought events against drought triggers



6 CARLISLE RESOURCE ZONE DROUGHT TRIGGERS

6.1 ASSESSMENT OF DROUGHT

UU undertakes regular assessments of the security of water supplies, in discussion with the EA water resources staff where appropriate. These assessments provide the basis for recognising drought conditions at an early stage. Our assessments in the Carlisle Resource Zone will take account of a range of water resource indicators, including:

- High probability of sources failing to meet demand or failing to refill sufficiently
- Rainfall significantly below average for 3 months or more
- Storage in Castle Carrock reservoir at or below 70% full and falling
- Low flows on the River Gelt preventing, or severely limiting abstraction, and low inflows from Geltsdale Springs
- Rapid decline in storage (or slow rise in storage during winter) of Castle Carrock reservoir
- Magnitude and duration of peak demands significantly higher than normal for the time of year

6.2 DROUGHT TRIGGERS

6.2.1 Introduction

The management of water supplies during drought conditions represents a progression of actions that reflect the severity, geographical extent and speed of development of the drought. UU has identified four triggers that act as decision-points for drought management actions. Drought triggers for the Carlisle Resource Zone have been developed in consultation with the EA based on storage in Castle Carrock reservoir.

Movement between triggers, and therefore drought management actions, will occur when the regular assessments of supply security indicate that further measures are required to safeguard essential water supplies. The nature of the triggers varies for each resource zone. Drought actions may be applied either company wide, by resource zone or to target a specific geographic area. This drought plan contains a range of potential drought management options available to UU. In the event of a drought, a specific set of actions will be implemented depending on the prevailing situation which will be set out in a Drought Action Plan produced at the time.

6.2.2 Castle Carrock Drought Triggers

The drought triggers for Castle Carrock in UU's 2008 Final Statutory Drought Plan were updated for the Final Drought Plan 2013 (see Figure 19) with Trigger 2 adjusted to rebalance the time interval between Triggers 1 and 3 to provide more time for management actions between Triggers 1 and 2. The triggers presented in the Final Drought Plan 2013 have not been altered for this plan.

Given the short critical period of the Carlisle Resource Zone, winter droughts are equally a risk as summer droughts, therefore flat trigger levels throughout the year are appropriate.

UU is not proposing any drought permit/order applications in the Carlisle Resource Zone, therefore no triggers for such actions are required. Changes to the River Eden abstraction licence in 2003 and improvements to the supply system in the zone mean that extensive drought management actions, including drought permit/order applications, are unlikely to be required during a drought as severe as the worst on record.

Figure 19: Castle Carrock drought triggers

Trigger	Gross storage in Castle Carrock reservoir
Trigger 1	674 Ml
Trigger 2	536 Ml
Trigger 3	440 Ml
Trigger 4	387 Ml

6.3 DROUGHT TRIGGER TESTING

To prove the robustness of the drought triggers for Castle Carrock (see Figure 19), they have been tested using the water resources simulation package, Aquator. The Carlisle Resource Zone model uses dry weather demands and water supply system arrangements to reflect the period covered by this plan, which includes the pumped pipeline from the River Eden to Castle Carrock reservoir. It therefore shows how UU's current system would cope with a repeat of historic hydrological drought events.

In accordance with EA guidance, a wide range of drought events have been used to test the robustness of the drought triggers. This modelling exercise covers the period 1976 to 2010 and includes a wide range of historic drought events including 1976, 1995, 1996 and 2003. Given the nature of the resource zone these are all single season events. In terms of criticality, both the 1976 and 1996 events are considered to be the most severe droughts for the Carlisle Resource Zone supply system.

A range of sensitivity tests have been completed within the models, and in accordance with EA guidance, more severe droughts than those on record have been used to verify drought trigger robustness. In particular longer drought events have been examined by extending the 1976 drought with the 1996/97 inflows. These have shown the triggers to be robust.

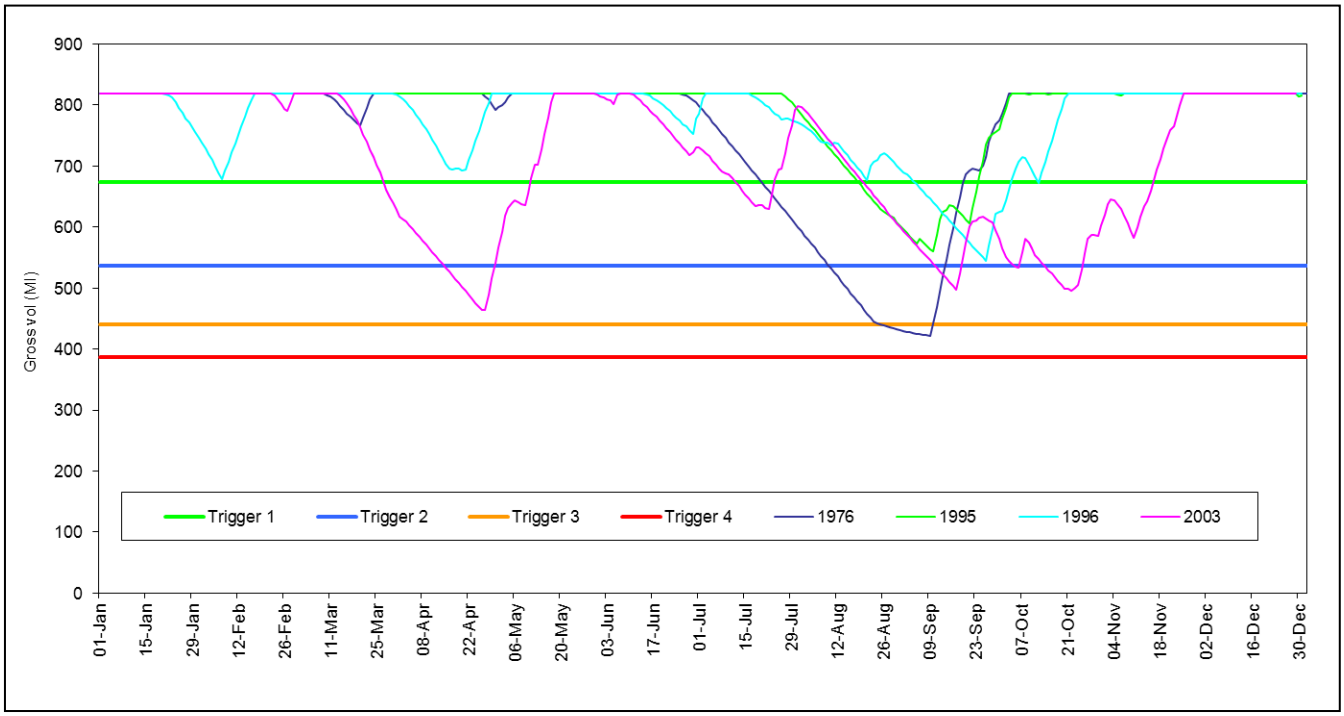
Figure 20 shows the estimated frequency of crossing the Castle Carrock drought triggers based on the 35-year record:

Figure 20: Estimated average frequency of crossing Castle Carrock drought triggers

Trigger	Castle Carrock
Trigger 1	1 in 4 years
Trigger 2	1 in 12 years
Trigger 3	1 in 35 years
Trigger 4	Less than 1 in 35 years

The frequency of crossing drought triggers is considered to be an acceptable balance to allow sufficient time for actions during severe drought events. The results show that UU's level of service of 1 in 20 years is met for crossing Trigger 4 when statutory water use restrictions are expected to be imposed. Example outputs from scenario modelling to compare modelled storage to the drought triggers for the whole record period (1976 to 2010) are shown for Castle Carrock (see Figure 21).

Figure 21: Castle Carrock drawdown scenario against drought triggers



7 NORTH EDEN RESOURCE ZONE DROUGHT TRIGGERS

7.1 ASSESSMENT OF DROUGHT

There are 14 boreholes in the North Eden Resource Zone located on five water treatment work sites. The zone contains these groundwater sources and a small import from Northumbrian Water in the Alston area.

UU undertakes regular assessments of the security of water supplies, in discussion with EA water resources staff where appropriate. These assessments provide the basis for recognising drought conditions at an early stage. Our assessments in the North Eden Resource Zone will take account of a range of water resource indicators, including:

- The probability of sources failing to meet the required demand
- Rainfall is significantly below average for three months or longer
- Significant reduction in the output of groundwater sources
- Declining groundwater levels that could impact on resource availability
- The magnitude and duration of peak demands that are significantly higher than normal for the time of year

7.2 DROUGHT TRIGGERS

The management of water supplies during drought conditions represents a progression of actions that reflect the severity, geographical extent and speed of development of the drought. UU has identified four triggers that act as decision-points for drought management actions. Drought triggers for the North Eden Resource Zone have been developed in consultation with the EA based on actual abstraction volumes compared to the annual licence limit.

The need for drought options in the North Eden Resource Zone is highly unlikely due to the current surplus of water supplies over demand during drought conditions. Therefore, this drought plan details the options available to deal with localised problems that may occur and how customers' water supplies can be maintained throughout drought periods.

Movement between triggers, and therefore drought management actions, will occur when the regular assessments of supply security indicate that further measures are required to safeguard essential water supplies. The nature of the triggers varies for each resource zone. Drought actions may be applied either company wide, by resource zone or to target a specific geographic area. This drought plan contains a range of potential drought management options available to UU. In the event of a drought, a specific set of actions will be implemented depending on the prevailing situation which will be set out in a Drought Action Plan produced at the time.

The potential drought permit/order applications for the North Eden Resource Zone relate to the relaxation of the annual abstraction licence limits (see Appendix 7 for details), thereby permitting abstraction to continue at a higher rate. The need to make these applications would not be based on specific groundwater level triggers but instead would relate to a prolonged period of dry weather and associated high demands for water, which would in turn necessitate an increase to the annual abstraction licence limit.

The drought triggers for the North Eden boreholes are based on percentages of the cumulative annual abstraction licence total for all the boreholes. Using this approach, drought triggers are only at risk of being crossed towards the end of a year. See Figure 22 for North Eden boreholes drought triggers. The triggers presented in the Final Drought Plan 2013 have not been altered for this plan.

Figure 22: North Eden boreholes drought triggers. Note that to abstract beyond Trigger 4, UU would require a drought permit/order

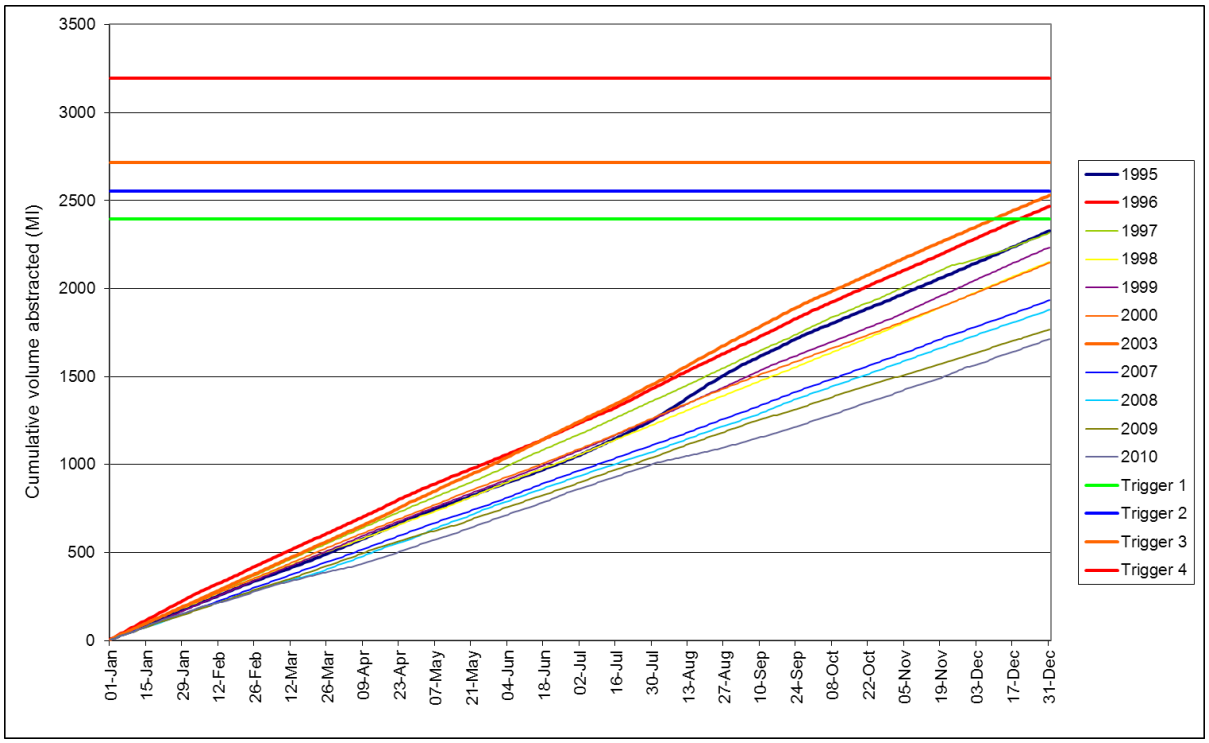
Trigger	Cumulative Annual Abstraction from 1 January
Trigger 1	2,394 Ml
Trigger 2	2,554 Ml
Trigger 3	2,714 Ml
Trigger 4	3,192 Ml

7.3 DROUGHT TRIGGER TESTING

Figure 23 shows the combined cumulative actual abstractions for the North Eden boreholes for a variety of years between 1995 and 2010 against the drought triggers (see Figure 22).

Drought Trigger 1 has been crossed on only two occasions (December 1996 and December 2003) whereas Trigger 2 has never been crossed. In 2003, the cumulative abstraction for the year was 2,530 Ml, just below the Trigger 2 level of 2,554 Ml. Since 2003, demands in the North Eden boreholes have declined each year; the cumulative abstraction for 2010 was 1,714 Ml. Drought triggers are only crossed late in the calendar year, avoiding abortive work applying for drought permits/orders early in the year. Given the surplus of supply over demand for this resource zone, this is an acceptable level of risk. The triggers have also been tested using theoretical scenarios with higher rates of abstraction than we have seen historically. Trigger 4 was crossed only under a "very worst case" scenario, with the maximum daily abstraction figure from the whole of the abstraction record (9.67 Ml/d in August 1995) occurring each day of the year.

Figure 23: North Eden borehole actual abstraction scenarios against drought triggers



8 DROUGHT MANAGEMENT ACTIONS

8.1 INTRODUCTION

This section outlines the drought management actions that UU would consider implementing during a drought event. These include:

- Operational actions
- Communication actions
- Demand side actions
- Leakage actions
- Supply side actions (contingency and non-commissioned sources; tankering)
- Drought permit/order actions

Actions will only be pursued if they are relevant to the prevailing drought situation, and the plan for dealing with a specific drought event is likely to comprise actions from all of the above areas. Drought actions may be applied either company wide, by resource zone or to target a specific geographic area depending on the nature of the drought event prevailing at that time.

The drought triggers outlined in the previous sections are designed to provide sufficient time between them to allow these actions to be instigated. The triggers are decision points to review possible actions and determine the appropriate course of action in the particular drought event. Different actions will take different timescales to implement following the decision to commence. The spacing of drought triggers has been derived to ensure a balance between:

- Sufficient time being available to implement drought actions
- Acceptable frequencies of crossing the triggers

During preparation of this plan the drought actions and triggers at Ennerdale Water (West Cumbria Resource Zone) have been reviewed through discussion with Defra. At Ennerdale Water, voluntary water use restrictions would be in place at Trigger 2 (rather than at Trigger 3 for all other sources in this plan), allowing these to be in place for 7 days, on average, before a drought order application is made on reaching Trigger 3. On reaching Trigger 4 at Ennerdale Water we would impose statutory water use restrictions ensuring these were in force ahead of needing to implement a drought order on reaching the hands-off lake level of 1.7m below weir crest. In addition, at Trigger 3 we would commence tankering of treated water to the service reservoirs associated with Ennerdale Water. Tankering will increase if a drought order is implemented. This ensures that all feasible demand and supply management measures are adopted ahead of a drought order application at Ennerdale Water. The Ennerdale Water triggers have been set to allow 28 days, on average, between Trigger 3 (drought order application) and drought order implementation on reaching the hands-off lake level of 1.7m below weir crest. These differences to the drought triggers and actions at Ennerdale Water compared to other sources should be kept in mind when reading this plan.

For all resource zones the estimated period between Triggers 1 and 3 is around 28 days. This allows time for drought management actions to be instigated. During this period we would produce a Drought Action Plan specific to the drought event being experienced, and implementation of that plan would commence. If appropriate, following Trigger 3, we would implement voluntary water use restrictions (Trigger 2 at Ennerdale) and commence the consultation process for statutory water use restrictions. Following Trigger 4 we would implement statutory water use restrictions, if appropriate.

For all zones where drought permit/order applications are proposed, these would be made approximately 7 days after voluntary water use restrictions are in place.

An estimated period of 21-35 days between Triggers 3 and 4 is designed to allow sufficient time to consult on the implementation of statutory water use restrictions, allow the public to respond and

get ready to implement those restrictions, as well as to apply for drought permit/order applications (if appropriate) and provide time for the EA and Defra to consider these. A target of 35 days minimum between Triggers 3 and 4 has been used for Crummock and Scales boreholes in the West Cumbria Resource Zone and the North Eden Resource Zone as drought permits/orders have to be implemented at these sources when Trigger 4 is reached to allow more water to be abstracted. For the Integrated Zone, there is no absolute need for drought permits/orders to be in place at Trigger 4 but they are likely to follow after this trigger is crossed – the triggers provide around 32-34 days between Triggers 3 and 4. Depending on the actual drought being experienced and the speed with which it develops, the interval between the various triggers may be different to the estimated periods outlined above. The drought triggers were developed with these estimated periods to ensure sufficient time exists between them to implement the associated drought actions as outlined in the following sections.

The fine balance between public water supply and environmental impacts in West Cumbria means that very careful consideration of the drought options is required and these are discussed in Section 8.8.

8.2 OPERATIONAL ACTIONS

Under normal operation UU holds weekly meetings to review the current water resources position and agree actions required to address specific issues, for example, re-zoning of water supplies to enable abstraction rates to be reduced at sources that are deemed to be at relatively more risk. In times of potential drought, the frequency of such meetings increases and a drought management structure is established (see Section 3.10). We hold frequent meeting with EA, Natural England and Defra regarding West Cumbria. The frequency of these will increase upon crossing Trigger 1 in that zone.

In times of increased drought risk (below Drought Trigger 1) UU increases the frequency of checking releases from reservoirs to maintain downstream river flows (compensation flows). In addition, the level of control of compensation flow releases is tightened to minimise any over-release, whilst being mindful that to under-release a compensation flow is a prosecutable offence.

Figure 24 outlines operational actions that UU would consider on reaching each drought trigger for each resource zone.

Figure 24: Operational drought management actions

Trigger	Integrated Resource Zone	West Cumbria Resource Zone	Carlisle Resource Zone	North Eden Resource Zone
Trigger 1	Continuously monitor the water resource situation and reduce outputs from local reservoir sources to sustainable levels where appropriate Rezone to meet demand including increasing water supplies from regional strategic sources where appropriate Increase pumping from Windermere, Ullswater, River Lune and boreholes across the region (where appropriate) dependant on licence conditions and demand levels. UU will utilise all practicable opportunities to help support storage in Haweswater reservoir in accordance with this drought plan, by pumping from Windermere and/or Ullswater and/or utilising the West-East link depending on the resource availability Review use of West-East and Rivington Aqueduct links to balance risk across the resource zone	Continuously monitor the water resource situation, with increased frequency of checking water levels at Crummock and Ennerdale Rezone to meet demand and balance zonal risk including adjusting the outputs from Ennerdale, Crummock and Quarry Hill sources where appropriate If appropriate increase abstraction from Scales boreholes within licence limits Ensure washwater is recycled at Ennerdale to support compensation flow	Continuously monitor the water resource situation to ensure sustainable source use and balance of risk across the zone Consider reducing the volume of Castle Carrock water transfer and increase River Eden, subject to water quality and licence constraints (if appropriate) Test and, if required, replace turbidity monitors in preparation for Eden pumping to Castle Carrock if storage in Castle Carrock continues to decline	Continuously monitor the water resource situation to ensure sustainable source use and balance of risk across the zone Increase abstraction from borehole/spring sources within the constraints imposed by the annual abstraction licence limits to meet increases in demand Increase import of water from Northumbrian Water to Alston if necessary within the agreed maximum volume Close monitoring of abstraction compared to the drought triggers
Trigger 2	Continue with Trigger 1 drought actions; continue to balance regional system to ensure risk is balanced across the resource zone Continue to review the use of normal dry weather water sources (different to contingent and non-commissioned sources) in order to optimise resource use and ensure sustainable abstractions from local reservoir sources Assess the potential use of Trigger 2 contingent drought sources where appropriate Initiate discussions with EA to review the use of Stocks, Wet Sleddale, Windermere and Vyrnwy waterbanks (where appropriate)	Continue with Trigger 1 drought actions; continue to balance risk across the zone where possible Continue to rezone in order to balance resource zone risk by implementing temporary changes to the distribution system operation whilst maintaining sufficient water pressure to customers (for example, the use of pumps at West Moor End to support the Quarry Hill zone from Crummock if appropriate) All viable options to limit the drawdown of Ennerdale lake, and hence avoid the need for a drought order, will be considered and adopted if proved feasible	Continue with Trigger 1 drought actions; continue to balance risk across the zone where possible Consider further reducing the transfer of water from Castle Carrock to minimum flow levels and maximising the River Eden accordingly subject to day-to-day water quality constraints and licence limits Consider distribution network changes including temporary pipelines or pumping stations to provide alternative water supplies or temporary changes to the distribution system operation to maintain sufficient water pressure to customers	Continue with Trigger 1 drought actions; continue to balance risk across the zone where possible Consider distribution network changes including temporary pipelines or pumping stations (where appropriate) to provide alternative water supplies or temporary changes to the distribution system operation to maintain sufficient water pressure to customers

Trigger	Integrated Resource Zone	West Cumbria Resource Zone	Carlisle Resource Zone	North Eden Resource Zone
Trigger 3	Continue with Trigger 1 and 2 drought actions; continue to balance the regional system to ensure risk is balanced across the resource zone Where necessary, augment declining gravity flows from reservoirs to water treatment works with temporary pumps (e.g. Piethorne reservoir) Consider temporary pipelines and pumping stations within the supply system to provide alternative water supplies Implement any actions agreed with the EA in relation to the use of the Stocks, Wet Sleddale, Windermere and Vyrnwy waterbanks and the Windermere fishery sluices Assess the potential use of Trigger 3 non-commissioned sources where appropriate	Continue with Trigger 1 and 2 drought actions; continue to balance risk across the zone where practical Commence tankering of treated water to the service reservoirs associated with Ennerdale Water (approximately 0.6Ml/d which will require 24 tanker deliveries a day)	Continue with Trigger 1 and 2 drought actions; continue to balance risk across the zone where possible Undertake River Eden pumping subject to licence and water quality constraints in order to augment storage in Castle Carrock reservoir where possible. This is dependent upon water quality constraints. Continuously monitor Eden catchment rainfall, weather forecasts and water quality; balance resource risk against water quality as appropriate	Continue with Trigger 1 and 2 drought actions; continue to balance risk across the zone where possible
Trigger 4	Continue with Trigger 1, 2 and 3 drought actions; continue to balance the regional system to ensure risk is balanced across the resource zone Assess potential use of Trigger 4 non-commissioned sources where appropriate	Continue with Trigger 1, 2 and 3 drought actions; continue to balance risk across the zone where possible On implementation of drought order (at 1.7m below weir crest) increase tankering of treated water to the service reservoirs associated with Ennerdale Water (approximately 2Ml/d which will require 76 tanker deliveries a day)	Continue with Trigger 1, 2 and 3 drought actions; continue to balance risk across the zone where possible Continue to operate River Eden support to Castle Carrock, subject to licence and water quality constraints Assess potential use of Trigger 4 non-commissioned sources where appropriate	Continue with Trigger 1, 2 and 3 drought actions; continue to balance risk across the zone where possible

8.3 DEMAND SIDE ACTIONS

8.3.1 Water Efficiency Actions

As part of its normal operation UU takes an active role in promoting the efficient use of water to all types of household and non-household customers. A range of measures are undertaken including many publicity, education and advisory activities. These activities are estimated to save 3 Ml/d each year during 2010-15.

UU promotes and distributes shower regulators as well as promoting the 'Save-a-Flush' cistern displacement devices to all of its customers. Approximately 70,000 shower regulators will be distributed each year. The devices, along with other water saving ideas, are promoted in the billing leaflet which is sent to all customers. UU also promotes these on its website, through advertisements in local council magazines, local press, at community events and through road show activities.

These devices are provided alongside a household water audit and guide to using water wisely in the home, to reinforce water saving behaviour, and are provided free of charge to our customers via our customer call centre and website. UU also undertake a programme of installing water meters for those customers who wish to benefit from a measured tariff. UU estimates that an average of 46,000 properties will be metered in this way, each year during 2010-15. Water efficiency devices are also promoted to customers who are requesting a free water meter.

UU produce an annual Responsibility Report covering environmental performance, initiatives and projects including SSSI status, SCaMP project progress and other environmental work such as the removal of Baystone Bank reservoir and its return to a natural environment (see corporateresponsibility2012.unitedutilities.com). We also have a permanent exhibition at the Manchester Museum of Science and Industry (see www.mosi.org.uk/explore-mosi/explore-galleries/underground-manchester-gallery) which aims to inform the public about their water and wastewater supplies. In 2011/12 the museum attracted over 830,000 visitors and reaches over 100,000 school children per year.

In September 2011 we developed a water efficiency education programme for primary schools in the North West region. The programme includes topics such as the water cycle, where your water comes from, water safety, what not to flush and water efficiency. So far over 5,000 Key Stage 2 pupils have taken part in the programme which is delivered by an education provider. As well as the expert teaching, spread over two classroom visits, each child receives a booklet reiterating the important messages, a set of water efficiency trump cards and a toothy timer to encourage them to turn off the tap when brushing their teeth.

In April 2012, UU began to sponsor the ITV weather in the Granada and Border television regions which gives us an opportunity to communicate daily to a large number of customers including water saving messages, such as turning the tap off when brushing your teeth, and raise cold weather awareness such as the need to lag pipes. Our weather sponsorship also includes the online communication channel which we use to support the campaigns we run to raise customer awareness, educate and change customer behaviour.

We maintain partnerships with external bodies to promote water conservation including the EA, local councils, local environmental groups and water efficient product manufacturers.

While extensive water efficiency promotion is undertaken every year, during a drought event, UU will enhance this publicity, for example the placing of adverts in newspapers or on local radio. Enhancements to water efficiency promotion will start following the crossing of the first drought trigger, when the heightened risk of drought is first identified. The water efficiency promotion will escalate as appropriate to the situation. The nature of this promotion during a drought event will vary depending on aspects of the drought such as its geographical extent, the population centres affected and the time of year. For example, during the spring and summer months, water conservation messages will focus on garden watering. However, during the winter months when garden watering is minimal, it will be more appropriate to issue customer communications relating

to the need to lag pipes to prevent bursts, particularly during the Christmas holiday period when businesses and homes may be left unoccupied for some time. The following list shows the range of possible water efficiency actions that could be employed during a drought event:

- General use water wisely messages
- Use water wisely in the garden messages
- Use water wisely in the household messages
- Free issue of water saving devices for use in toilet cisterns
- Free issue of water savers packs
- Promotion of water efficiency and provision of water efficiency devices at superstores and attendance at local events such as flower shows
- Joint initiatives with other organisations to promote water efficiency (e.g. EA and Consumer Council for Water)
- Information on billing leaflets
- Targeted mailshots to areas particularly affected
- Issue of press releases to the local press
- Adverts in the local press
- Utilisation of our ITV weather sponsorship to raise awareness and communicate with customers
- Local radio adverts
- Messages on the need to lag pipes

Water efficiency promotion will be closely linked to wider customer communication in a drought, and this is discussed further in Section 8.7

8.3.2 Water Use Restrictions

The management of customer demand plays an important role in assisting the assurance of security of supply, particularly during times of drought. The Flood and Water Management Act 2010 introduced a range of new options for managing customer demand at times of drought.

This section outlines the relevant legislation, the expected benefit of water use restrictions (as detailed in the most recent research) and the recent experience in the North West of the hosepipe ban imposed during the 2010 drought event. This section also sets out the plan for introducing the various water use restriction measures and associated triggers, together with any exemption criteria which may be applied.

Companies must demonstrate that they have implemented appropriate demand side restrictions to support drought permit/order applications (with the exception of winter restrictions).

The benefit of demand restrictions during the winter is negligible given the limited use of hosepipes for garden watering and washing motor vehicles where most usage is seen. Therefore we believe that introducing demand restrictions in winter months is not appropriate as it will not result in a reduction in demand for water. During winter drought situations, UU will continue to use enhanced communications to reinforce how customers can help save water and use water wisely inside the home, for example, by lagging pipes to prevent burst pipes in freezing temperatures. We may continue water use restrictions implemented during the summer into the winter months if there is a high risk of restrictions being required the following summer. Consequently, UU does not plan to introduce, but may continue with, restrictions during the winter period (October to March). Similarly, if storage is below the relevant triggers only for the Dee, and the storage is not being used to regulate flows in the river, then UU may not introduce water use restrictions as this may not benefit

storage in the Dee regulating reservoirs. However if there were wider zonal benefits, or a forecast that Dee regulation may be imposed, we would consider implementing water use restrictions.

Additional information on demand side actions can be found in Appendix 1. Additional information on water use restrictions can be found in Appendix 8.

Box – water use restrictions explained

There are three types of water use restrictions in this plan: voluntary water use restrictions, statutory water use restrictions and non-essential use bans. On reaching Trigger 3 we would ask customers to use water wisely and ask them to voluntarily restrict their water use by not using hosepipes connected to the mains water supply. We would also announce our intention to introduce statutory water use restrictions and would commence a three week period for representations on this proposal. On reaching Trigger 4 we would consider imposing statutory water use restrictions. The Flood and Water Management Act 2010 gives water companies the power to enforce restrictions. Following this, if the situation continued to worsen, we would consider applying to the Secretary of State for a drought order to impose a non-essential use ban as set out in the government's Drought Direction 2011

Voluntary water use restrictions	Customers asked not to use hosepipes connected to the mains water supply to wash cars or water their gardens
Statutory water use restrictions	Customers must not use hosepipes connected to the mains water supply to water gardens, wash cars, fill a domestic swimming pool and similar uses. Certain exemptions and concessions will be offered including blue badge holders, affected businesses and use for reasons of health and safety
Non-essential use ban	The Drought Direction 2011 sets out the uses than can be banned including the use of mechanical vehicle washers, filling non-domestic swimming pools (exclusions include public pools) and using hosepipes to clean the exterior (including windows) of non-domestic buildings
More information can be found in Appendix 1 and Appendix 8	

8.3.3 Legislation and Guidance on Water Use Restrictions

As explained in Section 2, several new pieces of legislation relating to water use restrictions have come in to force recently. Information on this new legislation is included in Appendix 8. This plan takes this new legislation in to account, in particular the need to consult with customers prior to enforcing statutory water use restrictions.

UU will act in accordance with the four principles outlined in the UKWIR Code of Practice and Guidance on Water Use Restrictions. These are:

- Ensuring a consistent and transparent approach
- Ensuring that water use restrictions are proportionate
- Communicating clearly with customers

- Considering representations in a fair way

8.3.4 Water Use Restrictions Savings

It is intended that during any restriction, all categories of usage outlined by Section 76 of the Water Industry Act 1991 (as amended by the Flood and Water Management Act 2010) which apply to domestic usage will be prohibited. All of the restrictions contribute to an overall reduction in demand and therefore the imposition of the restriction is necessary during times of drought. UU believes that restrictions should be sensible and proportionate to the savings made and to their potential impact. Consequently UU will operate the same exemptions as the 2010 Hosepipe Ban, where commercial companies who may be affected by a restriction will be exempt from any restriction. This could include mobile car washes, wheelie bin cleaners etc.

The saving associated with water use restrictions has been estimated to be 3-5% of the average dry weather demand expected during the drought period. This is based on experience of hosepipe bans introduced by UU in 1995/96 and 2010.

The Flood and Water Management Act 2010 introduced a range of non-essential use restrictions under the revised Section 76 of the Water Industry Act 1991, referred to as statutory water use restrictions in this plan. In the summer these restrictions will always be introduced before a drought order for a non-essential use ban (provided for by the Drought Direction 2011). Evidence from the 1995/96 drought indicated very small demand savings were achieved from the non-essential use ban (approximately 0.2% demand reduction) and this would therefore need to be compared with the effectiveness of other drought actions for protecting essential water supplies. An assessment of the relative merits of a non-essential use ban to manage customer demand in a particular drought event would be discussed with the EA and the Consumer Council for Water, after the introduction of statutory water use restrictions.

It is important not to place complete reliance on a non-essential use ban achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances, including actual weather conditions and also the effectiveness due to the time it takes to obtain from the Secretary of State. As with statutory water use restrictions, there are very limited demand savings arising from a non-essential use ban in winter. Consequently, UU does not plan to introduce a non-essential use ban during the winter (October to March). Instead, UU will focus attention on publicity to advise customers to use water wisely in their homes and business activities, and the need to lag pipes to protect them from extreme temperatures.

8.3.5 Process for Implementation of Water Use Restrictions

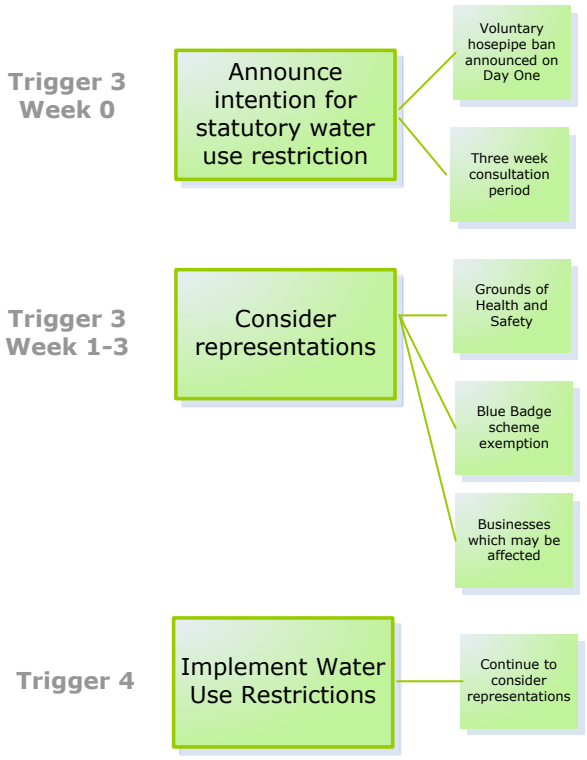
In order for UU to implement statutory water use restrictions we must be satisfied that “it is experiencing, or may experience, a serious shortage of water for distribution”. In following applicable legislation (Section 76 Water Industry Act 1991), we will impose all available statutory water use restrictions at Drought Trigger 4 which affect domestic customers to ensure sufficient action has been taken to reduce customer demand. This section explains how and at what point water use restrictions will be put in place.

Following the 2010 drought and the Flood and Water Management Act 2010, UU commissioned a customer survey in 2011 looking at customer views of water use restrictions. The results of this survey have been used by UU to develop the following process (see Figure 25). The process has also taken account of the need to maximise the amount of water to be saved during times of drought, the need to meet legislative requirements and to align to the four principles in the UKWIR Code of Practice on Water Use Restrictions.

In order to encourage reduction in demand UU will implement voluntary water use restrictions at Trigger 3 (Trigger 2 at Ennerdale), commensurate with the start of the consultation period for statutory water use restrictions. This will help avoid short term increases in demand before the statutory restrictions take effect. The message will be conveyed through the use of press releases and coverage on UU’s website, as well as through the formal legal notice. Enforcement of statutory

water use restrictions will occur following the end of the three week consultation period and should be in place around the time Trigger 4 is reached.

Figure 25: Process for implementation of water use restrictions



Details on how to make representations on the proposal to implement statutory water use restrictions will be included in the formal legal notice and UU will give three weeks for representations to be made by affected parties. UU will provide a dedicated email address for the public to respond to the statutory water use restrictions consultation.

Section 76 of the Water Industry Act 1991 (as amended) stipulates the following:

- Notice must be given to those affected (no time restriction is imposed)
- As a minimum, notice must be advertised in two newspapers circulating in the area to which the restrictions apply and advertised on UU's website

Enforcement of statutory water use restrictions will occur following the end of the three week consultation period, once Trigger 4 is crossed.

UU will take a pragmatic approach to granting exemptions and concessions for water use restrictions. Any exemption or concession will be dealt with in accordance with the UKWIR Code of Practice and Guidance on Water Use Restrictions (2011). Three main exemptions will be automatically granted:

- Concessions on the grounds of health and safety
- Concessions for those holding a "Blue Badge"
- Concessions for businesses which may be affected

Customers may wish to apply for an exemption even if they do not consider themselves to be part of these exemption categories.

8.4 LEAKAGE ACTIONS

Leakage control is a key activity in managing the balance between water supply and water demand. Our long term programme for leakage reduction is outlined in our business plan in

accordance with the Water Resources Management Plan 2009. This ensures that we manage leakage at a sustainable and economic level and achieve our target set by Ofwat. Whilst leakage control is a long term activity, during a drought situation we will make every effort to further reduce leakage beyond our Ofwat target through additional leakage detection and repair over and above our normal efforts. The extent to which, during a drought, our intensive efforts can further reduce leakage will depend on leakage levels and weather conditions at the time.

Reductions in leakage below the sustainable economic level are not required to prevent reservoirs emptying even in a repeat of the worst drought on record, even when the forecast effects of climate change are taken into account. However, UU customers expect us to control leakage, and particularly so during a drought. Therefore it is essential that we explain to our customers the actions that we are taking to control leakage during a drought event. This reflects the enhanced value of water during such times and the need to complement water savings measures by our customers.

In a possible drought event (below Drought Trigger 2), additional detection and repair resources will be implemented. As the drought event intensifies and the drought triggers are reached, the priority of leak detection and repair alters. Where demand savings can be made, additional leakage resources will be utilised during a drought.

Regionally, overtime working and redeployment of personnel on leakage work could yield an estimated additional 50 Full Time Equivalents to UU's leakage workforce. This could potentially reduce total leakage by up to 5 Ml/d each month. Savings of around this level were seen in the 2010 drought. This would not be sustainable in the longer term as the easiest to detect leaks are found first and other activities would need to be attended to over the longer term. If leakage is already at historically low levels or there is severe break out of new leaks there may be limited scope for further leakage reduction even in the short term. Droughts can increase leak breakout rates as there is a link between soil-moisture deficit and increasing leakage levels, for example, due to increased subsidence of soils. In this event, additional resources are needed to simply hold leakage steady and the benefit of our significant increase to our leakage control activities would be to minimise increases in leakage which might otherwise occur.

In a drought lasting three months or more, which affects the North West but not other regions of the UK, we would look to acquire skilled leak detection resource on contract from other regions. This means that any leakage reduction achieved by short term activities might be maintained over the longer term. If a drought affects other regions of the country UU may find it difficult to acquire additional skilled leak detection resources due to the demand for such skills.

In order to achieve the savings indicated by using an enhanced workforce, a number of different additional working practices would be deployed. These would vary as appropriate to the location and extent of the drought. These various working practices may include:

- Increased management focus on leakage including increased frequency of UU's Leakage Board meetings, and coordination through UU's drought management structure (section 3.10)
- Increased frequency of data analysis to improve targeting of repair and detection resources
- Increased publicity of our free "LeakLine" telephone service for customer reporting of leaks
- Promote pipe lagging (according to season of drought) and encourage customers to repair leaks on their own pipes
- Promote the private leak repair scheme offering free repairs (subject to conditions) to domestic customers for leaks on their supply pipes
- Increased frequency of surveys of aqueduct systems and the local distribution network

- Increased frequency of service reservoir inspections
- Further use of advanced acoustic leak detection on aqueducts
- Write to landowners with large mains crossing their property to request them to report suspect leaks
- Liaison with councils to reduce notice periods required before a repair can be carried out in the highway
- Issue more Defective Fitting notices to customers
- Consider use of legislation, for example by enforcing urgent work notices where appropriate
- Night staff to increase the use of more disruptive leak control methods e.g. step tests and pressure zone tests
- Accelerate pressure management programme in areas already identified for leakage reduction and deploy flow modulated control devices where appropriate

In summary, additional leakage control will be deployed as part of UU's reaction to a drought event. This will mean a significant additional use of resources and the adoption of more disruptive working practices. The actions that UU would take to reduce leakage during a drought would depend upon the prevailing situation in other regions of the country, the location and severity of the drought, the timescale for implementation of the action, together with a consideration of the potential water savings that could be achieved. Enhanced leakage detection and repair during a drought event could potentially give a benefit of several Ml/d during a drought lasting several months, but this may be at the detriment of other performance measures such as lower pressure water supplies to customers and increased disruption to highways.

8.5 SUPPLY SIDE ACTIONS

Actions relating to UU's operational asset base are discussed in Section 8.2, but there are also a number of further sources that may be utilised in the event of a severe drought. These sources are not required to prevent reservoirs emptying in a repeat of the worst drought on record, even when the forecast effects of climate change are taken into account. However action may be taken to start bringing these sources into use as a precaution against the risk of a worse than historic drought occurring.

Sources with a long lead-in time (9-12 months) would be of benefit in a multi season drought such as those that occurred in 1933/4 and 1995/6. For example, Figure 11 shows that a repeat of the 1995/6 drought would result in Trigger 4 at Haweswater being crossed in late August of the first drought year. Non-commissioned sources with long lead-in times should be available from late May of the second drought year and would reduce the abstraction needed from reservoir sources, reducing the extent of drawdown in that year. The benefit by October in this second year would be equivalent to 13% of Haweswater storage. Similarly, Figure 12 shows that a repeat of the 1933/4 would result in Trigger 4 in the Dee being crossed in mid-November of the first drought year. Non-commissioned sources with long lead-in times should be available from mid-August of the second drought year to help recovery in Dee reservoir storage. The benefit by October in this second year would be equivalent to 6% of Haweswater storage.

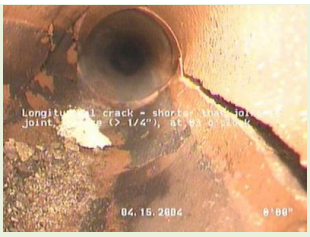
Drinking water quality needs to be maintained even during drought conditions. UU is required by legislation to provide drinking water that meets the statutory water quality standards and this would continue to be the case during drought conditions. Contingent and non-commissioned water sources will always be fully tested prior to being used in accordance with the sampling provisions set out in Section 15 of The Water Supply (Water Quality) Regulations 2000 (as amended) to ensure we are able to treat the water to the required potable standards. In some cases the source may not comply with these regulations resulting in it being unavailable for use. Water quality sampling can take several weeks to complete before the source can be brought in to operation. All contingent drought sources will be risk assessed through our drinking water safety plan approach

and included within the relevant Regulation 28 report. If a source is not included in the relevant report, a risk assessment needs to be completed and a three month period elapsed before the source can be used, and a revised report sent to the Drinking Water Inspectorate.

In some cases, for example when a reservoir source is changed for a groundwater source, customers can notice a change in the type of water, e.g. from "soft" to "hard" water. In these cases, we will carry out local publicity through press releases and direct contact with industrial process companies that would be sensitive to such a change. In the event of any concerns about drinking water quality arising from drought conditions, we would liaise closely with the Health Protection Agency and the Drinking Water Inspectorate.

A complete review of all of UU licensed and unlicensed water sources was completed as part of this drought plan, separating out those sources which are used in normal operation each year from those which could be used during periods of drought. This review incorporated lessons learnt from the 2010 drought (Section 3.7). Utilisation of such sources will assist by taking demand off the regional or local water supply system, or both, and therefore represent an important drought management action. In this plan these potential sources of water are termed contingency sources and non-commissioned sources as explained in the following box:

Box – drought water sources explained

These sources are not part of UU's normal operational asset base and most have not been used since the 1995/6 drought event due to falling industrial water demand and significant reductions in leakage.	 
Contingency sources	Sources which may be utilised following some minor works to assist with an in-season drought, i.e. those which normally occur within the space of a calendar year. These sources are ascribed to drought Trigger 2 and UU has an abstraction licence for all such sources
Non-commissioned sources	Sources which may be utilised following major capital work to assist with multi-season droughts that may last for longer periods, such as autumn and winter periods when reservoir refill is required in order to protect water supplies into the next year. These sources are ascribed to drought Triggers 3 and 4. The majority of these sources have UU abstraction licences

In the majority of cases, these contingency and non-commissioned sources have not been used since the 1995/6 drought event due to falling industrial water demand and significant reductions in leakage. These sources are not part of UU's normal operational asset base and are not included in UU's assessment of Water Available for Use when assessing levels of service. Therefore substantial work is required to bring them in to operation, including the need for water quality testing and risk assessments, resulting in long timescales for implementation in some cases. Thus these sources are associated with drought Triggers 2, 3 and 4 as outlined above. It should be remembered that all normal water sources that could assist with the prevailing drought situation would be in operation.

In addition to the contingency and non-commissioned source supply-side options, there is a supply-side option for tankering of treated water from the Integrated Resource Zone to the West Cumbria Resource Zone to help support Ennerdale in times of drought – this option utilises an existing source of water.

Drought option forms for each supply-side option have been prepared (see Appendices 3, 5 and 6). For each, details on the source and the estimated benefit of using this source are given, together with any potential environmental risks and the mitigation measures that would need to be considered.

In close consultation with the EA, 26 supply-side options have been identified for this drought plan. These comprise 25 source options and one option for tankering support to the West Cumbria Resource Zone.

In Figure 26, the details of the 25 source options are presented alongside their deployable output. This is the volume of water (in Ml/d) expected to be produced from the source when it becomes available for public water supply. Deployable output figures are available for all of these potential sources of water and have been used to understand the relative benefit of utilising a given source during drought periods. Each source is allocated to its water resource zone and to the specific area it would supply. This was to facilitate targeting of additional resources to the most vulnerable areas and to ensure that maximum benefits are realised. The nature and extent of the drought determines which of these sources we would seek to utilise at any particular time. Crossing through a particular drought trigger would not automatically mean that action would be taken to instigate the use of all the sources associated with that trigger as a source would only be considered for use if it would aid the prevailing drought situation.

The supply-side options have been separated into the four resource zones.

- Integrated Resource Zone: 24 of the 26 supply-side options are located in this zone. Of these, 23 are for groundwater sources the other being for a surface water source. Six of the sources are drought contingency sources and linked to Haweswater drought Trigger 2, the other 18 sources are non-commissioned sources linked to Haweswater drought Triggers 3 and 4
- West Cumbria Resource Zone: There is one supply-side option for this zone which involves tankering treated water from the Integrated Resource Zone to the West Cumbria Resource Zone to help support Ennerdale during a drought. UU has no unused water sources in the West Cumbria Resource Zone that would be of benefit during a drought; therefore this zone is more reliant on the need for other options as discussed in Section 8.8
- Carlisle Resource Zone: There is one supply-side option for this zone, Castle Carrock reservoir. This option seeks to utilise water stored in the reservoir below the normal operational level (commonly called dead water) at drought Trigger 4. It is considered unlikely that UU would need to utilise this option as the drought trigger modelling showed that Trigger 4 is not crossed based on the historic record (see Section 6.3). Consequently, this option has been linked to drought Trigger 4 as a non-commissioned source
- North Eden Resource Zone: There are no supply-side options detailed for this zone. It is considered unlikely that UU would seek to apply for a drought permit/order given the supply/demand surplus with the resource zone

Figure 26: List of contingency and non-commissioned sources for supply side options

Source	Deployable Output (Ml/d)		Estimated time to implement (months)	Water Resources Benefit
	In WRMP	Estimated in drought		
Trigger 2: Contingency Sources				
Park Road South borehole	0	6.8	1-3	Integrated Resource Zone, with local support to Wigan area
Landside borehole	0	4.8	1-3	Integrated Resource Zone, with local support to Wigan area
Melling boreholes	0	13	1-3	Integrated Resource Zone, with local support to Southport area
Netherley boreholes	0	11.4	1-3	Integrated Resource Zone, with local support to Widnes area
Pex Hill boreholes	0	5.8	1-3	Integrated Resource Zone, with local support to Widnes area
Worsthorne borehole	0.5	2	1-3	Integrated Resource Zone, with local support to Burnley area
Trigger 3: Non-commissioned Sources				
Croft boreholes	0	6	3-6	Integrated Resource Zone, with local support to Wigan area
Daresbury borehole	0	4.5	3-6	Integrated Resource Zone, with local support to Warrington area
Walton boreholes	0	3.9	3-6	Integrated Resource Zone, with local support to Warrington area
Mow Cop borehole	0	1.7	3-6	Integrated Resource Zone, with local support to Congleton area
Belmont borehole	0	1	3-6	Integrated Resource Zone, with local support to Bolton area
Bromiley borehole	0	1	3-6	Integrated Resource Zone, with local support to Bolton area
Springs borehole	0	1	3-6	Integrated Resource Zone, with local support to Bolton area
Helsby boreholes	0	2	3-6	Integrated Resource Zone, with local support to Vale Royal area
Swineshaw boreholes	0	4	3-6	Integrated Resource Zone, with local support to Tameside area
Trigger 4: Non-commissioned Sources				
Castle Carrock reservoir, dead-water storage	0	6.3	3	Carlisle Resource Zone
Greensbridge Lane boreholes	0	12	9-12	Integrated Resource Zone, with local support to Widnes area
Randles Bridge boreholes	0	8	9-12	Integrated Resource Zone, with local support to Liverpool / Southport areas
Ashton borehole	0	4.5	9-12	Integrated Resource Zone, with local support to Vale Royal area
Eaton boreholes	0	6.6	9-12	Integrated Resource Zone, with local support to Vale Royal area
Newton Hollows boreholes	0	6	9-12	Integrated Resource Zone, with local support to Vale Royal area
Springhill borehole	0	6	9-12	Integrated Resource Zone, with local support to Wirral area
Gorstons borehole	0	4	9-12	Integrated Resource Zone, with local support to Wirral area
Hooton borehole	0	5.9	9-12	Integrated Resource Zone, with local support to Wirral area
Worthington reservoirs	0	2.9	9-12	Integrated Resource Zone, with local support to Wigan area

* In addition to the above supply-side options (contingency and non-commissioned sources) there is an additional supply-side option for the West Cumbria Resource Zone of tankering treated water from the Integrated Resource Zone to help support Ennerdale in times of drought

8.6 DROUGHT PERMITS/ORDERS

Drought permits/orders are required as a precaution against the risk of a drought occurring that is worse than the worst historic drought that has been experienced. Applications must be made early enough to allow sufficient time for the powers to be granted in advance of existing licence constraints being reached and therefore protect the availability of water supplies for customers. The drought permit/orders included in this plan cover a range of actions including:

- Reducing compensation flow releases from reservoirs to downstream rivers to conserve storage in the reservoirs for future abstraction (for both public water supply and for release to the rivers)
- Relaxing abstraction licence limits such as annual volumes of water that can be abstracted or flow limits below which abstraction cannot occur
- Allowing increased drawdown of lakes and reservoirs to enable water to continue to be abstracted to provide both public water supplies and flow releases to the downstream rivers

Box – drought permit/orders

The legislation allows water companies to apply for both Drought Permits and Drought Orders to manage a drought situation. In this plan the term drought permit/order is used throughout as applications could be for either 	
Drought Permits: Environment Act 1995	The Environment Act 1995 introduced drought permits – prior to this only drought orders existed. Drought permit applications are determined by the Environment Agency and they can alter the conditions for an existing abstraction (i.e. alter an abstraction licence). The EA can hold a local public hearing to discuss the application if it deems one is necessary. A drought permit lasts for a maximum of 6 months but can be extended by a further 6 months if necessary
Drought Orders: Water Resources Act 1991	Drought order applications are determined by Defra and they have the same powers as drought permits but can also authorise the water company to enter/occupy land to carry out necessary works, for example, construction of the temporary weir at Ullswater. Defra expect water companies to apply for orders rather than permits for applications that could affect Habitats Directive sites. For example, applications for drought powers at Crummock are likely to be orders rather than permits. Defra can hold a local public hearing or public inquiry to discuss an application if it deems one is necessary. A drought order lasts for a maximum of 6 months but can be extended by a further 6 months if necessary (note that water companies can also apply for drought orders to restrict water supplies – see box in Section 2 for details)

Figure 27 lists the potential drought permit/order sites that UU would consider implementing, together with details of the change that would be sought in a drought event and any protected sites in the vicinity of the source. For several sites there is more than one possible option for the drought permit/order. This is because the actual powers sought depend on the severity of the drought event and the prevailing situation at that time. For example, in the 1995/6 drought event, an initial drought permit to reduce the compensation flow at Longdendale to 22.5 Ml/d was applied for.

However, as the drought intensified a subsequent application was made to reduce the compensation flow further to 15 Ml/d. There are no drought permit/order sites for the Carlisle Resource Zone. Not all of the actions would necessarily be implemented to the full extent shown, and some actions may not be required. Depending on the nature and extent of the drought, further drought permits/orders not identified in Figure 27 may be required.

With the exception of the River Lune, drought permits/orders were granted and implemented at all the sites in the 1995/96 drought with no reported long-term environmental impacts.

There is no guarantee that any of the potential drought permits/orders would be granted. Each application would need to be assessed by the EA/Secretary of State taking account of prevailing conditions in a specific drought situation.

Further details on each drought permit/order site are included in the appendices to this plan (Appendices 2, 4 and 7).

The need for drought permits/orders would be considered when Trigger 2 is reached and the required information to support an application would be prepared. UU will discuss any plans for drought permits/orders with the environmental regulators (EA, Natural England and Natural Resources Wales) and Defra as appropriate. The need for either a drought permit or drought order application for a specific site would be discussed with the EA.

Drought permit/order options for this drought plan have been assessed using the Habitats Regulations Assessment (HRA) process to establish whether there are any potential adverse impacts on European designated sites. The outcomes of this assessment are discussed further in Section 8.8.

Figure 27: Potential drought permit/order sites

Integrated Resource Zone	Change Sought	Designated Sites in vicinity
Delph reservoir	Reduce compensation flow from 3.7 to 1.0 Ml/d	No protected sites
Dovestone reservoir	Reduce compensation flow from 15.9 to 10.0 or 5.0 Ml/d	Rochdale Canal SAC
Jumbles reservoir	Reduce compensation flow from 19.9 to 12.0 or 6.0 Ml/d	No protected sites
Longdendale reservoirs	Reduce compensation flow from 45.5 to 22.5 or 15.0 Ml/d	No protected sites
River Lune LCUS abstraction	Reduce prescribed flow from 365 to a minimum of 200 Ml/d	Morecambe Bay SPA/SAC/SSSI/Ramsar
Rivington reservoirs – Brinscall Brook	Reduce compensation flow from 3.9 to 2.0 Ml/d	No protected sites
Rivington reservoirs – White Coppice	Reduce compensation flow from 4.9 to 2.0 Ml/d	No protected sites
Ullswater	Reduce hands-off flow conditions to a minimum of 95 Ml/d Construct temporary outlet weir to raise lake level by up to 0.15 m Relax 12-month rolling abstraction licence limit	River Eden SAC
Lake Vyrnwy	Reduce compensation flow from 45.0 to 25.0 Ml/d	The Severn Estuary SAC/SPA/Ramsar, Berwyn SPA, and the Berwyn and South Clwyd Mountains SAC
Lake Windermere	Scenario 1: Reduce hands-off flow conditions to a minimum of 95 Ml/d and relax 12-month rolling abstraction licence limit Scenario 2: Relax 12-month rolling abstraction licence limit and permit drawdown of lake level (up to a maximum of 0.5 m below weir crest). During drawdown, releases to the River Leven would be made by the Environment Agency through their fisheries sluice depending on the prevailing requirements of the river	Low Wray Bay SSSI
West Cumbria Resource Zone	**Change Sought**	**Designated Sites in vicinity**
Ennerdale Water	Allow abstraction for both compensation flow provision to the River Ehen and public water supply to continue down to a lake level of 2.5m below weir crest	Ennerdale SSSI; River Ehen SAC; River Ehen and Tributaries SSSI
Crummock Water	Allow pumping of abstraction and compensation flows at lake levels below 1.1m below weir crest level to 1.5m below weir crest level	River Derwent and Bassenthwaite Lake SAC
Scales boreholes	Increase the annual licence limit from 365 Ml to between 438 and 621 Ml to enable the continuation of a higher daily abstraction rate (up to the licence limit of 6 Ml/d)	No protected sites
North Eden Resource Zone	**Change Sought**	**Designated Sites in vicinity**
Bowscar; Gamblesby; Tarn Wood boreholes	Increase annual licence limit to enable continuation of the maximum daily abstraction rate as annual limit constrains abstraction	River Eden SAC

8.7 COMMUNICATION ACTIONS

8.7.1 Drought Communications Plan

This plan sets out the drought triggers that UU uses as decision points to guide us in determining what drought action measures to take in any particular drought event. UU has developed a detailed communication plan which maps these drought triggers to communication actions. The plan shows at what stage we would anticipate undertaking communication with various organisations. It also

links communication actions and associated key messages to the drought triggers, together with information on the lead in times for the actions and the frequency with which they should be undertaken. The detailed communications plan can be found in Appendix 9. However it should be noted that the actual communication messages and methods used in a drought event will depend upon many factors including the prevailing political climate, time of year, current and forecast weather conditions, and the geographical extent of the drought. The following sections summarise the key aspects of drought liaison between UU and other organisations and interested parties.

8.7.2 Customer Drought Communications

UU is responsible for communicating with its customers during droughts and deciding the content and timing of drought communications and the media to be used. UU will also liaise closely with the EA, Consumer Council for Water (and other bodies, such as Waterwise and local authorities) on water conservation publicity during drought events. This may involve joint communications to ensure consistency of message and demonstrate consensus on the need for water saving actions.

UU will enhance its on-going water conservation communication programme during a drought and will keep its customers fully informed of the actions being taken to safeguard water supplies, the need for any water use restrictions, and the current status of water resources. UU will ensure close dialogue with the EA and the Consumer Council for Water in relation to the need for any water use restrictions.

In the event of an application for a drought order to prohibit non-essential uses of water, UU will discuss the measures with the Consumer Council for Water and endeavour to contact those customers and trade organisations that will be directly affected to discuss ways to minimise any adverse impacts. The impact of drought powers on vulnerable customers will be considered and our usual incident management procedures and communication links with the health sector and local authorities will be utilised if necessary.

UU undertakes customer communications on a continual basis utilising media such as local papers, the UU website and billing leaflets. During a drought event, UU will enhance this publicity, for example the placing of adverts in newspapers or on local radio. The nature of this promotion during a drought event will vary depending on aspects of the drought such as its geographical extent, the population centres affected and the time of year.

UU recognises that in times of drought we are likely to experience a higher volume of customer contacts, for example water meter requests and requests for advice and reassurance on drought measures. UU is experienced at dealing with such additional customer contact and if necessary, additional personnel will be provided to ensure our customers receive the expected level of service from our customer contact centres.

During a drought, UU will firstly seek to manage demand by an appropriate, phased escalation of our water conservation publicity campaign. In communicating with our customers it is essential to maintain good relationships. Our communications campaign must be carefully planned and timed to maintain high awareness of the need to conserve water, without provoking “drought fatigue” or antagonising customers.

During a drought a range of activity to increase the promotion of water efficiency would be undertaken, this is discussed in Section 8.3.1 The following list shows the additional possible customer communication actions that could be employed during a drought event:

- Water industry communications through Water UK
- Joint initiatives with other organisations to promote water efficiency (e.g. EA and Consumer Council for Water)
- Advertising UU’s LeakLine
- Targeted mailshots to areas particularly affected
- Issue of press releases to the local press

- Adverts in the local press
- Local radio adverts
- Information on the current status of our water resources
- Information on the actions UU is taking to ensure reliability of water resources
- Messages on the need to lag pipes
- Non-essential use ban communications
- Water use restrictions communications, paying particular attention to the need to carefully explain these to the public
- Information on why UU is applying for drought powers such as drought permits/orders

8.7.3 UU and Environment Agency / Natural Resources Wales Drought Liaison

During normal conditions UU and the EA hold regular liaison meetings to discuss water resource issues at various management levels. In particular, there are bi-monthly technical water resources meetings.

In drought situations, a UU/EA Drought Liaison Group is formed and will meet to ensure:

- A clear line of communication is maintained between UU and the EA
- A consistent application of policy across the region by UU and the EA
- Any actions agreed by the liaison group represent corporate decisions
- An on-going review of UU's Drought Action Plan developed for the specific drought event including stakeholder communications

If any of UU's sources in Wales are affected by the drought, this group will be extended to include Natural Resources Wales. The Drought Liaison Group will meet fortnightly if Trigger 1 is crossed, increasing to weekly meetings on crossing Trigger 2.

UU will prepare a Drought Action Plan prior to the first meeting of the Drought Liaison Group for discussion with the EA and Natural Resources Wales. The Drought Action Plan will set out the details of the specific actions that UU is taking, or plans to undertake, to deal with the specific drought event that is occurring. Formal minutes will be produced for each meeting detailing the actions agreed and clearly identifying any areas where agreement has not been possible. Any actions agreed should be promptly briefed to the relevant staff in each organisation so that there is no misunderstanding at a local level.

In a drought the EA will also establish a Multi-Agency Drought Group. The will comprise senior managers from the EA, UU, Natural England, Natural Resources Wales, the Canal and River Trust and others as appropriate. It is anticipated that this group will hold a weekly teleconference. Details are given in the EA's North West Regional Drought Plan (EA, 2012).

Regular Director-level liaison meetings will take place between UU and the EA if Trigger 3 is reached. The purpose of these liaison meetings will be to particularly discuss the issues surrounding the implementation of drought powers such as drought permits/orders and statutory water use restrictions.

8.7.4 Dee Consultative Committee

UU is a member of the Dee Consultative Committee. If storage in the River Dee regulation reservoirs falls to the drought action trigger level, a meeting of the Committee will take place to discuss the introduction of drought alleviation measures as enshrined in the Dee General Directions. The Committee will continue to meet on a regular basis during a drought to review the sustainable operation of the River Dee Regulation Scheme.

8.7.5 Natural England and Natural Resources Wales

If appropriate UU will engage Natural England and Natural Resources Wales at an early stage as drought conditions emerge and develop, particularly for sources within or upstream of a Special Area of Conservation (SAC) and/or a Site of Special Scientific Interest (SSSI), and also in general for non-designated sites. UU will seek early and regular meetings with the EA and Natural England (and Natural Resources Wales, if appropriate) to discuss potential drought measures – these meetings worked well during the 2003 and 2010 droughts. During a drought, UU will review the existing environmental monitoring arrangements for drought permit/order sites with our environmental regulators.

8.7.6 UU Liaison with other Regulators and Government

UU will provide regular and timely updates to Defra as a drought situation develops. Such updates will include details of available water resources and measures taken to conserve reservoir storage and reduce demand. UU will also attempt to provide Defra with as much notice as possible of any drought order applications (both abstraction drought order applications and drought order applications for non-essential use bans).

UU will ensure that it keeps the Drinking Water Inspectorate, Ofwat, Consumer Council for Water and the Welsh Government fully appraised of the drought situation and the actions being taken and under consideration. Customer communications and issues will be discussed with the Consumer Council for Water.

In relation to specific drought permits/orders, UU will endeavour to provide as much prior warning as practicable.

8.7.7 UU Liaison with other Water Companies

UU will liaise with other water companies as appropriate with respect to bulk supply arrangements or actions that could affect other companies. In the event of UU introducing water use restrictions, UU will inform neighbouring water companies in case of customer queries. The decision to impose water use restrictions for each water company ultimately depends on the water resource position of that company. We will work constructively with our neighbouring water companies, for example we will work to ensure our drought management communications are consistent. UU will participate in any national communication initiatives organised by Water UK or Waterwise.

Our approach to customer water use restrictions (see Section 8.3) is comparable to our neighbouring water companies. We are also working with other water companies through Water UK and UKWIR to update the Code of Practice for water use restrictions, following experience of companies in the South of England which imposed water use restrictions during 2012.

8.7.8 UU Liaison with other Bodies

Communication with the Fire Service will be maintained through the normal UU liaison channels and meetings will be arranged to discuss any concerns that may arise.

UU will discuss any specific issues relating to interactions between UU sources and the Canal and River Trust canal systems with local trust staff or with their Head Office as appropriate.

With respect to Local Authorities, the Strategic Health Authority and the Health Protection Agency, the normal UU communication channels will be maintained and briefings on the drought situation will be provided as necessary. In the event of an application for a drought order to prohibit non-essential uses of water, UU will contact these organisations to explain the need for the restrictions and any mitigation measures that UU is taking.

Drought communications and liaison arrangements will include full and timely liaison with local authority emergency planning teams and other Category 1 responders under the Civil Contingencies Act through our existing lines of communication. This would particularly be the case in the event of a drought significantly worse than any in our historic record, where we may need to implement emergency plans agreed with Local Resilience Forums. These plans would be used to

facilitate the appropriate distribution of water supplies within the North West region during civil emergencies resulting in wide scale, long term loss of water supplies.

Based on a robust assessment of water resources based on repeats of the worst droughts in our historic record but with forecast future demand for water and current infrastructure, UU does not forecast the need to use rota cuts or standpipes in drought situations. Therefore we do not expect any interruptions to supply arising from drought, nor should there be any adverse impact on vulnerable customers, schools, the Health Services and other essential services. However, UU will keep the Health Authorities/Agencies, Local Authorities and the Consumer Council for Water fully informed of our actions during a drought, particularly to provide reassurance that essential supplies will be maintained.

8.7.9 Liaison with other Stakeholders

UU liaison during a drought will also include discussions with organisations including:

- Lake District National Park Authority
- Angling associations
- Environmental/conservation organisations
- Recreational users of UU's reservoirs and lake water sources
- Local industry and businesses (including those dependent on lake water sources such as Windermere and Ullswater)
- Local stakeholders

UU will disseminate information to these key stakeholders during a drought, including the potential need for drought permit/order applications.

The new Windermere waterbank agreement agreed in December 2012 states that at any time that Windermere is 2.5 cm below weir crest and/or Haweswater storage has crossed Trigger 3; a meeting of a Windermere stakeholder group will be convened. This group will include representatives from the following organisations: UU, EA, Holker Estates, Windermere Lake User Forum, Windermere Lake Cruises Ltd and Windermere Marina Village Ltd.

There is a need for early consultation with recreational users of UU's reservoirs and lake water sources through our existing communication links via UU's Area Catchment Teams. UU fully recognises that, regrettably, drought conditions will often have an adverse effect on sailing activities on our reservoirs. Early consultation with recreational users is vital during drought conditions to enable them to plan ahead and try to make alternative arrangements. Where possible, UU will seek to help find temporary alternative facilities for recreational activities (as has been the case during planned reservoir remedial works). Where sailing clubs and other recreational users are adversely affected during drought conditions, fees payable would be considered sympathetically on a case-by-case basis.

The environmental studies that UU has undertaken for the drought permit/order sites included in this plan, were carried out in consultation with regulators (EA and NE, where appropriate) as well as local interested organisations and individuals. Through this process UU has developed a database of local contacts, and their involvement in the drought planning process ensures that they are better informed regarding any future proposals for actual drought permit/order applications that may be required.

8.8 WEST CUMBRIA DROUGHT OPTIONS

8.8.1 Background

Both Ennerdale Water and Crummock Water have high levels of environmental designation. Ennerdale Water is a Site of Special Scientific Interest (SSSI) and, downstream of the lake, the River Ehen is both a SSSI and a Special Area of Conservation (SAC). Crummock Water and the

River Cocker are both part of a SSSI and an SAC. Both Ennerdale and Crummock are in the Lake District National Park. Providing secure water supplies and protecting the aquatic environment in this setting is a fine balance. The Cumbrian mountains mean that the water network in West Cumbria is separate from the rest of United Utilities' water supply area and public water supplies are reliant on the local sources. Both Ennerdale and Crummock are "flashy" catchments with short critical periods which mean that while severe droughts are extremely unlikely, there is very little time to take actions should a drought occur (see Chapter 5). All of this means that the drought management options in West Cumbria are limited.

All the demand side options discussed in this chapter of the plan would be implemented in West Cumbria – including water efficiency promotion, leakage reduction and water use restrictions. Every year from 2010 to 2015 UU will be carrying out an enhanced level of water efficiency promotion and leakage reduction in West Cumbria compared to the rest of the region. However in the unlikely event of a very severe drought, when lake levels at Ennerdale and Crummock reach the point where abstraction is not licensed, there would still be a need to find significant volumes of water to maintain supplies to customers and provide compensation flows to the downstream rivers.

8.8.2 Return period of drought events

Droughts severe enough to cause Ennerdale and Crummock to reach lake levels where abstraction is not licensed are unlikely – they have a long return period (see box below). For Ennerdale our water resource modelling has shown that the 1.7m below weir crest drawdown limit (as set in the Environmental Damage notice) has a return period of less than 1 in 50 years. Return periods are normally estimated using historical data, however very extreme droughts may not have occurred in the period for which historical data are available. To bring a greater understanding for Crummock, a statistical technique known as "extreme value analysis" has been used to estimate return periods for extreme events based on a 95% confidence level. This analysis shows that the return period for Crummock reaching a lake level of 1.1m below weir crest (when pumping of the compensation flow to the River Cocker is required) is estimated to be longer than 1 in 530 years.

Box - return periods explained

A return period is a statistical measure of how often an event of a certain size is likely to happen. Return periods are commonly used in hydrology to understand extreme events of flooding and drought and should be based on as long a record period as possible. For example a return period of 1 in 100 years means that, when measured over a long period of time and averaged, an event of this magnitude, or greater, is not expected to occur more often than once in every 100 years. This doesn't mean that the event occurs regularly every 100 years. Events would occur irregularly in an unpredictable manner. For example, Trigger 4 at Haweswater (see Figure 11) has been crossed in 1984, 1995 and 1996 but as the record period covers 1927 to 2010 inclusive this represents 3 events over the 84 year record, or a return period of 1 in 28 years despite the fact that all three events have occurred in the last 27 years of the record. The return period has an inverse relationship with the probability that the event will be exceeded in any one year. For example, a 1 in 100 year drought has a 1% chance of being exceeded by a worse drought in any one year.

This can also be understood by thinking about a dice rolling example. When rolling an ordinary six-sided die the return period of a "six" is 1 in 6 rolls. You can quite easily roll two sixes in a row, but when averaged over a long period there will be a "six" once every six rolls. Extending this example, the return period of a "five" is 1 in 3 rolls, because over a long period you would roll a "five" once every 6 rolls and a "six" (which is a

greater magnitude event) also once every 6 rolls. So you would expect to see a “five” or greater twice in every six rolls, which is the same as 1 in 3.

8.8.3 Drought options for West Cumbria

In developing this drought plan, UU has conducted a thorough review of options to bring additional water sources into use. No contingency or non-commissioned water source options were identified in West Cumbria (see Figure 26); however an option to tanker treated water from the Integrated Resource Zone to the West Cumbria Resource Zone (to help support Ennerdale at times of drought) is included. This tankering option only provides relatively small volumes of treated water and will not avoid the need for a drought order at Ennerdale in a severe drought; although it will reduce the volume of water abstracted from Ennerdale and hence, provide support in drought. Further details of the tankering supply-side option can be found in Appendix 5.

This plan includes the following drought permit/order options in West Cumbria:

- A drought order option for Ennerdale to allow abstraction for both compensation flows and public water supply abstraction to continue to a lake level of 2.5m below weir crest. This option was not included in our Final Drought Plan 2013. A Stage 2 HRA Appropriate Assessment has identified the potential for adverse impacts on the River Ehen SAC, however, following guidance from Defra, the drought order option is included in this plan as there are no alternatives. Our Draft Drought Plan 2014 included a second drought order option for Ennerdale for drawdown to 3.0 m below weir crest; however following representations received from the Environment Agency, Natural England and others during the consultation period this has been removed from this plan.
- A drought permit/order option for Crummock to allow abstraction for both compensation flows and public water supply abstraction to continue to a lake level of 1.5m below weir crest. As part of the Final Drought Plan 2013 preparation, a Stage 2 HRA Appropriate Assessment identified no potential adverse impacts on the River Derwent SAC and so this option is included in this plan. Other options at Crummock with the potential for adverse impact are not included. With early engagement of EA and Natural England from Trigger 1, and with their involvement in the Appropriate Assessment, Environmental Assessment and Environmental Monitoring Plan, UU consider that a drought permit/order for the Crummock option included in this plan could be granted in 35 days from the point of formal application just after Trigger 3.
- A drought permit/order option for Scales boreholes to increase the annual abstraction licence limit. As part of the Final Drought Plan 2013 preparation, this option was assessed as having no impact on any designated sites.

The HRA assessment outcomes for these drought permit/order options are discussed further in Section 9.4.

UU’s Ennerdale abstraction licence has been subject to a ‘Review of Consents’ by the EA in accordance with Regulation 63 of the Habitats Regulations. Through this process the EA concluded that the existing abstraction licence could not be shown to have no adverse impact on the integrity of the River Ehen SAC and changes to the abstraction licence were proposed including increased and variable compensation flows. However following an incident on the River Ehen in June 2012, the EA issued an Environmental Damage notice (under the Environmental Damage Regulations 2009) to help the freshwater mussel population in the River Ehen to recover. The Environmental Damage notice allows UU to draw Ennerdale lake down to a maximum level of 1.7m below weir crest to enable a higher compensation flow release to be provided to the downstream River Ehen and flows up to 80 Ml/d are now being provided, significantly greater than the abstraction licence requirement of 31.8 Ml/d. The higher the compensation flow release out of the lake to the River Ehen, the faster the lake will drawdown and to a lower level, taking longer to refill following rainfall. The EA recently confirmed its Review of Consents decision and the abstraction licence at Ennerdale will be revoked to protect the River Ehen SAC. Our Revised Draft

Water Resources Management Plan 2013 includes proposals for how to address the resultant shortfall in public water supplies. If the EA request further changes in the compensation flow requirements from Ennerdale, the drought triggers and options for Ennerdale in this plan will need to be revised, as well as the associated environmental study and Appropriate Assessment. This drought plan will also be fully revised before the changes to the supply system in the Revised Draft Water Resources Management Plan 2013 are implemented.

Alternative options to drought permits/orders at Ennerdale have been reviewed including temporary pipelines from other water sources in Cumbria and using road tankers to maintain supplies. There are considerable logistical and technical challenges with these options due to the long distances and terrain involved. Moreover, they could lead to disruption and loss of visual amenity in the National Park. UU has submitted a report to Defra on the alternative options. This did not identify any feasible options that could be implemented during the timescale of an actual drought event that would avoid the need for a drought order at Ennerdale; although the option of tankering treated water could partially alleviate a drought situation, making a very small contribution to protecting the aquatic environment, and would be implemented prior to a drought order application.

UU is committed to working with Natural England, the Environment Agency, local stakeholders and experts in order to find the best solution to the protection of the River Ehen SAC and public water supplies. This includes consideration of options to develop new sources of water to improve the resilience of public water supply to drought events, and reduce the potential for adverse impacts on the SAC. These longer term considerations have been taken up in UU's Draft Water Resources Management Plan, which was published for consultation in 2013, and includes consideration of comments received during the Draft Drought Plan 2012 consultation process.

9 ENVIRONMENTAL ISSUES

9.1 STATUTORY DUTIES FOR DESIGNATED SITES

At all times, not just in times of drought, UU will adhere to its statutory duties for designated sites. This is particularly important due to the location of many of our water abstractions and discharges within, adjacent or upstream of designated sites, and the large area of catchment land owned by UU. The relevant statutory duties include:

- Conservation of Habitats and Species Regulations 2010 (as amended). Statutory responsibilities to Special Areas of Conservation (SAC) and Special Protection Areas (SPA)
- Government policy is to apply the same protection framework to Ramsar sites as to SPA's and SAC's (Defra, 2006)
- The Environment Act, 1995. Section 62 to have regard to the purposes for which National Parks are designated
- The Water Resources Act 1991 (as amended by the Water Act 2003). Any work which may affect SSSIs, or other land of special interest, must involve consultation with Natural England before authorisation of the works
- Section 28G of the Wildlife and Countryside Act 1981, as inserted by Section 75 and Schedule 9 to the Countryside and Rights of Way Act 2000. This places a duty on public authorities, including water companies, to take reasonable steps consistent with the proper exercise of their functions to further the conservation and enhancement of SSSIs
- The Wildlife and Countryside Act 1981 and Section 85 of the Countryside and Rights of Way Act 2000. To have regard to the purpose of conserving and enhancing an Area of Outstanding Natural Beauty (AONB) when exercising or performing any function that will affect land in an AONB
- The Natural Environment and Rural Communities (NERC) Act 2006. An extension of the Countryside and Rights of Way Act 2000 biodiversity duty to ensure due regard to the conservation of biodiversity
- Water Industry Act 1991: Code of Practice on Conservation, Access and Recreation – Guidance for the Environment Agency and Water and Sewerage Undertakers

The Drought Options Forms in Appendices 2 to 7 identify if such designated sites are associated with potential supply-side or drought permit/order sites.

9.2 DROUGHT PERMIT/ORDER ENVIRONMENTAL STUDIES

Detailed environmental studies have been completed for each potential drought permit/order site listed in Figure 27. As part of our regular reviews of these assessments, we are currently in the process of updating the assessments for Crummock, Ullswater and Windermere drought options. We have recently completed an update of the environmental assessment for the Ennerdale drought order option included in this plan, including an Appropriate Assessment.

The studies typically consider a range of possible impacts due to the drought permit/order including:

- Hydrodynamics (e.g. river level, wetted area, velocity, reservoir exposure)
- Water quality and temperature
- Fish (various species and life stages)
- Macroinvertebrates
- Macrophytes

- Protected species
- Geomorphology
- Landscape and visual amenity
- Archaeology and cultural heritage
- Recreation
- Noise
- Socio-economics including tourism

In many cases the environmental studies required additional monitoring work to be completed to enable completion of a robust environmental assessment.

The EA and NE were involved in each study together with local interested stakeholders, and each took approximately two years to complete. In the event of needing to apply for an actual drought permit/order, the environmental study would be updated to reflect the prevailing conditions as well as to incorporate any new information available since the study was completed. UU intends to review each environmental study in line with every other statutory drought plan submission (i.e. every 7 years) unless there is a need to review it at an earlier stage. Figure 28 gives the dates of the environmental study reports produced by UU, together with an indication of when the next review is scheduled to commence. In some cases the next review of the environmental study is scheduled to commence before the 7-year review period has elapsed, primarily due to the need to incorporate issues that have emerged since the last study was completed.

Figure 28: Details of drought permit/order environmental studies

Drought permit/order site	Resource Zone	Date of environmental study report	Next review to commence
Delph	Integrated	July 2010	2017/18
Dovestone	Integrated	July 2010	2017/18
Jumbles	Integrated	July 2010	2017/18
Longdendale	Integrated	July 2010	2017/18
River Lune (LCUS)	Integrated	April 2008	Currently underway
Rivington (2 sites)	Integrated	July 2010	2017/18
Ullswater	Integrated	December 2005	Currently underway
Vyrnwy	Integrated	September 2010	2017/18
Windermere	Integrated	January 2008	Currently underway
Ennerdale	West Cumbria	April 2014	2021/22
Crummock	West Cumbria	June 2008	Currently underway
Scales boreholes	West Cumbria	July 2010	2017/18
North Eden boreholes - Bowscar	North Eden	July 2010	2017/18
North Eden boreholes - Gamblesby	North Eden	July 2010	2017/18
North Eden boreholes - Tarn Wood	North Eden	July 2010	2017/18

A proposed programme of baseline environmental monitoring for each drought permit site is contained in the environmental study reports. Some baseline environmental monitoring at UU drought permit/order sites is carried out by the EA and some is carried out by UU. Environmental

monitoring associated with the implementation of a drought permit/order (i.e. during and post-implementation) is the responsibility of UU. UU and the EA share environmental monitoring data freely, and the environmental study reports have been shared with the EA and Natural England.

Each environmental study contains an Environmental Monitoring Plan (EMP). Following the 2010 drought event, the need to review the EMPs to ensure they are fit for purpose and to include new information from the 2010 drought event was identified. In 2013 UU agreed revised Environmental Monitoring Plans for all drought permit/order sites included in this plan with the EA, Natural England and Natural Resources Wales (as appropriate). The environmental studies also consider any mitigation measures that are required to address any significant adverse effects that are identified.

Further details on each drought permit/order site are included in Appendices 2, 4 and 7. These appendices contain a summary of the environmental impacts identified by the environmental study, together with monitoring and mitigation measures.

9.3 DESIGNATED SITES

Figure 29 and Figure 30 show the location of drought permit/order sites (as identified in Section 8.6) and supply-side options (as identified in Section 8.5) along with environmental designated sites. The impact on any designated areas likely to be affected by a potential drought permit/order is considered within the environmental study.

9.4 STRATEGIC ENVIRONMENTAL ASSESSMENT AND HABITATS REGULATIONS ASSESSMENT

9.4.1 Requirements for SEA and HRA

The Strategic Environmental Assessment (SEA) Directive (2001/42/EC) (and the associated Regulations, 2004) requires a formal strategic assessment of the likely significant environmental effects of implementing a plan/programme during its preparation to integrate environmental considerations into the decision making process. The EA's Drought Plan Guideline confirms that Water companies, as responsible authorities, must determine if their drought plan falls within the scope of the SEA Directive, and if so undertake an SEA of the Drought Plan.

The key stages of SEA are:

- Screening to determine if SEA is required. EA, NE and English Heritage should be consulted before taking the screening decision
- Deciding the scope and level of detail required for the SEA
- Assess the effects of the plan/programme and its reasonable alternatives and prepare an environmental report
- Consultation on the environmental report and draft plan/programme
- Adoption of the plan/programme and monitoring of any significant environmental effects

As a responsible authority UU must also ensure that this plan also meets the requirements of the Habitats Regulations (Conservation of Habitats and Species Regulations 2010 (as amended)). There is little guidance on this process. In consultation with the EA, Natural England and the Countryside Council for Wales, a similar process to that outlined above for the SEA has been used. Information from the HRA process has been used to inform the SEA. The key stages of the HRA process are:

- Stage 1: Screening to determine if drought options are likely to have a significant effect on European designated sites

- Stage 2: Appropriate Assessment of options with likely significant effects to determine if they adversely impact the integrity of the designated site (both alone and in-combination)
- Stage 3: Consideration of alternative options where significant adverse effects are identified at Stage 2
- Stage 4: Compensatory measures in the case that no alternative options exist and where Imperative Reasons of Overriding Public Interest can be demonstrated

In developing this plan UU has followed the HRA process. This section details the process which UU has taken in preparing the SEA and the HRA, and the outcomes and impacts on this drought plan.

The SEA Environmental Report and HRA Screening Report are provided alongside this plan. The SEA Environmental Report was also open for consultation at the same time as the Draft Drought Plan 2014.

9.4.2 SEA and HRA Screening Process

As part of the Final Drought Plan 2013 preparation, UU sought to include statutory consultees throughout the process of completing the SEA and HRA. In developing our approach to SEA and HRA, UU was guided by a Project Steering Group which has involved representatives from Natural England, Environment Agency and Countryside Council for Wales. The SEA Environmental Report, HRA Screening Report and HRA Appropriate Assessment (for Ennerdale) have been updated to include consideration of the Ennerdale drought options included in this plan. No other changes have been made.

The first step of the SEA process is to carry out a screening assessment to determine whether a SEA is or is not required. UU believes that this plan is subject to the SEA Directive as it includes drought management options that will require assessment under the Habitats Directive. The route that UU has followed to come to this decision is shown in Appendix 11. The next stage in the SEA process is deciding the scope and level of detail required for the SEA.

The Stage 1 HRA screening assessment identifies potential impacts for the options that are included in this plan to determine whether or not they could adversely affect the integrity of a European site (SAC, SPA and Ramsar). If this is the case, then a detailed Appropriate Assessment of the option is required (Stage 2). In order to comply with the Habitats Regulations (Conservation of Habitats and Species Regulations 2010 (as amended)), UU has undertaken a HRA screening of all supply-side options and drought permits/orders proposed in this plan to assess the effects on European sites. The screening utilised three key questions to identify whether an Appropriate Assessment for the option was required:

- Whether a scheme is likely to have a significant effect on a European site(s)
- Whether the option would have an in-combination effect with existing consents
- Whether there would be an in-combination effect with other drought options in the plan

The HRA identified four drought permit/order sites with the potential to impact European designated sites: Cliburn, Ullswater, Crummock and Ennerdale.

In 2010 UU completed an environmental study for a drought option at Cliburn boreholes to vary the annual licence. The study highlighted the potential for minor to moderate impacts on the River Leith, including water levels, water quality and ecology (including the protected species of white clawed crayfish). Cliburn was included within the HRA screening assessment for the Draft Drought Plan 2012 and it was identified as needing an in-combination Appropriate Assessment due to potential adverse impacts identified in the environmental study in-combination with other consents (Shap Fell Quarry). Discussions with NE and EA in 2011-12 continued to highlight concerns relating to the Cliburn drought permit/order application and the need for both a stand-alone and in-

combination Appropriate Assessment for this option remains a pre-requisite. Given that these concerns remained, UU carried out a review of the need for a drought permit/order at Cliburn. This concluded that the demand from the customer supply system can be met with a combination of network configuration changes and tankering to the service reservoirs, which would only be required in extreme circumstances and for a very short duration. Therefore the Cliburn drought permit option has been removed from this plan and an Appropriate Assessment has not been undertaken on this option.

Following Stage 1 HRA screening, the remaining three sites (Ennerdale, Crummock and Ullswater) moved to Stage 2 of the HRA process; Appropriate Assessment.

9.4.3 SEA and HRA Scoping Process

As part of the Final Drought Plan 2013 process, the Project Steering Group were consulted to produce the SEA scoping report. Their comments helped to shape the SEA Environmental Report. The SEA Environmental Report produced for the Final Drought Plan 2013 has been updated for this plan to include the Ennerdale drought options. No other changes have been made.

The approach for completing the HRA Appropriate Assessments was agreed, and the assessments have been completed in consultation with the Project Steering Group. The methodology for completing the Appropriate Assessments was based on guidance from a range of policy and guidance documents. The results of the three Appropriate Assessments undertaken are given in Sections 9.4.4 to 9.4.6. The findings of the HRA Appropriate Assessments and the SEA have informed the revision and selection of options included in this drought plan.

9.4.4 Result of Appropriate Assessment: Ennerdale Water, West Cumbria Resource Zone

As Section 8.8 explains, the EA recently reviewed UU's Ennerdale abstraction licence as part of their 'Review of Consents' process in accordance with Regulation 63 of the Habitats Regulations. The EA initially proposed changes to the abstraction licence, including increased and variable compensation flows, but has recently confirmed that the conclusion of no adverse effect on site integrity of the River Ehen SAC cannot be reached for any option other than revocation. United Utilities included revocation of the Ennerdale Water abstraction licence in its Revised Draft Water Resources Management Plan 2013, which set out plans for how public water supply could be maintained following revocation. Due to planning, land and Environmental Impact Assessment considerations, the current best estimate for cessation of abstraction at Ennerdale Water is no later than 2025. Once complete, this will remove any on-going impact of public water supply abstraction on the River Ehen SAC and will mean that drought orders affecting this site will no longer be required. In accordance with Article 6(4) of the Habitats Directive, compensatory measures need to be secured because it cannot be concluded that continued abstraction will not lead to an adverse effect on site integrity. A package of compensatory measures has been proposed by United Utilities under the advice of Natural England and the Environment Agency and is discussed below.

As Section 8.8 also explains, an Environmental Damage notice is currently in force at Ennerdale requiring higher compensation flow releases than normal to be made from the lake to the downstream River Ehen. Provision of this additional water means that lower lake levels will be reached more quickly and frequently, and requires drought options to be identified to deal with the situation.

In preparing our Draft Drought Plan 2014, two potential drought options at Ennerdale Water were considered:

- Scenario 1: Allow drawdown of the lake to 2.5m below weir crest
- Scenario 2: Allow drawdown of the lake to 3.0m below weir crest

The conclusions of HRA Screening assessment were that both Ennerdale drought options had the potential for significant effects alone and in-combination with the existing abstraction licence at Ennerdale Water. Therefore an Appropriate Assessment was undertaken in consultation with Natural England and the Environment Agency. The Appropriate Assessment could not conclude no

adverse effects. Options with the potential to adversely impact the integrity of a European site can only be adopted subject to there being no alternative solutions, where the Secretary of State is satisfied that there are imperative reasons of overriding public interest and with the adoption of suitable compensatory measures. Following representations made by the Environment Agency, Natural England and others during the Draft Drought Plan 2014 consultation process, scenario 2 at Ennerdale has been removed from this plan. Following guidance from Defra, this drought plan includes a drought order option for Ennerdale to allow drawdown to 2.5 m as there are no alternatives and without this option abstraction for both compensation flow provision to the River Ehen and public water supply would need to cease once a lake level of 1.7m below weir crest is reached.

UU has worked closely with the Environment Agency and Natural England to update the detailed environmental assessment during 2013/14 for the Ennerdale drought order option, including discussion of compensatory measures to address the possible impacts. UU has also been in close discussion with Defra regarding the drought options at Ennerdale, including an assessment of alternative options and submission of a draft drought order application. This has led to the inclusion of a supply-side option in this plan for tankering of treated water from the Integrated Resource Zone to the West Cumbria Resource Zone to help support Ennerdale at times of drought. Imperative reasons of overriding public interest ("IROPI") have been identified and relate to human health and public safety. Social and economic reasons have also been identified.

A package of compensatory measures has been proposed by United Utilities, under the advice of Natural England and the Environment Agency. This provides compensation for all potential impacts to the River Ehen SAC as a result of continued abstraction (to no later than 2025) and a drought order. The compensatory measures should be delivered in proportion with the impact of continued abstraction and a drought order acting in combination, but are not to resolve historic damage relating to the River Ehen SAC. The uncertainty associated with the scale of potential impacts means that the compensation put forward by United Utilities must be flexible and kept under review. A package of physical ecological measures, supported by research measures, is therefore proposed.

The aims of the compensation package are to enable the recruitment of more freshwater mussels and salmon and to undertake research and monitoring to inform the continued review of the package of measures. The compensatory measures will be secured as far as possible within the River Ehen SAC and are therefore planned to both prevent and compensate for potential further damage. The physical ecological measures include implementation of catchment management actions in order to improve water quality and optimise freshwater mussel and salmon habitat extent and condition in the River Ehen SAC, and to enhance recruitment in both of the interest features. The research and monitoring studies will monitor the effectiveness of the physical compensatory measures and will improve the body of knowledge regarding factors which threaten the River Ehen SAC and the wider coherence of the Natura 2000 network. Offsite compensatory measures are also planned and include a trial freshwater mussel recovery project and measures to restore salmon habitat and the natural functioning of some other designated and undesignated Cumbrian lakes and rivers. Appendix 12 explains the proposed measures in further detail.

There is considerable research, monitoring and physical action currently being delivered by United Utilities and other organisations focused on restoring the River Ehen SAC to favourable condition. The package of compensatory measures proposed by United Utilities will provide additional knowledge and ecological actions over and above the actions that are normal practice for the management of the SAC. We are committed to working with Natural England, the Environment Agency, local stakeholders and experts in order to find the best solution to the protection of the River Ehen SAC and public water supplies in light of emerging evidence.

9.4.5 Result of Appropriate Assessment: Crummock Water, West Cumbria Resource Zone

For our Final Drought Plan 2013, several drought permit/order options were considered for Crummock. The HRA Appropriate Assessment process identified one option that could be concluded to have no adverse impacts on the River Derwent SAC: to allow pumping of

compensation flows at lake levels below 1.1m below weir crest level to 1.5m below weir crest level. This option was included in our Final Drought Plan 2013 and remains in this plan.

Other options that were assessed as having the potential for adverse impact were removed from the Final Drought Plan 2013. These included abstraction to a lake level of 2m below weir crest and reduced compensation flows to the River Cocker.

9.4.6 Result of Appropriate Assessment: Ullswater, Integrated Resource Zone

The conclusions of the Appropriate Assessment for construction, operation and decommissioning phases of a drought permit/order at Ullswater concluded no adverse impacts to the River Eden SAC features, therefore the drought option remains in the drought plan unchanged.

Figure 29: Map of ecological sites showing drought permit/order sites and supply side options (Ramsar, SAC, SPA)

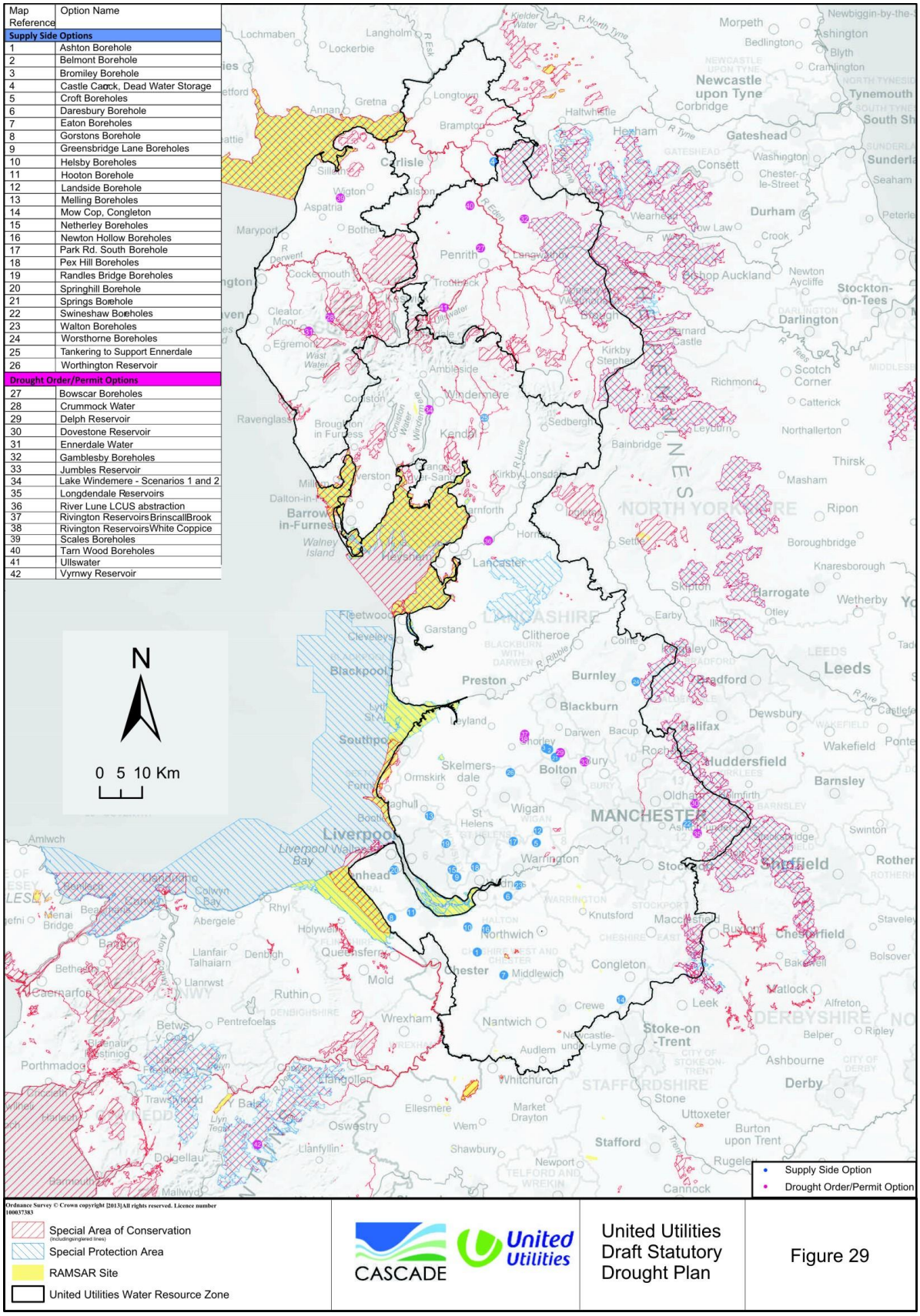
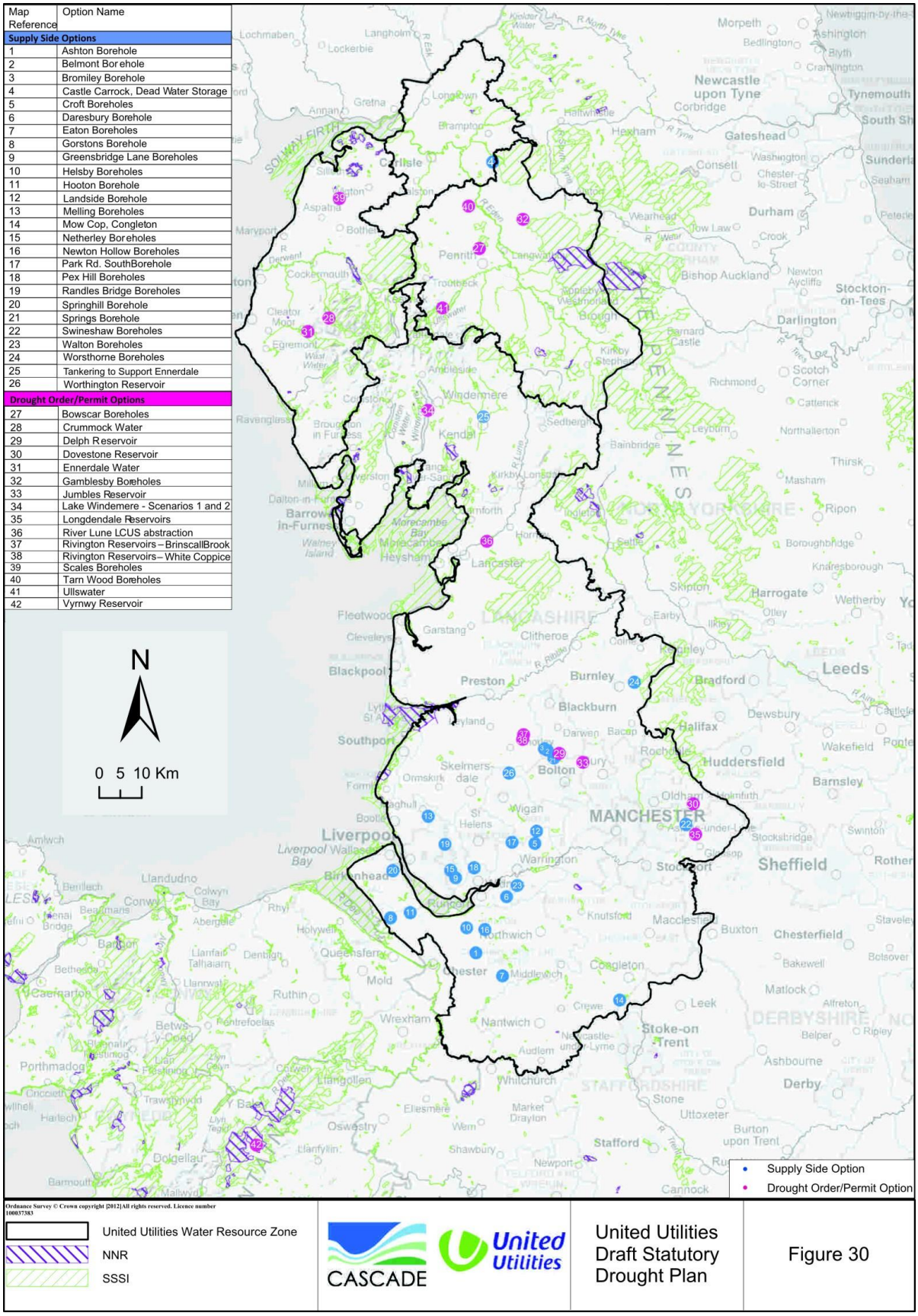


Figure 30: Map of ecological sites showing drought permit/order sites and supply side options (SSSI, NNR)



10 CONCLUSIONS AND SUMMARY OF PLAN

UU regularly reviews its drought plan, in consultation with the EA, and the full plan is revised every 3½ years (or earlier in the event of a material change) and undergoes a public consultation.

This Final Drought Plan 2014 has been produced by UU to provide a comprehensive statement of the actions that we will consider implementing during drought conditions to safeguard essential water supplies to our customers and minimise environmental impact. The security and integrity of water supplies is of the utmost importance to our customers. This plan incorporates lessons learnt from the 2010 drought event as well as new water use restriction legislation. It updates our Final Drought Plan 2013 by the inclusion of drought options at Ennerdale and a revision of its drought triggers and actions, which were considered to be a material change.

Following submission to the Secretary of State on 22 November 2013 and his subsequent permission to proceed to publication; the Draft Drought Plan 2014 was published and open to public consultation from 13 January 2014 to 17 February 2014. 22 responses were received to the consultation and the comments raised were incorporated into a Revised Draft Drought Plan 2014 which was published on 14 March 2014. A Statement of Response was also published setting out the consultation responses received and explaining how they have been addressed. Following direction from the Secretary of State, this Final Drought Plan 2014 has been produced and published.

As droughts do not follow any particular pattern and can occur at any time of year, exhibiting differing characteristics, this plan sets out a range of options available in the event of drought, and the processes and timescales required for their implementation.

This plan presents four drought triggers for each of UU's four resource zones. The triggers are decision points, to consider the measures required to address the prevailing situation. The plan includes a range of drought management actions, which are linked to the drought triggers, including:

- Operational actions
- Communication actions
- Demand side actions (water efficiency campaigns, voluntary water use restrictions, statutory water use restrictions, non-essential use ban)
- Leakage actions
- Supply side actions (contingency and non-commissioned sources; tankering)
- Drought permit/order actions

Drought actions may be applied either company wide, by resource zone or to target a specific geographic area depending on the nature of the drought event prevailing at that time.

The West Cumbria Resource Zone is the most sensitive to drought due to its short critical period, resulting in the need for prompt decisions and actions during a drought event, and the limited number of drought options available. West Cumbria contains a number of environmentally sensitive sites which are designated by EU and national legislation and UU is legally required to protect such sites and in drought there is a fine balance between public water supply and environmental protection.

This drought plan takes account of new legislation relating to the imposition of water use restrictions on customers. The plan includes provision for voluntary water use restrictions, followed by a consultation period, prior to the implementation of statutory water use restrictions. For all resource zones (except Carlisle where, following infrastructure improvements and licence changes in 2003, the need for drought permits/orders is unlikely), applications for drought permits/orders would be made following the commencement of voluntary water use restrictions.

Our minimum level of service for water supply is for the implementation of statutory water use restrictions and drought permits/orders not more than once in every 20 years on average, with

drought orders to restrict non-essential water use not more than once in every 35 years on average. No rota cuts or standpipes to ration essential supplies are planned. This is consistent with the level of service in our Water Resources Management Plan (UU, 2009) and our Revised Draft Water Resources Management Plan (UU, 2013) and is a balance between customer and environmental impacts. The level of service is reviewed as part of the Water Resources Management Plan process rather than this drought plan.

A separate Strategic Environmental Assessment and Habitats Regulations Assessment of the options included in this plan have been undertaken. Any options identified as having the potential to significantly affect European designated sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites), have been subjected to a detailed Appropriate Assessment. A drought option that has an adverse effect on the integrity of a European site can only be included in the plan subject to there being no alternative solutions, and where the Secretary of State is satisfied that there are imperative reasons of overriding public interest for its inclusion and the adoption of suitable compensatory measures. This is the situation at Ennerdale.

Overall we consider that this plan sets out the best course of action to safeguard water supplies should a severe drought occur. Every drought is different and actions in this plan will need tailoring to the specific circumstances of a particular drought. However, the plan has been built on experience of recent droughts and the triggers tested in our water resources models. Even though reservoirs are not forecast to empty even under a repeat of the worst drought on record, and taking into account the forecast effects of climate change, it is necessary to take action to conserve water supplies in case the drought is even more severe.

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English Nature, Habitats Regulations Guidance Note HRGN 1, 1997

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Environment Agency, Water Company Drought Plan Guideline, March 2011

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Environmental Damage (Prevention and Remediation) Regulations 2009

EU Directive 2001/42/EC on the Assessment of the Effects of Certain Plans and Programmes on the Environment, 2001

EC Directive 79/409/EEC on the Conservation of Wild Birds, 1979

EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive), 1992

EC Water Framework Directive 2000/60/EC, 2000

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Water Resources Act 1991

Water Supply (Water Quality) Regulations 2000 (and amendments)

Water Use (Temporary Bans) Order 2010

Wildlife and Countryside Act 1981

GLOSSARY OF TERMS

Aquator	An advanced water resources simulation model used by UU for drought and water resources planning
AONB	Area of Outstanding Natural Beauty
Blue Badge	The Blue Badge scheme is for people with severe mobility problems. It allows Blue Badge holders to park close to where they need to go. The scheme is managed by local authorities, who deal with applications and issue Blue Badges
BOD	Biological oxygen demand is a measure of the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present. High BOD levels are indicative of polluted water bodies
btwl	Below Top Water Level. Used to quote water levels below reservoir/lake top water level (i.e. how drawn down a reservoir/lake is and therefore how much water remains in storage)
Countryside Council for Wales	Countryside Council for Wales (superseded by Natural Resources Wales as of 1 April 2013)
Compensation flow	Stored water released from a reservoir to ensure a continuous flow in the downstream watercourse
Consumer Council for Water	The Consumer Council for Water (Northern), which represents the interests of water customers
Contingency Sources	Sources which can be utilised to assist with an in-season drought, i.e. those which normally occur within the space of a calendar year. These sources are ascribed to drought Trigger 2 and UU has an abstraction licence for all such sources
Critical period	The length of time between a reservoir being full and the reservoir reaching minimum storage during the worst drought on record
Defra	Department for Environment, Food and Rural Affairs
Deployable Output	Deployable output (known as DO) is the output of a commissioned source or group of sources or of a bulk supply as constrained by: the environment; abstraction licences; water quality; existing water treatment and supply system capacities. Yield is a similar but more general term
DO	Dissolved oxygen
Drought Order	The Water Resources Act 1991 gives the Secretary of State or the National Assembly for Wales the power to grant ordinary and emergency drought orders to water undertakers or the EA Ordinary drought orders can include the same powers to abstract water as drought permits, but they can also authorise water undertakers to take other actions. In this plan the term “drought permit/order” is used to differentiate these from drought orders for non-essential use An emergency drought order gives water companies complete discretion on the uses of water that may be prohibited or limited, and they can authorise supply of water by standpipes or water tanks, or impose rota cuts
Drought Permit	Schedule 22 of the Environment Act 1995 amended the Water Resources Act 1991 to give the EA the power to grant drought permits. Drought permits can only authorise a water undertaker to “take water” from specified sources or modify or suspend restrictions or obligations relating to a water undertaker’s existing powers to “take water” from a source. In this plan the term “drought permit/order” is used to differentiate these from drought orders for non-essential use
Droughtwatch	Joint UU and EA spreadsheet tool used to assess a range of scenarios for reservoirs to assess their risk of failure
DWI	The Drinking Water Inspectorate regulates drinking water quality in England and Wales
EA	The Environment Agency
EMP	Environmental Monitoring Plan. A plan for monitoring the impact of a drought permit/order on the environment
HRA	Habitats Regulations Assessment is a process for identifying the implications of the drought plan options for European designated sites (SAC, SPA, Ramsar). If likely significant adverse impacts are predicted, then a detailed Appropriate Assessment of the option is required

Hands-off flow	A hands-off flow (also known as a prescribed flow) is normally associated with a river abstraction and is the flow above which abstraction can occur. The purpose of a hands-off flow is to ensure a given flow of water continues in the river prior to abstraction
Hosepipe Ban	Section 36 of The Flood and Water Management Act 2010 replaced the original Section 76 of the Water Industry Act 1991. The original legislation only allowed water undertakers to prohibit or restrict the use of hosepipes (or similar apparatus) for the purposes of watering private gardens and the washing of private motor cars, commonly known as a hosepipe ban. The new legislation gives water companies further powers to restrict water use by customers. Therefore this plan refers to "water use restrictions" rather than hosepipe bans
Inset Appointee	The inset appointment process is the route by which one company replaces the incumbent (i.e. United Utilities for the north west) as the appointed water and/or sewerage company for a specified area. As such the replacement appointed water company will have all of the same duties and responsibilities as the previous statutory water company for the specified area. UU's only inset appointment is for Peel Water Networks Ltd. who supply water to Media City, Salford. Peel are not a licensed supplier as they do not hold a Water Supply Licence
LCUS	The Lancashire Conjunctive Use Scheme. This scheme comprises river (River Lune and Wyre), borehole (Fylde aquifer) and reservoir (Barnacre) sources
LeakLine	A free telephone number for the public to report leaks to UU
Level of Service	Reliability of water supply to our customers expressed as the frequency of the imposition of water use restrictions
Local Resilience Forums	Local Resilience Forums have a statutory responsibility in terms of emergency planning and response, including for vulnerable customer groups
MISER	UU's water supply system model used in assessments of water supply risk
Ml/d	Megalitres per day (million litres per day)
Natural Resources Wales	Supersedes Countryside Council for Wales as of 1 April 2013 – the new organisation also incorporates Environment Agency Wales and the Forestry Commission Wales
NE	Natural England
NNR	National Nature Reserve
Non-commissioned Sources	Sources which can be utilised to assist with multi-season droughts, such as autumn and winter periods when reservoir refill is required in order to protect water supplies into the next year. These sources are ascribed to drought Triggers 3 and 4. The majority of these sources have UU abstraction licences
Non-essential Use Ban	Also known as a prescribed uses order. The Drought Direction 2011 sets out the "non-essential" uses of water that can be prohibited or limited by an ordinary drought order. It is more restrictive than Section 76 of the Water Industry Act 1991 (as replaced by Section 36 of The Flood and Water Management Act 2010) and can impact particularly on car washing businesses, building cleaning businesses and those businesses with private swimming pools
ODPM	Office of the Deputy Prime Minister
Ofwat	Office of Water Services (the economic regulator of the water industry in England and Wales). Ofwat was replaced by the Water Services Regulation Authority on 1 April 2006
pH	pH is a measure of the acidity of an aqueous solution. Pure water is neutral, with a pH close to 7.0 whilst solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline
Ramsar	Ramsar sites are wetlands of international importance designated under the Ramsar Convention. More formally known as "The Convention on Wetlands of International Importance especially as Waterfowl Habitat" it is an intergovernmental treaty signed in Ramsar, Iran, in 1971
Resource Zone	The largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall
Review of Consents	The EA process by which abstraction licences (and other consents such as discharge consents) that have the potential to adversely affect SAC and SPA sites are being reviewed by the EA to determine if they need to be altered. This process will result in changes such as increases to compensation or prescribed flow requirements and reductions to the volume of water that can be abstracted

Rezone	UU will undertake a variety of actions to "rezone" water supplies during a drought. This involves altering the water supply network such that the area that a particular water source supplies is altered (i.e. enlarged or contracted). Rezoning allows UU to balance the abstractions of various water sources
SAC	Special Area of Conservation, as designated under the EU Habitats Directive. Together with SPA's these form the Natura 2000 network of protected sites
SEA	Strategic Environmental Assessment. A process which occurs alongside the development of the drought plan to ensure that environmental aspects are fully considered
Secretary of State	The Secretary of State for Defra (Department for Environment, Food and Rural Affairs)
Statutory water use restrictions	Statutory water use restrictions would be implemented approximately 28 days following the introduction of voluntary water use restrictions. The statutory water use restrictions are as set out in Section 76 of the Water Industry Act 1991 (as replaced by Section 36 of The Flood and Water Management Act 2010)
SPA	Special Protection Area, as designated under the EU Directive on the conservation of wild birds (also known as the Birds Directive). Together with SAC's these form the Natura 2000 network of protected sites
SSSI	Site of Special Scientific Interest, as designated under the Countryside and Rights of Way (CRoW) Act 2000
UKWIR	United Kingdom Water Industry Research Limited is a research organisation jointly funded by all UK water and wastewater service suppliers
UU	United Utilities Water PLC
Voluntary water use restrictions	Prior to the introduction of statutory water use restrictions, UU would implement voluntary water use restrictions. The time between the two would allow for consultation on the intention to impose statutory water use restrictions, together with time for the pubic to respond and for UU to implement statutory restrictions
WAG	Welsh Assembly Government (also known as the Welsh Government or Welsh Ministers)
WaterUK	WaterUK is the industry association that represents all UK water and wastewater service suppliers at national and European level
Waterwise	An organisation set up and jointly funded by all water companies. Acting independently, its aim is to increase demand management actions to address public water supply needs
WFD	EU Water Framework Directive (2000/60/EC). Came in to force on 23 October 2000
WFD UKTAG	Water Framework Directive United Kingdom Technical Advisory Group (UKTAG). The group supports the implementation of the directive in the UK and has developed standards and classifications for water bodies
WRMP	Water Resources Management Plan. UU last published its WRMP in 2009 and it is updated every 5 years. The WRMP identifies if there is expected to be a deficit in the availability of water supplies compared to demand, resulting in the need for new sources of water. The assessment takes climate change impacts in to account. The WRMP identifies the preferred solutions for dealing with any deficits, which are then funded through the AMP process
WSRA	The Water Services Regulation Authority replaced Ofwat on the 1 April 2006, however the term Ofwat is still generally used
Yield	A general term for the reliable supply of water from a source. Deployable Output is a similar but more specific term

UNITED UTILITIES WATER PLC

Final Drought Plan 2014

APPENDICES

APPENDIX 1: DEMAND SIDE DROUGHT OPTION FORMS

Option Name: Drought Publicity	
Trigger(s) (or preceding actions)	On reaching Trigger 1 UU would enhance its water conservation/efficiency publicity programme to customers. At each subsequent trigger the communications to customers would reflect the actions associated with that trigger (e.g. at Trigger 3, voluntary water use restrictions may be implemented). Concurrent actions could include rezoning of water supplies
Demand Saving Ml/d unless stated otherwise	The saving associated with drought publicity is difficult to quantify separately to the impact on demand resulting from the implementation of water use restrictions (see following drought option forms). UU believes that a combination of increased publicity and a voluntary water use restriction could result in a saving of 3-5% of the average dry weather demand expected during a drought period. This is based on experience of hosepipe bans introduced by UU in 1995/96 and 2010 It is important not to place too much reliance on drought publicity achieving a predefined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances, such as uptake of publicity by local and national media
Demand Saving Percentage reduction on peak week demand	The saving associated with a combination of increased publicity and water use restrictions has been estimated to be 3-5% of the average dry weather demand expected during the drought period. This is based on experience of hosepipe bans introduced by UU in 1995/96 and 2010
Location Area affected or whole supply zone	Drought publicity would be targeted to those areas where it is considered appropriate, however it is likely that the effects would be seen in neighbouring areas
Implementation timetable Preparation time, time of year effective, duration	As part of its normal operation UU takes an active role in promoting the efficient use of water to all types of household and non-household customers. A range of measures are undertaken including many publicity, education and advisory activities. These activities are estimated to save 3 Ml/d each year during 2010-15. In times of drought, this publicity is enhanced Drought publicity is relevant at all times of year however the nature of the publicity depends on a variety of prevailing circumstances, particularly the time of year and recent weather. During the winter, publicity will focus on providing advice to customers to use water wisely inside the home and to lag their pipes to prevent bursts in freezing temperatures. Whereas in the spring/summer, publicity would concentrate on the use of water for garden watering etc. Drought publicity would continue for the duration of a drought event, including drought recovery. It is important that following a drought, customers are thanked for their role in helping the water situation A substantial customer communications programme would accompany the implementation of both voluntary and statutory water use restrictions to highlight the reasons for the restriction, the need to comply to conserve water, the details of the restriction, to explain the actions being taken by UU to safeguard water supplies and to promote LeakLine. A detailed communications plan will be prepared in preparation for the lead up to Trigger 3 (voluntary water use restrictions) UU will also communicate with the Consumer Council for Water, Ofwat and other regulators and bodies as appropriate. Neighbouring water companies and inset appointees will also be informed in case of any queries from their own customers, especially those who live near the UU boundary. UU will also seek to provide a telephone information line or similar service to deal with customer queries, and this will be publicised as part of the communications programme UU has an archive of publicity material used in previous drought events and this has been updated to take account of the new legislation on water use restrictions. Examples of drought publicity can be found in APPENDIX 9: Communication Plan Details

Option Name: Drought Publicity (continued)	
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None
Risks associated with option	It is important not to place reliance on drought publicity achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances

Option Name: Enhanced Leakage Detection and Repair	
Trigger(s) (or preceding actions)	On reaching Trigger 2 UU would enhance its leakage detection and repair activities Preceding actions could include rezoning of water supplies and customer communication actions
Demand Saving Ml/d unless stated otherwise	Enhanced leakage detection and repair could save up to 5Ml/d of water a month It is important not to place too much reliance on leakage detection and repair achieving a predefined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances including soil moisture deficit, leakage levels at the time and the availability of leak detection and repair resources Droughts can increase leak breakout rates as there is a link between soil-moisture deficit and increasing leakage levels, for example, due to increased subsidence of soils. In this event, additional resources are needed to simply hold leakage steady and the benefit of our significant increase to our leakage control activities would be to minimise increases in leakage which might otherwise occur. Therefore enhanced leakage detection and repair may not result in a reduction in leakage levels, but rather reduce the increase that would otherwise have occurred
Demand Saving Percentage reduction on peak week demand	Enhanced leakage detection and repair could save up to 5Ml/d of water a month however enhanced leakage detection and repair may not result in a reduction in leakage levels, but rather reduce the increase that would otherwise have occurred
Location Area affected or whole supply zone	Enhanced leakage detection and repair would be targeted to those areas where it is considered appropriate, and where the greatest savings can be achieved
Implementation timetable Preparation time, time of year effective, duration	Leakage control is a key activity in managing the balance between water supply and water demand. Our long term programme for leakage reduction is outlined in our business plan in accordance with the Water Resources Management Plan 2009. This ensures that we manage leakage at a sustainable and economic level and achieve our target set by Ofwat. Whilst leakage control is a long term activity, during a drought situation we will make every effort to further reduce leakage beyond our Ofwat target through additional leakage detection and repair over and above our normal efforts. The extent to which, during a drought, our intensive efforts can further reduce leakage will depend on leakage levels and weather conditions at the time Enhanced leakage detection and repair is relevant at all times of year however the success of such activity depends on a variety of prevailing circumstances, particularly the time of year and ground conditions. Enhanced leakage detection and repair would continue for the duration of a drought event
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Permission to work in highways
Risks associated with option	It is important not to place reliance on enhanced leakage detection and repair achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances

Option Name: Voluntary Water Use Restriction	
Trigger(s) (or preceding actions)	UU will give strong consideration to implementing a voluntary water use restriction at Trigger 3 during the summer (April to September) in order to attempt to reduce external household demand for water. For Ennerdale, this action will occur at Trigger 2. UU will use the consultation period for the full Section 76 Temporary Use Ban (water use restriction option) to implement the voluntary water use restriction for the three weeks leading into the full statutory water use restriction. UU will use this as an opportunity for customers to review their current levels of demand and adjust their behaviour accordingly before implementing a full statutory water use restriction under Section 76 of the Water Industry Act 1991 However, before deciding to introduce a voluntary water use restriction, UU would assess actual customer demand data to establish whether sufficient reductions in demand were being achieved from the water conservation publicity programme which would take place ahead of any voluntary water use restrictions Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions
Demand Saving Ml/d unless stated otherwise	Before implementing a voluntary water use restriction, UU will consider carefully what impact it will have on current and forecast levels of demand. The voluntary water use restriction will apply to the general use of a hosepipe for domestic purposes. This is for ease of communication to customers. It is expected that this will achieve the highest saving of demand from the beginning to reduce the risk of having any further restrictions The saving associated with water use restrictions has been estimated to be 3-5% of the average dry weather demand expected during the drought period. This is based on experience of hosepipe bans introduced by UU in 1995/96 and 2010, however it is possible that greater demand savings could be realised in a future drought event. UU believes that the combination of the increased publicity and the voluntary water use restriction could result in a similar level of saving It is important not to place too much reliance on a water use restriction achieving a predefined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances, such as temperature, soil moisture deficit, political climate and uptake of publicity by local and national media. All of these factors play a part in reducing demand
Demand Saving Percentage reduction on peak week demand	The saving associated with water use restrictions has been estimated to be 3-5% of the average dry weather demand expected during the drought period. This is based on experience of hosepipe bans introduced by UU in 1995/96 and 2010
Location Area affected or whole supply zone	The voluntary water use restriction will only be introduced in those areas where it is considered appropriate, as in the case of 2010 drought where the hosepipe ban was only implemented in the Integrated Resource Zone

Option Name: Voluntary Water Use Restriction (continued)	
Implementation timetable Preparation time, time of year effective, duration	The implementation of voluntary water use restrictions would be the first step of the implementation of statutory water use restrictions. Voluntary water use restrictions would be initiated at Trigger 3 (Trigger 2 at Ennerdale) with an accompanying communication regarding the commencement of a consultation period for the introduction of statutory water use restrictions. This would be implemented during the summer (April to September). UU does not plan to introduce voluntary water use restrictions during the winter (October to March). Instead, UU will focus attention in winter on publicity to advise customers to use water wisely inside the home and to lag their pipes to prevent bursts in freezing temperatures. The duration of voluntary water use restrictions would depend on the prevailing situation but there is no limit on the length of time a restriction could be in place for Duration of the restrictions will depend on the particular circumstances of a drought event. In 1995/96 the statutory hosepipe ban was in place for 14 months and in 2010 the statutory ban was in place for 42 days A substantial customer communications programme would accompany the implementation of voluntary water use restrictions to highlight the reasons for the restriction, the need to comply to conserve water, the details of the restriction, to explain the actions being taken by UU to safeguard water supplies and to promote LeakLine. It would also explain details of the full statutory water use restrictions, the exemption process and detail the timings of the proposed statutory restriction UU will also communicate with the Consumer Council for Water, Ofwat and other regulators and bodies as appropriate. Neighbouring water companies and inset appointees will also be informed in case of any queries from their own customers, especially those who live near the boundary of the UU supply area affected. UU will also seek to provide a telephone information line or similar service to deal with customer queries, and this will be publicised as part of the communications programme Preparation for voluntary water use restrictions will commence at Trigger 2 (Trigger 1 at Ennerdale) and a detailed communications plan will be prepared There will be no prior notification for the public for voluntary water use restrictions, however communications leading up to the restriction will signal our intention to introduce a voluntary restriction should customer demand not reduce, and drought permits/orders continue to be required
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	The decision to introduce voluntary water use restrictions rests with United Utilities Water PLC Board. The decision will be taken at the same time as the decision to implement statutory water use restrictions. This will be subject to satisfying the serious deficiency of water available for distribution criteria in Section 76 of the Water Industry Act 1991 Before implementing voluntary water use restrictions, UU would consult with the Consumer Council for Water and the EA. It would also have in place regular communications to these bodies, but also including Ofwat, Drinking Water Inspectorate, Natural England, Defra and other relevant organisations
Risks associated with option	It is important not to place reliance on voluntary water use restrictions achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances

Option Name: Statutory Water Use Restriction	
Trigger(s) (or preceding actions)	UU will give strong consideration to implementing statutory water use restrictions at Trigger 4 during the summer (April to September) in order to attempt to reduce external household demand for water. UU will use the consultation period (of three weeks) to implement voluntary water use restrictions, whilst the notice period runs. The consultation period will commence at Trigger 3 (Trigger 2 at Ennerdale). UU will use this as an opportunity for customers to review their current levels of demand and adjust their behaviour accordingly before implementing full statutory water use restrictions under Section 76 of the Water Industry Act However, before deciding to introduce statutory water use restrictions, UU would assess actual customer demand data to establish whether sufficient reductions in demand were being achieved from the voluntary water use restrictions to meet our commitment to customers to not have statutory water use restrictions in place any earlier than necessary Prior to Trigger 4, UU will have implemented an escalated water conservation publicity programme and asked customers to follow voluntary water use restrictions. Preceding actions could also include rezoning of water supplies; bringing water sources online
Demand Saving Ml/d unless stated otherwise	Before implementing statutory water use restrictions UU will consider carefully what impact it will have on current and forecast levels of demand. UU would implement all options available to it under Section 76 of the Water Industry Act. This includes the prohibition of the following: watering a garden using a hosepipe cleaning a private motor-vehicle using a hosepipe watering plants on domestic or other non-commercial premises using a hosepipe cleaning a private leisure boat using a hosepipe filling or maintaining a domestic swimming or paddling pool drawing water, using a hosepipe, for domestic recreational use filling or maintaining a domestic pond using a hosepipe filling or maintaining an ornamental fountain cleaning walls, or windows, of domestic premises using a hosepipe cleaning paths or patios using a hosepipe cleaning other artificial outdoor surfaces using a hosepipe The saving associated with water use restrictions has been estimated to be 3-5% of the average dry weather demand expected during the drought period. This is based on experience of hosepipe bans introduced by UU in 1995/96 and 2010, however it is possible that greater demand savings could be realised in a future drought event. We have not planned for a further reduction of demand between voluntary and statutory water use restrictions It is important not to place reliance on a water use restriction achieving a predefined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances, such as temperature, soil moisture deficit, political climate and uptake of publicity by local and national media, which all play a part in reducing demand

Option Name: Statutory Water Use Restriction (continued)	
Demand Saving Percentage reduction on peak week demand	Following the experience of the 2010 drought and implementation of the hosepipe ban demand fell by approximately 3% which is the assumption on which our plans have been based upon
Location Area affected or whole supply zone	Statutory water use restrictions will only be introduced in those areas where it is considered appropriate, as in the case of 2010 drought where the hosepipe ban was only implemented in the Integrated Resource Zone
Implementation timetable Preparation time, time of year effective, duration	Preparation for statutory water use restrictions would begin at Trigger 3 (Trigger 2 for Ennerdale) with an accompanying communication regarding the commencement of a consultation period before its implementation at Trigger 4. This would be implemented during the summer (April to September). UU does not plan to introduce statutory water use restrictions during the winter (October to March). Instead, UU will focus attention in winter on publicity to advise customers to use water wisely inside the home and to lag pipes to prevent bursts in freezing temperatures. The duration of statutory water use restrictions would depend on the prevailing situation but there is no limit on the length of time a restriction could be in place for Duration of the restrictions will depend on the particular circumstances of a drought event. In 1995/96 the statutory hosepipe ban was in place for 14 months and in 2010 the statutory ban was in place for 42 days A substantial customer communications programme would accompany the implementation of statutory water use restrictions to highlight the reasons for the restriction, the need to comply to conserve water, the details of the restriction, to explain the actions being taken by UU to safeguard water supplies and to promote LeakLine. It would also explain the details of any exemptions available to customers and the process by which a customer may apply for an exemption UU will also communicate with the Consumer Council for Water, Ofwat and other regulators and bodies as appropriate. Neighbouring water companies and Inset Appointees will also be informed in case of any queries from their own customers, especially those who live near the boundary of the UU supply area affected. UU will also seek to provide a telephone information line or similar service to deal with customer queries, and this will be publicised as part of the communications programme There will be three weeks notification for the public for statutory water use restriction, however communications leading up to the restriction will signal our intention to introduce statutory water use restrictions should demand not reduce and drought permits/orders continue to be required
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	The decision to introduce statutory water use restrictions rests with United Utilities Water PLC Board subject to satisfying the serious deficiency of water available for distribution criteria in Section 76 of the Water Industry Act 1991 Before implementing statutory water use restrictions, UU would consult with the Consumer Council for Water and the EA. It would also have in place regular communications to these bodies, but also including Ofwat, Drinking Water Inspectorate, Natural England, Defra and other relevant organisations
Risks associated with option	It is important not to place reliance on statutory water use restrictions achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances

Option Name: Non-Essential Use Ban	
Trigger(s) (or preceding actions)	UU will carefully consider the merits of implementing a Non-Essential Use Ban following the implementation of statutory water use restrictions after Trigger 4 during the summer (April to September). This would follow a full assessment of the potential demand saving benefits and the socio-economic impacts such a restriction could have in the North West Voluntary and statutory water use restrictions will always be introduced before a Non-Essential Use Ban is applied for. Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions The implementation of a Non-Essential Use Ban may not necessarily be associated with drought permit/order applications depending on factors such as the likely benefit of such an action
Demand Saving Ml/d unless stated otherwise	The benefit of a Non-Essential Use Ban will depend upon various factors including the time of year, weather conditions, the supply area concerned and the proportion of demand accounted for by the water uses prescribed in the Drought Direction 2011 (which replaced the Drought Direction of 1991). It will be important to carefully evaluate the possible demand benefits before deciding to implement the ban In 1995/96 UU sought to prohibit the full set of uses specified in the Drought Direction 1991 with exemptions applied to automatic car washes that recycled the water. The 1995/96 non-essential use ban was in force in Greater Manchester, most of Lancashire and south Cumbria from 9 October 1995 to 2 April 1996, affecting a population of 4.1 million. In evaluating the impact of this on demand, it was concluded that it was not a direct demand management tool. The quantity of water saved was very small (about 0.2% of regional supply) and no significant direct impact on demand was observed It is important not to place reliance on a Non-Essential Use Ban achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances
Demand Saving Percentage reduction on peak week demand	Based on the savings observed during the 1995-96 drought, UU would expect to see a reduction of 0.2% in demand
Location Area affected or whole supply zone	The Non-Essential Use Ban will only be introduced in those areas where it is considered appropriate, as in the case of the 1995-96 drought where a Non-Essential Use Ban was only implemented in parts of the region

Option Name: Non-Essential Use Ban (continued)	
Implementation timetable Preparation time, time of year effective, duration	UU will carefully consider the merits of implementing a Non-Essential Use Ban following the implementation of statutory water use restrictions after Trigger 4 during the summer (April to September). This would follow a full assessment of the potential demand saving benefits and the socio-economic impacts such a restriction could have in the North West. A Non-Essential Use Ban will only be introduced in those areas where it is considered appropriate. It will not always be the case that a Non-Essential Use Ban will be applied across the whole of a resource zone A substantial customer communications programme would accompany the implementation of a Non-Essential Use Ban to highlight the reasons for the restriction, the need to comply to conserve water, the details of the restriction, to explain the actions being taken by UU to safeguard water supplies and to promote LeakLine UU will also communicate with the Consumer Council for Water, Ofwat and other regulators and bodies as appropriate. Neighbouring water companies and Inset Appointees will also be informed in case of any queries from their own customers, especially those who live near the boundary of the UU supply area affected. UU will also seek to provide a telephone information line or similar service to deal with customer queries, and this will be publicised as part of the communications programme The preparation time for a Non-Essential Use Ban is relatively prolonged due to the need for application to the Secretary of State. There is no statutory time period for the Secretary of State to make a decision. Defra (2011) advise that applicants should allow 28 days for an application to be determined if there are objections and 10 days if there are no objections (this is unlikely) A Non-Essential Use Ban can last up to six months, though it can be amended to last up to a maximum of one year. UU will have a Non-Essential Use Ban in place no longer than necessary
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	The Drought Direction 2011 sets out the non-essential uses of water that can be prohibited or limited by an ordinary drought order (a Non-Essential Use Ban). If UU were to apply for such a drought order, a decision would be taken as to which uses to include in the order and whether the use should be prohibited or limited. The decision to apply for a Non-Essential Use Ban rests with United Utilities Water PLC Board. To grant such an order the Secretary of State must be satisfied that a serious deficiency of supplies of water in an area exists or is threatened and that the reason for the deficiency is an exceptional shortage of rain (Water Resources Act 1991) UU's assessment of the relative merits of a Non-Essential Use Ban in the summer months would be discussed with the EA and the Consumer Council for Water
Risks associated with option	It is important not to place reliance on a Non-Essential Use Ban achieving a pre-defined demand reduction since the magnitude of any reduction is influenced by a variety of prevailing circumstances. There is a risk that the Secretary of State will not grant the Non-Essential Use Ban or may restrict the extent to which certain water uses are curtailed. There is a risk that the time it takes to obtain could impact the application of drought permits/orders which is a particularly issue in areas with a short critical period such as West Cumbria

APPENDIX 2: INTEGRATED DROUGHT OPTION FORMS: DROUGHT PERMITS/ORDERS

Option Name: Delph Reservoir drought permit/order: reduce compensation flow from 3.7 to 1.0 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions. The need to bring the non-commissioned Springs, Belmont and Bromiley boreholes into supply will be considered prior to an application for drought powers at Delph reservoir
	Deployable Output of action Ml/day	The drought option would reduce the compensation flow requirement from 3.7 Ml/d to 1 Ml/d. This would result in a temporary reduction in the flow from Delph reservoir to Delph Brook. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of the reservoir would be c.2.7 Ml/d
	Location Area affected or whole supply zone	Local impact in Bolton area. Benefit to Integrated Resource Zone due to conservation of reservoir storage in Delph reservoir, resulting in reduced need to support the area from other local and regional water sources
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Delph Reservoir drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No protected sites affected The environmental study identified a moderate adverse environmental impact on bullhead. Mitigation measures are expected to reduce the impact to a non-significant level The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In May 2013, the EMP for the Delph drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	UU will use Eagley borehole (reliable yield of 1.43 Ml/d) to help sustain flows in Eagley Brook (into which Delph Brook flows) and to help mitigate the reduction in Delph reservoir's compensation flow from 3.7 Ml/d to 1.0 Ml/d The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring then various measures could be implemented to mitigate the moderate adverse environmental impact on bullhead, including a return to the statutory compensation flow or a temporary increase in discharge
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

Option Name: Dovestone Reservoir drought permit/order: reduce compensation flow from 15.9 to 10.0 or 5.0 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions. The need to bring the non-commissioned Swineshaw boreholes into supply will be considered prior to an application for drought powers at Dovestone reservoir
	Deployable Output of action Ml/day	The drought option would reduce the compensation flow requirement from 15.9 Ml/d to between 10 Ml/d and 5 Ml/d. This would result in a temporary reduction in the flow from Dovestone reservoir to Chew Brook. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of Greenfield, Yeoman Hey and Dovestone reservoirs would be between c.5.9 Ml/d to 10.9 Ml/d depending on the magnitude of the compensation flow reduction applied for, or this water could be conserved in the reservoirs to safeguard the compensation flow
	Location Area affected or whole supply zone	Local impact in Tameside and Oldham areas. Benefit to Integrated Resource Zone due to conservation of reservoir storage in Dovestone reservoir, resulting in reduced need to support the area from other local and regional water sources
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved. In 1995, one objection was made to the proposed compensation flow reduction at Dovestone reservoir due to concern about the impact on fisheries and ecology in Chew Brook and the River Tame. A local public hearing was held, but the Inspector recommended that the permit be granted

Option Name: Dovestone Reservoir drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The Rochdale Canal SAC, primarily designated for its floating water-plantain, is in the local area although the environmental study showed no adverse impacts. The site is located within the Peak District National Park The environmental study assessed reducing the compensation flow to 10 Ml/d and 5 Ml/d. The study identified no moderate or major adverse environmental impacts The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In May 2013, the EMP for the Dovestone drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	As the environmental study did not identify any moderate or major adverse impacts, no mitigation measures are anticipated
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

Option Name: Jumbles Reservoir drought permit/order: reduce compensation flow from 19.9 to 12.0 or 6.0 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions. The need to bring the non-commissioned Springs, Belmont and Bromiley boreholes into supply will be considered prior to an application for drought powers at Jumbles reservoir
	Deployable Output of action Ml/day	The drought option would reduce the compensation flow requirement from 19.9 Ml/d to between 12 Ml/d and 6 Ml/d. This would result in a temporary reduction in the flow from Jumbles reservoir to Bradshaw Brook. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of the associated supply reservoirs of Wayoh and Entwistle would be between c.8 Ml/d to 14 Ml/d depending on the magnitude of the compensation flow reduction applied for
	Location Area affected or whole supply zone	Local impact in Bolton area. Benefit to Integrated Resource Zone due to conservation of reservoir storage in Jumbles reservoir for the purpose of providing a compensation flow release to Bradshaw Brook, resulting in reduced need to support the area from other local and regional water sources
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Jumbles Reservoir drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No protected sites affected The environmental study identified a moderate adverse environmental impact on hydrodynamics (river flow, level and wetted area) for the option of reducing compensation flow to 6 Ml/d. Mitigation measures are expected to reduce the impact to a non-significant level. No moderate or major adverse environmental impacts were identified for the option of reducing compensation flow to 12 Ml/d The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In May 2013, the EMP for the Jumbles drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring then various measures could be implemented to mitigate the moderate adverse environmental impact on hydrodynamics, including a return to the statutory compensation flow or a temporary increase in discharge In implementing the drought powers, UU will aim to keep Jumbles reservoir above 11.45m btwl to protect fish in the reservoir. If this is not possible, UU will agree further actions with the EA e.g. a new application to further reduce compensation flows (to conserve storage in the reservoir) or a fish rescue
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified a moderate adverse impact on the availability of water to other amenity and commercial abstractors for the option of reducing compensation flow to 6 Ml/d, together with a minor adverse impact on landscape and visual amenity due to reduced river levels. Only a minor adverse impact on the availability of water to other amenity and commercial abstractors was identified for the option of reducing compensation flow to 12 Ml/d

Option Name: Longdendale Reservoirs drought permit/order: reduce compensation flow from 45.5 to 22.5 or 15 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	The drought option would reduce the compensation flow requirement from 45.5 Ml/d to 22.5 Ml/d or 15 Ml/d. This would result in a temporary reduction in flow from the Longdendale reservoirs to the River Etherow. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of the source would be between c.23 Ml/d to 30 Ml/d depending on the magnitude of the compensation flow reduction applied for
	Location Area affected or whole supply zone	Integrated Resource Zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved
	Risk to the Environment (High/Medium/Low or unknown)	Low Environmental study completed in 2010

Option Name: Longdendale Reservoirs drought permit/order (continued)		
Environmental Assessment	**Summary of likely environmental impacts** Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No protected sites affected. The Longdendale reservoirs are located just within the Peak District National Park, however the downstream watercourse (River Etherow) is outside the boundary The environmental study identified the following moderate environmental impacts for the option of reducing the compensation flow to 22.5 Ml/d. Mitigation measures are expected to reduce these impacts to a non-significant level: Moderate adverse impact on Atlantic salmon (fry and parr), bullhead and lamprey ammocoetes The environmental study identified the following moderate or major adverse environmental impacts for the option of reducing the compensation flow to 15 Ml/d. Mitigation measures are expected to reduce these impacts to a non-significant level: Moderate adverse impact on hydrodynamics (river flow, level and wetted area) Moderate adverse impact on water quality (DO, BOD, ammonia, pH) and WFD UKTAG standards Major adverse impact on Atlantic salmon (fry and parr) Moderate adverse impact on sea/brown trout (fry and juveniles/parr), bullhead and lamprey ammocoetes The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In May 2013, the EMP for the Longdendale drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring then various measures could be implemented to mitigate the moderate/major adverse environmental impacts outlined above, including a return to the statutory compensation flow, a temporary increase in discharge or freshet flow releases In implementing drought powers, UU will aim to keep Bottoms reservoir (part of the Longdendale reservoir system) above 9.5m btwl to protect fish in the reservoir. If this is not possible, UU will agree further actions with the EA e.g. a new application to further reduce compensation flows (to conserve storage in the reservoir) or a fish rescue
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified a minor adverse impact on landscape and visual amenity due to reduced river levels

Option Name: River Lune LCUS drought permit/order: reduce prescribed flow from 365.0 to a minimum of 200 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	The drought option would reduce the prescribed flow requirement at Skerton Weir from 365 Ml/d to a minimum of 200 Ml/d. This would allow UU to abstract from the River Lune (part of the Lancashire Conjunctive Use Scheme, LCUS) at lower river flows than normal. This would result in a temporary reduction in the flow in the River Lune. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances The potential benefit of drought powers at River Lune (LCUS) is dependent upon the exact scope of the application and the pattern of weather conditions. Drought powers to allow increased abstraction from the River Lune (LCUS) will reduce demand on the Lake District and Pennine reservoirs. Under dry winter conditions, the benefit could be 50 Ml/d for the period January to March inclusive. The benefits of drought powers would be greatest over a dry winter to aid refill of reservoirs
	Location Area affected or whole supply zone	Integrated Resource Zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: River Lune LCUS drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2008
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The River Lune is one of five major fresh water sources to Morecambe Bay (SAC/SPA/Ramsar/SSSI) which also include the rivers Leven, Kent, Keer and Wyre however the environmental study showed that these designated sites are not affected by this drought option. The LCUS abstraction site is located just within the Forest of Bowland AONB, however the downstream watercourse (River Lune) is outside the boundary The prescribed flow reduction would result in reduced river flows in the lower stretches of the River Lune. In drought conditions, the flow in the River Lune will naturally be lower than normal and the drought permit/order provisions will not result in any significant further reduction to low flows The environmental study assessed two prescribed flow reductions, to 250 Ml/d and 200 Ml/d, and identified no moderate or major adverse environmental impacts The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Water quality mass-flux and river flow modelling was also undertaken In 1995, following a public hearing, an application to reduce the prescribed flow to 200 Ml/d over the winter months was refused on grounds of adverse impacts on a specific genetic strain of spring salmon. Following this refusal, UU and the EA jointly commissioned an independent report from APEM to assess the spring salmon issues and the impacts of winter River Lune drought powers. The final report by APEM (1999) concluded that a reduction to the prescribed flow from 365 Ml/d to 200 Ml/d during winter months would have little or no impact on spring salmon migration in the River Lune
	Summary of additional baseline monitoring requirements	The 2008 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the River Lune LCUS drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	As the environmental study did not identify any moderate or major adverse impacts, no mitigation measures are anticipated. However if monitoring during a drought permit/order indicates that significant impacts are occurring, various mitigation measures could be implemented including a temporary return to the statutory prescribed flow, freshet flow releases, cessation of abstraction and measures to reduce predation by piscivorous birds
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified a moderate adverse impact on the availability of water to other amenity and commercial abstractors as a result of lower river levels resulting in potential pump cavitation issues. Following completion of the environmental study, a meeting was convened by UU with key abstractors in 2008 to discuss these issues further. The environmental study also identified minor adverse impacts on landscape and visual amenity, angling, canoeing and navigation due to reduced river flows. A potential benefit to the Lune estuary haaf netting industry in June to August was identified

Option Name: Rivington Reservoir – Brinscall Brook drought permit/order: reduce compensation flow from 3.9 to 2.0 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	The drought option would reduce the compensation flow requirement from 3.9 Ml/d to 2 Ml/d. This would result in a temporary reduction in the flow from The Goit (a man-made channel linking Rake Brook and Anglezarke reservoirs) to Brinscall Lodge. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of the source would be c.1.9 Ml/d
	Location Area affected or whole supply zone	Local impact in Wigan area
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Rivington Reservoir – Brinscall Brook drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No protected sites affected The environmental study identified a moderate adverse impact on Atlantic salmon, brown/sea trout, bullhead and eel. Mitigation measures are expected to reduce the impacts to a non-significant level The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In May 2013, the EMP for the Rivington (Brinscall Brook) drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring then various measures could be implemented to mitigate the moderate adverse environmental impact on fish, including: A return to the statutory compensation flow A temporary increase in discharge Funding for the provision of juvenile trout habitat creation to provide alternative, less flow sensitive, sites through impacted river reaches
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

Option Name: Rivington Reservoir – White Coppice drought permit/order: reduce compensation flow from 4.9 to 2.0 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	The drought option would reduce the compensation flow requirement from 4.9 Ml/d to 2 Ml/d. This would result in a temporary reduction in the flow from The Goit (a man-made channel linking Rake Brook and Anglezarke reservoirs) to White Coppice Lodge. The precise reduction would be discussed fully with the EA and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of the source would be c.2.9 Ml/d
	Location Area affected or whole supply zone	Local impact in Wigan area
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Rivington Reservoir – White Coppice drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No protected sites affected The environmental study identified a moderate adverse impact on Atlantic salmon, brown/sea trout and bullhead. Mitigation measures are expected to reduce the impacts to a non-significant level The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In May 2013, the EMP for the Rivington (White Coppice) drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring then various measures could be implemented to mitigate the moderate adverse environmental impact on fish, including: A return to the statutory compensation flow A temporary increase in discharge Funding for the provision of juvenile trout habitat creation to provide alternative, less flow sensitive, sites through impacted river reaches
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

Option Name: Ullswater drought permit/order: reduce hands-off flow conditions; construct temporary outlet weir to raise lake level by up to 0.15m and/or relax 12-month rolling abstraction licence limit		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	Drought powers could cover any or all of the following aspects to allow UU to continue abstracting: Reduce hands-off flow in the River Eamont at Pooley Bridge to a minimum of 95 Ml/d Construct a temporary outlet weir to raise the lake level by up to 0.15m Relax 12-month rolling abstraction licence limit The scope of required powers would be discussed fully with the EA and NE and will depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output depends on the extent of the drought powers applied for and the pattern of weather conditions. Under dry summer weather conditions, the benefit could be 50-60 Ml/d. The benefit of the temporary weir is only realised if there is sufficient rainfall to provide refill of the storage capacity provided behind the weir structure. Under dry winter conditions, the benefit has been estimated as 70-100 Ml/d, if the hands-off flow is reduced to 95 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application. A drought order may be required to build a temporary weir until such time as an agreement with the local landowners is in place to allow access to construct the weir. In the event of an application for drought powers for Ullswater it is likely that an Appropriate Assessment and CROW Assessment (under the Countryside and Rights of Way Act 2000) will be required due to potential impacts on the River Eden SAC and SSSI respectively
	Risks associated with option	That the application, as applied for, is not approved. Failure of negotiations to agree land access for construction of a temporary weir resulting in the need to apply for a drought order to gain access
	Risk to the Environment (High/Medium/Low or unknown)	Low Environmental study completed in 2005 - subsequently revised in 2010 to support a potential drought permit application at Ullswater but only in draft form as rainfall negated its need

Option Name: Ullswater drought permit/order (continued)		
Environmental Assessment	**Summary of likely environmental impacts** Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Ullswater is within the River Eden SAC which is designated primarily for its oligotrophic to mesotrophic standing waters (in terms of mean Chlorophyll A and Total Phosphorous), its water courses of plain to montane levels and its alluvial forest habitats. The primary designated species are white-clawed crayfish, sea/brook/river lamprey, Atlantic salmon, bullhead and otter. The River Eden and Tributaries is also a SSSI. Ullswater is located within the Lake District National Park. The environmental study assessed the impact of reducing the hands-off flow to 95 Ml/d, construction of a temporary weir and relaxation of the annual licence limit. The study identified no moderate or major adverse environmental impacts on non-designated features and identified the following adverse environmental impacts on designated features: Minor adverse impact on total phosphorous concentration in Ullswater lake (SAC designation) Moderate adverse impact on downstream migrating Atlantic salmon in April and May only (SAC designation). Mitigation measures are anticipated to reduce this impact to minor adverse Potential beneficial impact on river plant community, including water crowfoot, Atlantic salmon (redds, fry and parr), bullhead, lamprey ammocoetes and white-clawed crayfish (SAC designation) The environmental study states that it is assumed that construction of the temporary weir will be carried out incorporating Best Practice mitigation measures, including those for European protected species, including white clawed crayfish. With mitigation measures in place, the residual impacts of weir construction are anticipated to be minor adverse, short (less than one month) and temporary, and limited to the area in the immediate vicinity of the footprint of the weir. As such, no significant adverse impacts on the SAC are anticipated The site was included within the Habitats Regulations Assessment for this drought plan and it was identified as needing an Appropriate Assessment because of the potential effect on the River Eden SAC in-combination with other discharge consents due to Ullswater failing its phosphorous targets. The EA's Review of Consents concluded no adverse impacts and no changes to the licensed abstraction or the discharges. Due to concerns raised by the EA and Natural England, an alone Appropriate Assessment for this option has been undertaken as a precaution, this concluded no adverse impact to SAC features
	Baseline information used	The environmental study utilised historical data on river flow, lake level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Water quality and water resources modelling were also undertaken. UU is currently undertaking a review of the Ullswater environmental study and associated Appropriate Assessment which will include consideration of the construction and operation of the temporary weir. This review includes the involvement of local stakeholders, the Environment Agency and Natural England. We plan to complete this review by end March 2014 although progress will be dependent on timely data provision and input from third parties
	Summary of additional baseline monitoring requirements	Following completion of the 2005 environmental study, an Environmental Monitoring Plan (EMP) has been developed to set out the monitoring that would be required if a drought permit/order is implemented. In March 2013, the EMP for the Ullswater drought permit/order was reviewed and agreed by UU, EA and Natural England
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring, various mitigation measures could be implemented including a temporary return to the statutory hands-off flow or freshet flow releases
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified a minor adverse impact on local land owners due to disruption to allow access to build the temporary weir, however negotiation with land owners would aim to minimise this. The environmental study identified that any impacts on commercial/pleasure boats and other recreational activities were negligible. The environmental study identified a minor adverse impact on landscape and visual amenity due to weir construction works and flow reduction in the River Eamont. Ullswater Steamers would be consulted if drought powers at Ullswater are being considered

Option Name: Lake Vyrnwy drought permit/order: reduce compensation flow from 45.0 to 25.0 Ml/d		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	Reducing the compensation flow from 45 Ml/d to 25 Ml/d would result in a temporary reduction in flow from Lake Vyrnwy to the Afon Vyrnwy. The precise reduction would be discussed fully with the EA and Natural Resources Wales and would depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output of the reservoir would be c.20 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone: supports Liverpool area and Manchester via West-East link
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of application
	Risks associated with option	That the application, as applied for, is not approved or that the application conflicts with a drought order application by the EA to temporarily increase the Vyrnwy waterbank releases to the River Severn system
	Risk to the Environment (High/Medium/Low or unknown)	Low Environmental study completed in 2010

Option Name: Lake Vyrnwy drought permit/order (continued)		
Environmental Assessment	**Summary of likely environmental impacts** Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The Severn Estuary SAC/SPA/Ramsar, Berwyn SPA, and the Berwyn and South Clwyd Mountains SAC designated sites are within the locality of Lake Vyrnwy. The environmental study showed no adverse impacts on these protected sites In their consultation response to the Draft Statutory Drought Plan 2006, the Countryside Council for Wales confirmed that the drought plan is unlikely to have any adverse effect on the Berwyn SAC features or adjacent SSSIs The environmental study identified moderate adverse impacts on Atlantic salmon (fry and parr only), although these could be reduced to minor adverse if mitigation measures are adopted The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, reservoir level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken In 2005, the EA led a review of the application process for an EA drought order to temporarily increase the Vyrnwy waterbank releases to the River Severn system and the associated drought curve. This review involved UU, Severn Trent Water, South Staffordshire Water and Bristol Water, and ensures that water company drought plans and EA plans are aligned. Following this review, the EA issued a revised River Severn drought curve and drought order application process. The review confirmed that an overlap is unlikely between UU applying for drought powers to reduce the compensation flow from Lake Vyrnwy and the EA also applying for drought powers to increase the waterbank releases from the reservoir to the River Severn system. During drought conditions, UU and the EA will discuss potential management actions for the River Severn system
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In March 2013, the EMP for the Vyrnwy drought permit/order was reviewed and agreed by UU, EA and Countryside Council for Wales.
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts on salmon are occurring, various mitigation measures could be implemented including a temporary return to the statutory compensation flow or freshet flow releases. If these are adopted then the impact on salmon reduces to minor adverse
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified a moderate adverse impact on another abstractor, the hydroelectric power station at Dolanog, and mitigation measures were considered including provision of temporary pumps or appropriate compensation in the event that the power station cannot operate due to lower river flows resulting from the drought permit/order. Adoption of these mitigation measures would result in the impact reducing to minor adverse The environmental study identified a minor adverse impact during April to September on recreational angling opportunity on the downstream river Lake Vyrnwy can release water to the River Severn to support the river flow. This is important to the Canal and River Trust for both navigation on the River Severn and abstraction of water to the Gloucester & Sharpness Canal (from which Bristol Water abstracts). The Canal and River Trust will be consulted if drought powers at Vyrnwy are being considered

Option Name: Lake Windermere drought permit/order: reduce hands-off flow conditions and/or relax 12-month rolling abstraction licence limit (Scenario 1 with no lake drawdown)		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	Drought powers at Windermere could cover either or both of the following aspects to allow UU to continue abstracting: Reduce hands-off flow conditions in the River Leven at Newby Bridge to a minimum of 95 Ml/d Relax 12-month rolling abstraction licence limit This scenario, Scenario 1, does not include a lake drawdown The scope of required powers would be discussed fully with the EA and will depend upon the need for additional water, time of year and prevailing environmental circumstances. The benefit to deployable output depends on the extent of the drought powers applied for and the pattern of weather conditions. It was estimated that the 2003 drought permit would give a benefit of up to 50 Ml/d in dry conditions over the period December to March inclusive (with no drawdown of the lake)
	Location Area affected or whole supply zone	Integrated Resource Zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Lake Windermere drought permit/order: (Scenario 1 with no lake drawdown, continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2008 - subsequently revised in 2010 to support a drought permit application at Windermere although this was withdrawn following rainfall negating its need
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Lake Windermere is located within the Lake District National Park. Windermere is designated as a County Wildlife Site. A small proportion of Lake Windermere is within the Low Wray Bay SSSI which is designated for its preserved sediments of Lake Windermere and it is unlikely that drought powers at Windermere would adversely affect this site. The River Leven, which flows out of Windermere, is one of five major fresh water sources to Morecambe Bay (SAC/SPA/Ramsar/SSSI) which also include the rivers Lune, Kent, Keer and Wyre. Discussions with the EA and NE, as part of the environmental study, ascertained that the impact on Morecambe Bay is likely to be insignificant given the relative volumes of water involved and the large attenuation volumes available in Morecambe Bay. Therefore no designated sites are affected The environmental study assessed the impacts of reducing the hands-off flow to 95 Ml/d and relaxing the annual licence limit. The study identified no moderate or major adverse environmental impacts The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, lake level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Water resources modelling was also undertaken. The Windermere waterbank agreement was revised and agreed with the Environment Agency and local stakeholders in December 2012. UU is currently undertaking a review of the Windermere environmental study in partnership with local stakeholders and the Environment Agency. We plan to complete this review by end March 2014 although progress will be dependent on timely data provision and input from third parties
	Summary of additional baseline monitoring requirements	Following completion of the 2008 environmental study, an Environmental Monitoring Plan (EMP) has been developed to set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the Windermere drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	If monitoring during a drought permit/order indicates that significant impacts are occurring, various mitigation measures could be implemented including a temporary return to the statutory hands-off flow or freshet flow releases The new Windermere waterbank agreement agreed in December 2012 states that at any time that Windermere is 2.5cm below weir crest and/or Haweswater storage has crossed Trigger 3, a meeting of the Windermere stakeholder group will be convened to include representatives from the following organisations: UU, EA, Holker Estates, Windermere Lake User Forum, Windermere Lake Cruises Ltd and Windermere Marina Village Ltd. Through this process the most effective use of the Windermere water bank will be discussed
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified no adverse impacts on non-environmental features. The Windermere stakeholder group would be consulted if drought powers at Windermere are being considered

Option Name: Lake Windermere drought permit/order: relax 12-month rolling abstraction licence limit and/or permit drawdown of lake level (up to a maximum of 0.5m below weir crest) (Scenario 2 with lake drawdown)		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (Integrated Resource Zone). Preceding actions could include rezoning of water supplies; bringing water sources online; customer communication actions and demand restrictions
	Deployable Output of action Ml/day	Drought powers at Windermere could cover any or all of the following aspects to allow UU to continue abstracting: Permit drawdown of lake level up to a maximum of 0.5m below the crest of Newby Bridge weir. During drawdown, releases to the River Leven would be made by the Environment Agency through their fisheries sluice depending on the prevailing requirements of the river Relax 12-month rolling abstraction licence limit This scenario, Scenario 2, includes a lake drawdown The scope of required powers would be discussed fully with the EA and will depend upon the need for additional water, time of year and prevailing environmental circumstances. The option to lower the level of Windermere would be introduced as a precautionary measure that might be required during a severe drought. The benefit to deployable output depends on the extent of the drought powers applied for and the pattern of weather conditions. Under dry summer weather conditions, the benefit could be 90-110 Ml/d. It was estimated that the 2003 drought permit would give a benefit of up to 50 Ml/d in dry conditions over the period December to March inclusive (with no drawdown of the lake)
	Location Area affected or whole supply zone	Integrated Resource Zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Lake Windermere drought permit/order: (Scenario 2 with lake drawdown, continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium Environmental study completed in 2008 - subsequently revised in 2010 to support a drought permit application at Windermere although this was withdrawn following rainfall negating its need
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Lake Windermere is located within the Lake District National Park. Windermere is designated as a County Wildlife Site. A small proportion of Lake Windermere is within the Low Wray Bay SSSI which is designated for its preserved sediments of Lake Windermere and it is unlikely that drought powers at Windermere would adversely affect this site. The River Leven, which flows out of Windermere, is one of five major fresh water sources to Morecambe Bay (SAC/SPA/Ramsar/SSSI) which also include the rivers Lune, Kent, Keer and Wyre. Discussions with the EA and NE, as part of the environmental study, ascertained that the impact on Morecambe Bay is likely to be insignificant given the relative volumes of water involved and the large attenuation volumes available in Morecambe Bay. Therefore no designated sites are affected The environmental study assessed the impacts of reducing the hands-off flow to 95 Ml/d, relaxation of the annual licence limit and drawdown of the lake by a maximum of 0.5m below weir crest level The study identified a moderate adverse environmental impact on lake hydrodynamics in Windermere associated with lake draw down The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, lake level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Water resources modelling was also undertaken. The Windermere waterbank agreement was revised and agreed with the Environment Agency and local stakeholders in December 2012. UU is currently undertaking a review of the Windermere environmental study in partnership with local stakeholders and the Environment Agency. We plan to complete this review by end March 2014 although progress will be dependent on timely data provision and input from third parties
	Summary of additional baseline monitoring requirements	Following completion of the 2008 environmental study, an Environmental Monitoring Plan (EMP) has been developed to set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the Windermere drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	If monitoring during a drought permit/order indicates that significant impacts are occurring, various mitigation measures could be implemented including a temporary return to the statutory hands-off flow or freshet flow releases In the event of a lake draw down, UU will liaise with NE, Cumbria Wildlife Trust, landowners and other organisations to erect warning signs and/or temporary fencing to protect flora and fauna of special interest from trampling by the public In the event of navigation access being affected, the possibility of dredging access channels would be considered The new Windermere waterbank agreement agreed in December 2012 states that at any time that Windermere is 2.5cm below weir crest and/or Haweswater storage has crossed Trigger 3, a meeting of the Windermere stakeholder group will be convened to include representatives from the following organisations: UU, EA, Holker Estates, Windermere Lake User Forum, Windermere Lake Cruises Ltd. and Windermere Marina Village Ltd. Through this process the most effective use of the Windermere water bank will be discussed

Option Name: Lake Windermere drought permit/order: (Scenario 2 with lake drawdown, continued)		
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified the following moderate or major adverse impacts on non-environmental features: Major adverse impact on landscape and visual amenity on Lake Windermere during April to September due to lower lake levels Moderate adverse impacts on Lake Windermere during April to September, due to reduced lake levels, on reduced draft for commercial/pleasure crafts; reduced shoreline access for boat berthing/launching; reduced suitability of angling access Moderate adverse impact on socio-economics and the local community during April to September Minor adverse impact on landscape and visual amenity on the River Leven during October to March Minor adverse impact on in-river recreation (e.g. canoeing) in April to September Potential beneficial impact on recreational angling on the River Leven during April to September Under the lake draw down option, dredging of channels may be necessary for access, for example, for the Windermere Ferry service. The environmental study reviewed the implications of dredging including an assessment of the disposal of dredging material. UU would review the Windermere "Dredging Protocol" which was agreed in 1995/96 with NE, South Lakeland District Council and Cumbria Wildlife Trust, together with the expert ecological assistance of the Centre for Ecology & Hydrology. The protocol seeks to minimise the impact on the lake ecology and would prohibit dredging in all but essential circumstances. Measures to make temporary moorings available in deeper waters for larger vessels would be discussed with South Lakeland District Council and boat users. If the full drawdown of 0.5m is sought, UU may need to provide assistance for relocation of boats from the shallowest parts of marinas or boathouses to alternative locations. The Windermere stakeholder group would be consulted if drought powers at Windermere are being considered

APPENDIX 3: INTEGRATED DROUGHT OPTION FORMS: SUPPLY SIDE OPTIONS

Option Name: Landside Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 2. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	4.8 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Wigan area. Water from Landside borehole is treated at Lightshaw water treatment works
	Implementation timetable Preparation time, time of year effective, duration	1-3 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 3319 Ml/yr, daily licence limit 9 Ml/d It is assumed that a new borehole pump together with 75m of rising main will be required. This will involve the use of mobile lifting equipment on site. Construction period 1 month
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Landside Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Manchester Mosses SAC (designated for degraded raised bogs still capable of natural regeneration) are located 3.8km from the borehole, Rixton Clay Pits SAC (designated for the occurrence of great crested newt populations) are 7.3km from the borehole No licence modifications were made as part of the EA's Review of Consents for Manchester Mosses SAC and Rixton Clay Pits SAC, therefore, it is concluded that there will be no impact on these sites (either alone or in-combination with other consents)
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Netherley Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 2. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	11.4 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Widnes area
	Implementation timetable Preparation time, time of year effective, duration	1-3 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 4127 Ml/yr, daily licence limit 11.4 Ml/d It is assumed that existing pump-sets and boreholes will be used. It will be necessary to construct a UV rig on site - this may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Netherley Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No operational impacts of the option are anticipated on the Mersey Estuary SPA and Ramsar site (5.9km from source). SPA designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal; on passage the area regularly supports ringed plover and redshank. Ramsar designation for populations of birds with international importance
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Melling Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 2. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	13 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Southport area
	Implementation timetable Preparation time, time of year effective, duration	1-3 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 3573 Ml/yr (conjunctive limit increases this to 4148 Ml/yr), daily licence limit 13 Ml/d. It is assumed that existing pump-sets and boreholes will be used. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 2 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change from surface (River Dee) to borehole waters

Option Name: Melling Boreholes (Continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Sefton coast SAC designated for various sand dune types, including embryonic shifting dunes. Also designated for petalwort and great crested newt. Ribble and Alt estuaries SPA/Ramsar designated for over-wintering populations of birds, water fowl as well as natterjack toads No licence modifications were made as part of the EA's Review of Consents for Sefton Coast SAC, therefore, it is concluded that there will be no impact on this site (either alone or in-combination with other consents) and no operational impacts on this site are anticipated, either alone or in-combination. With respect to the SPA and Ramsar sites, no operational impacts of the option are anticipated either
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Park Road South Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 2. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	6.8 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Wigan area. Water from Park Road South borehole is treated at Lightshaw water treatment works
	Implementation timetable Preparation time, time of year effective, duration	1 to 3 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2738 Ml/yr, daily licence limit 8 Ml/d. It is assumed that a new borehole pump together with 100m of rising main will be required. This will involve the use on site of mobile lifting equipment. Construction period 1 month
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Park Road South Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Manchester Mosses SAC (designated for degraded raised bogs still capable of natural regeneration) are located 7.8km from the borehole No licence modifications were made as part of the EA's Review of Consents for Manchester Mosses SAC, therefore, it is concluded that there will be no impact on this site (either alone or in-combination with other consents)
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Pex Hill Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 2. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	5.8 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Widnes area
	Implementation timetable Preparation time, time of year effective, duration	1 to 3 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2500 Ml/yr, daily licence limit 9.1 Ml/d. It is assumed that existing pump-sets and boreholes will be used. It will be necessary to construct a disinfection rig on site - this may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply Pex Hill boreholes supply into Pex Hill service reservoir and there may be some customer impact caused by changes in water quality associated with a change in the normal blend of borehole and River Dee waters

Option Name: Pex Hill Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No operational impacts of the option are anticipated on the Mersey Estuary SPA and Ramsar site (4.8km from source). SPA designation is for over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Ramsar designation is for populations of birds with international importance
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Worsthorne Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 2. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	2 Ml/d (Note: this is additional water to the 0.5 Ml/d artesian supply already detailed in the WRMP)
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Burnley area
	Implementation timetable Preparation time, time of year effective, duration	1 to 3 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2454 Ml/yr, daily licence limit 2.7 Ml/d It is anticipated that minimal work will be required because of work initiated during the 2010 drought event. Construction period 2 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply. No customer impact expected

Option Name: Worsthorne Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The EA's Review of Consents for the South Pennine Moors SAC/SPA concluded no impacts of any abstraction licences (either alone or in-combination with other consents), therefore no operational impacts on these sites are anticipated. The South Pennine Moors SAC is designated for dry heaths, blanket bogs, oak woods, quaking bogs and transition mires. The SPA is designated for short eared owls and golden plover amongst other bird species
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Belmont Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	1 Ml/d, based on historical evidence of abstraction during 1995/96 drought
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Bolton area
	Implementation timetable Preparation time, time of year effective, duration	3 to 6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU and incorporated with that for Springs reservoir. New pump-sets, starter panels and rising main will be required. Repair to existing pipeline may be necessary. Supports Springs reservoir and water will be treated at Sweetloves Water Treatment Works. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Belmont Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No European sites have been identified within a 10km radius of this drought option location. No other environmental impacts predicted
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Bromiley Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	1 Ml/d, based on historical evidence of abstraction during 1995/96 drought
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Bolton area
	Implementation timetable Preparation time, time of year effective, duration	3 to 6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No abstraction licence held by UU. An abstraction licence would need to be applied for to permit abstraction. New pump-sets, starter panels and rising main will be required. Repair to existing pipeline may be necessary. Supports Springs reservoir and water will be treated at Sweetloves Water Treatment Works. Construction period 6 months, including time to apply for an abstraction licence
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Bromiley Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No European sites have been identified within a 10km radius of this drought option location. No other environmental impacts predicted
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Croft Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	6 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Wigan area
	Implementation timetable Preparation time, time of year effective, duration	3 to 6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2495 Ml/yr, daily licence limit 6.8 Ml/d. It is assumed that 2 new pump-sets and rising mains will be required. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 6 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Croft Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Manchester Mosses SAC (designated for degraded raised bogs still capable of natural regeneration) are located 3.1km from the borehole, Rixton Clay Pits SAC (designated for the occurrence of great crested newt populations) are 5.5km from the borehole No licence modifications were made as part of the EA's Review of Consents for Manchester Mosses SAC and Rixton Clay Pits SAC, therefore, it is concluded that there will be no impact on these sites (either alone or in-combination with other consents)
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Daresbury Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	4.5 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Warrington area
	Implementation timetable Preparation time, time of year effective, duration	3 to 6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 1245 Ml/yr, daily licence limit 4.5 Ml/d. It is assumed that existing pump-sets and boreholes will be used. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 6 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Daresbury Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Mersey Estuary SPA and Ramsar site located 7.1km from source, Midland Mere and Mosses Phase 1 Ramsar located 9.9km from source. SPA designation for over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance. Midland Mere Ramsar designated for open water and raised bog habitats including rare plants and invertebrates No operational impacts of the option are anticipated on the Mersey Estuary SPA and Ramsar sites. The West Midland Mosses SAC and Ramsar Review of Consents Stage 3 (which includes the Midland Meres and Mosses Phase 1 site), concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impact on these sites is anticipated
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Helsby Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	2 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Vale Royal area
	Implementation timetable Preparation time, time of year effective, duration	3-6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 455 Ml/yr, daily licence limit 2.7 Ml/d It is assumed that existing pump-sets and boreholes will be used. It will be necessary to replace the disinfection rig on site. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Helsby Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Mersey Estuary SPA and Ramsar site located 3.2km from source, Midland Mere and Mosses Phase 1 Ramsar located 6.9km, Phase 2 located 7.4km from source. SPA designation for over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance. Midland Mere Ramsar designated for open water and raised bog habitats including rare plants and invertebrates No operational impacts of the option are anticipated on the Mersey Estuary SPA and Ramsar sites. The West Midland Mosses SAC and Ramsar Review of Consents Stage 3 (which includes the Midland Meres and Mosses Phase 1 and 2 sites), concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts on these sites are anticipated either
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Mow Cop Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	1.7 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Congleton area
	Implementation timetable Preparation time, time of year effective, duration	3-6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 497 Ml/yr, daily licence limit 1.8 Ml/d New pump-set and rising main will be required. It will be necessary to replace the disinfection rig on site. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Mow Cop Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The Midland Meres and Mosses Phase 1 and 2 sites Ramsar sites are located 7.6km and 7.8km from the source respectively and are designated for open water and raised bog habitats including rare plants and invertebrates The EA's West Midland Mosses SAC and Ramsar Review of Consents Stage 3 (which includes the Midland Meres and Mosses Phase 1 and 2 sites), concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts are anticipated
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Springs Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	1 Ml/d, based on historical evidence of abstraction during 1995/96 drought
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Bolton area
	Implementation timetable Preparation time, time of year effective, duration	3 to 6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU and incorporated with that for Springs reservoir. New pump-sets, starter panels and rising main will be required. Repair to existing pipeline may be necessary. Supports Springs IR and water will be treated at Sweetloves WTW. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Springs Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No European sites have been identified within a 10km radius of this drought option location. No other environmental impacts predicted
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Swineshaw Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	4 Ml/d (output from abstraction during the 1995/96 drought)
	Location Area affected or whole supply zone	Integrated Resource Zone, also provides local support to the Tameside area. Water would be treated at Buckton Castle water treatment works
	Implementation timetable Preparation time, time of year effective, duration	3 to 6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 727 Ml/yr, daily licence limit 4.1 Ml/d There are 3 boreholes each requiring new pump-sets, starter panels and, potentially, rising mains. Water will be transferred using existing infrastructure to Buckton Castle Water Treatment Works for treatment. Construction period 6 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Swineshaw Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No licence modifications were made as part of the EA's Review of Consents for South Pennine Moors SAC and Peak District Moors (South Pennine Moors Phase 1) SPA, therefore, it is concluded that there will be no impact on these sites (either alone or in-combination with other consents). No operational impacts on these sites are anticipated, either alone or in-combination South Pennine Moors SAC are primary habitats for European dry heaths, blanket bogs, old sessile oak woods and qualifying features are Northern Atlantic wet heaths, transition mires and quaking bogs. The South Pennine Moors SPA supports breeding bird populations
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Hough Lane, Walton Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	3.9 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Warrington area
	Implementation timetable Preparation time, time of year effective, duration	3-6 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 1245 Ml/yr, daily licence limit 3.9 Ml/d It is assumed that existing pump-sets and boreholes will be used. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 3 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Hough Lane, Walton Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Manchester Mosses SAC (designated for degraded raised bogs still capable of natural regeneration) are located 9km from the boreholes; Rixton Clay Pits SAC (designated for the occurrence of great crested newt populations) are 9.8km from the boreholes; Mersey Estuary SPA is located 9.4km from source (designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal; on passage the area regularly supports ringed plover and redshank). Mersey Estuary Ramsar is located 9.4km from source (designated for populations of birds with international importance) No licence modifications were made as part of the EA's Review of Consents for Manchester Mosses SAC and Rixton Clay Pits SAC, therefore, it is concluded that there will be no impacts on these sites (either alone or in-combination with other consents). No impacts on the Mersey Estuary SPA or Ramsar sites are anticipated either
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Ashton Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	4.5 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Vale Royal area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 827 Ml/yr, daily licence limit 4.5 Ml/d. New pump-sets, starter panels and rising main will be required. A new 1km transfer main to Simmons Hill is also required. It will be necessary to construct a filtration plant for iron and manganese removal - this may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Note that a 50:50 blend of borehole:surface water at Hollins Hill service reservoir is required for arsenic compliance. Construction period 12 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply

Option Name: Ashton Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Oak Mere SAC (6.4km from source) is a lake formed within sediments that are low in nutrients and oligotrophic. It is a large water body that has formed in a kettle hole in the fluvio-glacial sands of the Cheshire Plain. The site has clear water of low nutrient status characteristic of oligotrophic waters and a marginal zone of shoreweed. The site supports an assemblage of plants that are now rare in the lowlands of England, including floating mats of bog-moss and the scarce narrow small-reed. Also includes transition mires and quaking bogs. The EA's Oak Mere SAC Stage 3 Review of Consents concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts are anticipated on the Oak Mere SAC West Midland Mosses SAC (8.7km from source) contains three pools, one at Clarepool Moss and two at Abbots Moss, which are designated as natural dystrophic lakes and ponds, as well as designation for transition mires and quaking bogs. The Midland Meres and Mosses Phase 1 Ramsar (5.7km from source) supports a number of rare species of plants associated with wetlands including five nationally scarce species together with an assemblage of rare wetland invertebrates (three endangered insects and five other British Red Data Book species of invertebrates). Midland Meres and Mosses Phase 2 Ramsar (4.6km from source) comprise open water and raised bog habitats and supports a number of rare species of plants associated with wetlands, including the nationally scarce cowbane and, elongated sedge. It also supports an assemblage of invertebrates including several rare species. The EA's West Midland Mosses SAC and Ramsar Review of Consents Stage 3 (which includes the Midland Meres and Mosses Phase 1 and 2 Ramsar sites), concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts on these sites are anticipated River Dee and Bala Lake SAC (9km from source) is designated for its water courses of plain to montane levels, Atlantic salmon and floating water-plantain. Qualifying features also include lamprey, bullhead and otter. The site was scoped out of the EA's Review of Consents for this SAC and therefore no operational impacts are anticipated
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan SEA environmental report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	Minor adverse impacts predicted in SEA environmental report on: material assets and resource use; air and climate; inter-relationships The construction phase will require a significant number of vehicle movements over a 12 month period. Due to this length of time and the significant number of vehicle movements required, the impact on material assets and resource use are considered to be minor adverse Construction will require delivery of plant and materials to site. Due to the number of vehicle movements required over the course of 12 months, impacts on air and climate are considered to be minor adverse Key inter-relationships between topics include construction impacts (vehicle movements) on material assets and resource use and air and climate. This has been assessed as minor adverse

Option Name: Eaton Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	6.6 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Vale Royal area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2273 Ml/yr, daily licence limit 7.3 Ml/d It is assumed that existing pump-sets and boreholes will be used. It will be necessary to construct a disinfection rig and arsenic removal plant on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 12 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Eaton Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The EA's West Midland Mosses SAC and Ramsar Review of Consents Stage 3 (which includes the Midland Meres and Mosses Phase 1 and 2 sites), concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts on these sites are anticipated Midland Meres and Mosses Phase 2 Ramsar (4.6km from source) comprise open water and raised bog habitats. Supports a number of rare species of plants associated with wetlands, including the nationally scarce cowbane and, elongated sedge. Also supports an assemblage of invertebrates including several rare species Midland Meres and Mosses Phase 1 Ramsar (5.7km from source) supports a number of rare species of plants associated with wetlands including five nationally scarce species together with an assemblage of rare wetland invertebrates (three endangered insects and five other British Red Data Book species of invertebrates) West Midland Mosses SAC (8.7km from source) contains three pools, one at Clarepool Moss and two at Abbots Moss, that are examples of natural dystrophic lakes and ponds in the lowlands of England and Wales, where this habitat type is rare. Also included are transition mires and quaking bogs
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Gorstons Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	4 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Wirral area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence reduced in 2009 to 568 Ml/yr. Daily remains at 4.5 Ml/d New pump-sets, starter panels, power supply and rising main are required. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 9 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Gorstons Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The proposed abstraction will not exceed the existing licence limits permitted by the Environment Agency abstraction licence (the annual licence of which was reduced in 2009 to 568 Ml/yr). No operational impacts of the option are anticipated on the Dee Estuary SAC, SPA and Ramsar sites or the Mersey Estuary SPA and Ramsar The Dee Estuary SAC (1.8km) designated for sites included mudflats, sandflats and Atlantic salt meadows. The Dee Estuary SPA (1.8km) designated for internationally important populations of regularly occurring migratory species. The Dee Estuary Ramsar (1.8km) qualifying features include natterjack toad and water bird species. Mersey Estuary SPA (8km) designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Greensbridge Lane Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	12 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Widnes area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2000 Ml/yr, daily licence limit 11.4 Ml/d It is assumed that existing pump-sets and boreholes will be replaced. Also, it will be necessary to construct a disinfection rig on site - this may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 9 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Greensbridge Lane Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Mersey Estuary SPA (4km from source) designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance. No operational impacts of the option are anticipated on the Mersey Estuary SPA and Ramsar sites
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Hooton Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	5.9 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Wirral area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2159 Ml/yr, daily licence limit 5.9 Ml/d New pump-sets, power supply and rising main will be required. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 9 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Hooton Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Mersey Estuary SPA (4km from source) designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance The Dee Estuary SAC (6.3km from source) designated for sites included mudflats, sandflats and Atlantic salt meadows. The Dee Estuary SPA (6.3km from source) designated for internationally important populations of regularly occurring migratory species. The Dee Estuary Ramsar (1.8km from source) qualifying features include natterjack toad and water bird species No operational impacts of the option are anticipated on the SAC, SPA and Ramsar sites
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Newton Hollow Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	6 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Vale Royal area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 1818 Ml/yr, daily licence limit 9.1 Ml/d. 3 new pump-sets, starter panels and rising main will be required. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 9 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Newton Hollow Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Oak Mere SAC (7.4km from source) is a lake formed within sediments that are low in nutrients and oligotrophic. It is a large water body that has formed in a kettle hole in the fluvio-glacial sands of the Cheshire Plain. The site has clear water of low nutrient status characteristic of oligotrophic waters and a marginal zone of shoreweed. The site supports an assemblage of plants that are now rare in the lowlands of England, including floating mats of bog-moss and the scarce narrow small-reed. Also includes transition mires and quaking bogs. The EA's Oak Mere SAC Stage 3 Review of Consents concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts are anticipated on the Oak Mere SAC Midland Meres and Mosses Phase 1 Ramsar (3.0km from source) supports a number of rare species of plants associated with wetlands including five nationally scarce species together with an assemblage of rare wetland invertebrates (three endangered insects and five other British Red Data Book species of invertebrates). Midland Meres and Mosses Phase 2 Ramsar (3.9km from source) comprise open water and raised bog habitats. Supports a number of rare species of plants associated with wetlands, including the nationally scarce cowbane and, elongated sedge. Also supports an assemblage of invertebrates including several rare species West Midland Mosses SAC (8.4km from source) 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. Also included are transition mires and quaking bogs The EA's West Midland Mosses SAC and Ramsar Review of Consents Stage 3 (which includes the Midland Meres and Mosses Phase 1 and 2 Ramsar sites), concluded that existing abstraction licences could be shown to have no adverse impact on site integrity (either alone or in-combination with other consents). Therefore, no operational phase impacts on these sites are anticipated Mersey Estuary SPA (5.8km from source) designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance. The operational impacts of the option are anticipated on these sites
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Randles Bridge Boreholes		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	8 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Liverpool and Southport areas
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 2905 Ml/yr, daily licence limit 9.1 Ml/d It is assumed that existing pump-sets and boreholes will be replaced. Also, it will be necessary to construct a disinfection rig on site - this may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 9 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Randles Bridge Boreholes (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No European sites have been identified within a 10km radius of this drought option location. No other impacts anticipated
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Springhill Borehole		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	6 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Wirral area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 1426 Ml/yr, daily licence limit 6.8 Ml/d New pump-sets and rising main will be required. It will be necessary to construct disinfection and UV rigs on site - these may be housed in a temporary pre-fabricated structure adjacent to existing pump-house on land already owned by UU. Construction period 12 months
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply There may be some customer impact caused by changes in water quality associated with change of source

Option Name: Springhill Borehole (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Mersey Estuary SPA (2.9km from source) designated as an over-wintering area for a number of bird species including golden plover, northern pintail and teal. On passage the area regularly supports ringed plover and redshank. Mersey Ramsar designation for populations of birds with international importance The Dee Estuary SAC (8.5km from source) designated for sites included mudflats, sandflats and Atlantic salt meadows. The Dee Estuary SPA (6.3km) designated for internationally important populations of regularly occurring migratory species. The Dee Estuary Ramsar (1.8km) qualifying features include natterjack toad and water bird species Liverpool Bay SPA (7km from source) is an over winter area for red throated diver and common scoter No operational impacts of the option are anticipated on these SAC, SPA and Ramsar sites
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	None

Option Name: Worthington Reservoirs		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	2.9 Ml/d
	Location Area affected or whole supply zone	Integrated Resource Zone and also provides local support to the Wigan area
	Implementation timetable Preparation time, time of year effective, duration	9-12 months to implement Available throughout year subject to reservoir storage levels
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Abstraction licence already held by UU. Annual licence limit 4646 Ml/yr, daily licence limit 21 Ml/d The proposed solution allows for treatment on site at Worthington Water Treatment Works and blending in the local network. Additional treatment will be housed within the existing Water Treatment Works site. Construction period 9 months Note that that there are alternative solutions using existing treatment facilities at Lostock or Rivington Water Treatment Works. However, both of these involve long lengths of pipeline with associated costs and disruption
	Risks associated with option	The use of this source is subject to Section 15 of The Water Supply (Water Quality) Regulations 2000 and there is a risk that the source will not comply Significant customer impact expected including key customer at Heinz

Option Name: Worthington Reservoirs (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	No European sites have been identified within a 10km radius of this drought option location. No other impacts are anticipated
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan SEA environmental report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	Minor adverse impacts predicted in SEA environmental report on: biodiversity (flora/fauna); water; landscape and visual amenity; inter-relationships Abstraction may lead to drawdown of the reservoir below normal levels, the impacts of which are likely to include minor temporary and reversible impacts on reservoir macrophyte and fish communities. The reservoir is not subject to any statutory designations. Overall, impacts on biodiversity, flora and fauna have been summarised as minor adverse Abstraction is likely to result in drawdown of the reservoir below normal levels, which may have implications for water quality. Therefore the impact on water has been assessed as minor adverse, temporary and reversible Temporary minor adverse effects on landscape and visual amenity are anticipated due to changes in exposure of the reservoir shoreline. In view of the fact that the reservoir levels are likely to be at their lowest during the summer, the impact of the drought option on landscape and visual amenity is considered to be minor adverse but temporary Key inter-relationships between topics include reservoir level impacts on biodiversity, flora and fauna and landscape and visual amenity. These have been summarised as minor adverse

APPENDIX 4: WEST CUMBRIA DROUGHT OPTION FORMS: DROUGHT PERMITS/ORDERS

Option Name: Ennerdale Water drought order: drawdown of the lake to 2.5 m below weir crest level		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation when a lake level of 1.7 m below weir crest is reached (West Cumbria Resource Zone). Preceding actions would include rezoning of water supplies, customer communication actions and demand restrictions (voluntary water use restrictions at Trigger 2 and statutory water use restrictions at Trigger 4). At a lake level of 1.7 m below weir crest (just below Trigger 4), abstraction from Ennerdale for both compensation flow provision to the River Ehen and for public water supply is not licensed
	Deployable Output of action Ml/day	Allow abstraction for compensation flow provision and public water supply to occur between lake levels of 1.7 m and 2.5 m below weir crest The scope of required powers would be discussed fully with the EA and NE and will depend upon the need for additional water, time of year and prevailing environmental circumstances, as well as the balance between protecting lake level and river flow The ability to abstract water from Ennerdale will allow compensation flows to the River Ehen to be maintained
	Location Area affected or whole supply zone	Whitehaven area (West Cumbria Resource Zone) with partial support to other areas of the resource zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought order preparation from Trigger 2 Application of drought order from Trigger 3 Implementation of drought order on reaching 1.7 m below weir crest level (just below Trigger 4) Drought order could be effective at all times of the year Drought orders are valid for up to 6 months however, in this case the application would be for a three month period To guard against continuing drought conditions it may be prudent to apply for drought permits/orders although they may not need to be implemented if weather conditions improve. This has been the experience in the past at Ennerdale (e.g. 2010) where significant rainfall arrived just before the powers are implemented and due to the flashy nature of the source, water storage has rapidly recovered to above Trigger 1 (within a few days)
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application. In the event of an application for drought powers for Ennerdale it is likely that an Appropriate Assessment and CRoW Assessment (under the Countryside and Rights of Way Act 2000) will be required due to potential impacts on the River Ehen SAC, Ennerdale SSSI and River Ehen and Tributaries SSSI Under Regulation 66 of The Conservation of Habitats and Species Regulations 2010 there is a need to secure necessary compensatory measures
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Ennerdale Water drought order: drawdown of the lake to 2.5 m below weir crest level (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	High An Environmental Assessment Report for this option was produced in April 2014, and includes an Appropriate Assessment of impacts on the SAC
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The River Ehen SAC is primarily designated for the freshwater mussel species (*Margaritifera margaritifera*) and has Atlantic salmon as a qualifying feature – the River Ehen is also a SSSI. Ennerdale is also a SSSI and is located within the Lake District National Park. The River Ehen SAC and SSSI are currently classified as being at unfavourable status. The Environment Agency's review of Consents could not conclude that UU's existing abstraction licence at this site could not be demonstrated not to impact the River Ehen SAC Ennerdale supports an Arctic charr population, aquatic lake flora community, and rich wildlife communities in the lagoons and wetlands at the head of the lake The drought order would result in a temporary reduction to Ennerdale lake level but would allow both abstraction for public water supply and the provision of compensation flow to the downstream River Ehen to continue. It should be noted that, without a drought order, the agreement between the Environment Agency and UU is that if the level of Ennerdale Water drops to 1.7m below weir crest, abstraction for both public water supply and for compensation flow releases to the River Ehen must cease The site was included within the Habitats Regulations Assessment for this drought plan which identified the need for an Appropriate Assessment for this drought option. The findings of the Appropriate Assessment, undertaken in consultation with the EA and NE, concluded that the proposed drawdown of the lake from 1.7 m to 2.5 m below weir crest cannot conclude no adverse impact on the River Ehen SAC (both alone, and in-combination with UU's existing abstraction licence as modified by the EDR notice) Drawdown of the lake impacts river flows as the lake stays below weir crest level for longer as, following rain, it would take longer for the lake to refill to weir crest level and begin to spill (by up to one month, more typically around 10 days), therefore flows from Ennerdale lake remain at the compensation flow level for longer (by up to one month, more typically around 10 days). During this period, natural accretion from rain in the catchment contributes to river flows downstream. The environmental study identifies the following impacts: Moderate adverse impact on Ennerdale lake hydrodynamics (including lake margin exposure) and connectivity with tributaries of the lake and the River Ehen. Minor adverse impact on River Ehen hydrodynamics as return of high flows in the River Ehen would be delayed by up to a month (more typically 10 days). This delay is during periods of heavy or sustained rainfall. No impacts on lake or river water quality have been identified Significant impacts of lake drawdown on designated features of Ennerdale Water SSSI including impacts on macrophyte populations and Arctic charr populations (including resident fish, smolt egress and potential impacts on spawning and egg incubation), failure to meet many of the Ennerdale Water SSSI conservation objectives and impacts on landscape and visual amenity Major and irreversible impacts on freshwater mussel populations, significant impacts on migration of Atlantic salmon and sea trout adult upstream migration and salmon and sea trout spawning and egg survival, and failure to meet River Ehen SAC and SSSI conservation objectives

Option Name: Ennerdale Water drought order: drawdown of the lake to 2.5 m below weir crest level (continued)		
Environmental Assessment	**Baseline information used**	The Environmental Assessment Report, produced in April 2014, has drawn on available information from surveys and investigations undertaken by UU, the Environment Agency and Natural England over a number of years A detailed bathymetry survey of Ennerdale Water was carried out by UU to provide information on shoreline exposure and this was distributed to all key stakeholders in 2000 The environmental study utilised historical data on river flow, lake level, ecological monitoring and water quality. SIMCAT water quality and water resources modelling was also undertaken In 2011, UU commissioned a macrophyte survey of Ennerdale lake to aid the impact assessment of lake drawdown on macrophytes. Surveys of marginal wetland plant communities were undertaken in 2013. In recent years numerous studies of the freshwater mussel population in the River Ehen have been undertaken by both UU and the EA. All of this information has been used in the current review of the environmental study The 2014 Environmental Assessment Report was prepared in partnership with the Environment Agency and Natural England
	Summary of additional baseline monitoring requirements	The Environmental Monitoring Plan (EMP) sets out the monitoring that would be required if a drought order is implemented. The EMP for the Ennerdale Water drought order was reviewed and agreed by UU, EA and Natural England in 2013 and will be reviewed annually
	Mitigation measures	A compensation flow of at least 60 Ml/d is being provided to the River Ehen The environmental study considers mitigation measures. If monitoring during drought order implementation indicates that significant impacts are occurring, various mitigation measures could be implemented, in consultation with Environment Agency, Natural England and experts. These include modifications to the flow regime (not including freshets, however potentially including gradual, limited increases in compensation flow); temporary modification of in-river structures to improve fish passage; transfer of migrating salmon smolts from the River Liza (a tributary flowing into Ennerdale Water) for release to the River Ehen (downstream of Ennerdale water); transfer of migrating adult salmon from the River Ehen into Ennerdale Water; excavation of channels to improve or restore connectivity of the River Liza or Smithy Beck with Ennerdale Water and to improve fish access; targeted habitat alteration/improvements to enhance natural recovery
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified the following adverse impacts on other activities: Moderate adverse impacts on landscape and visual amenity in Ennerdale Water Minor adverse impacts on change to recreational angling opportunity in Ennerdale Water, and moderate impacts to angling in the River Ehen (July to October) The Wild Ennerdale partnership would be consulted if drought powers at Ennerdale Water are being considered

Option Name: Crummock Water drought permit/order: allow pumping of compensation flows to a lake level of 1.5 m below weir crest		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (West Cumbria Resource Zone). Preceding actions could include rezoning of water supplies, customer communication actions and demand restrictions. Trigger 4 is reached when Crummock reaches a level of 1.1m below weir crest, the point at which the ability to release the compensation flow by gravity to the River Cocker is lost
	Deployable Output of action Ml/day	Allow pumping of the compensation flows once gravity outflows to the River Cocker cease at about 1.1m below weir crest level down to a level of 1.5 m below weir crest The scope of required powers would be discussed fully with the EA and NE and will depend upon the need for additional water, time of year and prevailing environmental circumstances, as well as the balance between protecting lake level and river flow The ability to pump water from Crummock will allow compensation flows to the River Cocker to be maintained
	Location Area affected or whole supply zone	Workington area (West Cumbria Resource Zone) with partial support to other areas of the resource zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months UU has never previously sought drought powers at Crummock, however to guard against continuing drought conditions it may be prudent to apply for them, although they may not need to be implemented if weather conditions improve. This has been the experience in the past at Ennerdale (e.g. 2010) where significant rainfall has arrived just before the powers are implemented and due to the flashy nature of the source, water storage has rapidly recovered

Option Name: Crummock Water drought permit/order (continued)		
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application. In the event of an application for drought powers for Crummock it is likely that an Appropriate Assessment and CROW Assessment (under the Countryside and Rights of Way Act 2000) will be required due to potential impacts on the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI respectively
	Risks associated with option	That the application, as applied for, is not approved. That any temporary pumping facilities can be implemented swiftly and deliver the required compensation flow. 24-hour security may be required to protect the temporary pump installations
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium to low depending on nature of drought powers sought and time of year Environmental study completed in 2008
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Crummock is within the River Derwent and Bassenthwaite Lake SAC. The SAC is primarily designated for its oligotrophic to mesotrophic standing water habitat and the Marsh Fritillary butterfly, sea/brook/river lamprey, Atlantic salmon, otter and floating water plantain. Its water courses of plain to montane levels are a qualifying feature. The River Derwent and Tributaries is also a SSSI. Crummock is located within the Lake District National Park There would be a temporary reduction to Crummock lake level

Option Name: Crummock Water drought permit/order (continued)		
Environmental Assessment	**Summary of likely environmental impacts** continued	The site was included within the Habitats Regulations Assessment for this drought plan which has identified the need for an Appropriate Assessment for this drought option The findings of the Appropriate Assessment concluded that the proposed drawdown of the lake between 1.1m and 1.5m below weir crest can conclude no adverse impact on Crummock Water and the River Cocker
	Baseline information used	The environmental study utilised historical data on river flow, lake level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. SIMCAT water quality and water resources modelling was also undertaken. UU is currently undertaking a review of the Crummock environmental study and associated Appropriate Assessment. We plan to complete this review by end March 2014 although progress will be dependent on timely data provision and input from third parties In 2012 UU undertook a macrophyte survey and an Artic Charr survey of Crummock. The outcomes from this work will be incorporated in to the review of the Crummock drought permit/order environmental study currently underway
	Summary of additional baseline monitoring requirements	The 2008 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In April 2013, the EMP for the Crummock drought permit/order was reviewed and agreed by UU, EA and Natural England
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring, various mitigation measures could be implemented including provision of fencing around the lake shore to reduce trampling of flora by people and stock; provision of signs to dissuade people walking around newly exposed shoreline
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified the following adverse impacts on other activities: Moderate adverse impact on landscape and visual amenity in Crummock Minor adverse impact in Crummock on recreational angling opportunity The Derwent Owners' Association would be consulted if drought powers at Crummock are being considered

Option Name: Scales boreholes drought permit/order: increase annual licence limit to enable continuation of abstraction		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (West Cumbria Resource Zone). Preceding actions could include rezoning of water supplies, customer communication actions and demand restrictions. Trigger 4 is reached when 100% of the annual licence volume has been abstracted
	Deployable Output of action Ml/day	The drought option would vary the annual licence limit (increase from 365 Ml/yr to between 438 Ml/yr and 621 Ml/yr) for the Scales boreholes to enable the continuation of abstraction up to the current licensed daily abstraction rate of 6 Ml/d (the annual licence limit of 365 Ml/yr allows for an average daily abstraction rate of 1 Ml/d). This would allow the associated surface water sources (Overwater and Chapel House reservoirs) to be kept at a sustainable rate of abstraction. The scope of required powers would be discussed fully with the EA and would depend upon the need for additional water, time of year, the overall condition of the local aquifer and prevailing environmental circumstances
	Location Area affected or whole supply zone	Wigton and Solway areas (West Cumbria Resource Zone) with partial support to other areas of the resource zone
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months To guard against continuing drought conditions it may be prudent to apply for drought powers at Scales, however they may not need to be implemented if weather conditions improve
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium to low depending on nature of drought powers sought Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	There are several protected sites in the vicinity of the Scales boreholes (e.g. Solway Firth SAC, South Solway Mosses SAC/NNR, Upper Solway Flats and Marshes SSSI/SAC/Ramsar) however the environmental study showed that these sites lie outside the potential zone of impact as they do not lie above the St Bees sandstone aquifer (in which the boreholes are located). Therefore no protected sites are affected. However the ability to increase abstraction from the Scales boreholes will reduce the need to abstract from other local water sources which have environmental designations. Overwater reservoir is a SSSI, whilst Hause Gill and Dash Beck (which feed Chapel House reservoir) are upstream of a SAC. It is important to keep these surface water abstractions at a sustainable level and increased abstraction from Scales helps to achieve this

Option Name: Scales boreholes drought permit/order (continued)		
Environmental Assessment	**Summary of likely environmental impacts** Continued	The environmental study assessed the impact of increasing the average daily abstraction rate from 1 Ml/d to 6 Ml/d and identified significant adverse effects which resulted in the identification and assessment of three alternative drought scenarios to increase the existing average daily abstraction rate of 1 Ml/d to: 1.5 Ml/d 2 Ml/d 3 Ml/d Assessment of these three drought power scenarios identified the following adverse environmental impacts for all three scenarios: Moderate adverse impact on hydrodynamics (river flow, wetted area and water levels) Moderate adverse impact on aquatic macrophytes Moderate adverse impact on otter The scenario to increase average daily abstraction to 3 Ml/d identified the following additional impact: Moderate adverse impact on water quality (reduced dilution of consented point source discharges (DO, BOD, ammonia, pH); WFD UKTAG standards; water quality interactions; water temperature) Mitigation measures are expected to reduce these impacts to non-significant levels Following discussions with the EA regarding the impact of this drought permit/order on river flows (hydrodynamics), UU is currently commissioning a review of this aspect of the environmental assessment previously completed in 2010 The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, groundwater level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	In February 2013 the scope of work for an investigation into the groundwater-surface water interactions associated with drought powers at Scales boreholes was agreed with the EA. We plan to complete the investigation no later than the end of March 2014. The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the Scales drought permit/order was reviewed and agreed by UU, EA and Natural England
	Mitigation measures	The environmental study considered mitigation measures. If monitoring during a drought permit/order indicates that significant impacts are occurring, various mitigation measures could be implemented including a temporary reduction in abstraction rate; a temporary return to the statutory abstraction rate; creation of neighbouring wetlands which are suitable to support self-sustainable coarse fish populations (e.g. stickleback and other small fish species to protect dietary needs of piscivorous birds)
	Impact on other activities e.g. fisheries, industry etc	The environmental study identified the following adverse impacts on other activities: Moderate adverse impact on hydrodynamics (availability of water to other amenity and commercial abstractors) Minor adverse impact on landscape and visual amenity (for the 2 Ml/d and 3 Ml/d abstraction rate options only)

APPENDIX 5: WEST CUMBRIA DROUGHT OPTION FORMS: SUPPLY SIDE OPTIONS

Option Name: Tankering to support Ennerdale Water		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 3. On reaching this trigger UU commence tankering of treated water from the Integrated Resource Zone to the West Cumbria Resource Zone to support Ennerdale Water
	Deployable Output of action Ml/day	Approximately 0.6 Ml/d at Trigger 3; increasing to approximately 2 Ml/d if a drought order is implemented at Ennerdale Water (on reaching a lake level of 1.7m below weir crest)
	Location Area affected or whole supply zone	Transfer from the Integrated Resource Zone to the West Cumbria Resource Zone to provide support to Ennerdale at times of drought
	Implementation timetable Preparation time, time of year effective, duration	2 weeks (the 2 week preparation period required for this action will take place prior to reaching Trigger 3 when implementation of the action is required) Available throughout year and for any duration
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None
	Risks associated with option	Availability of suitable tankers to undertake operation and maintain a wholesome supply of water; delays on road network impacting on tanker deliveries; adverse weather conditions; tanker filling and emptying logistics

Option Name: Tankering to support Ennerdale (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Tankering will utilise the existing road network and infrastructure. Tankering operations will increase traffic on local roads and may cause some disturbance to the local population (especially around tanker filling and emptying locations). A transfer of 0.6Ml/d is estimated to require 24 tanker deliveries a day; a transfer of 2Ml/d is estimated to require 76 tanker deliveries a day. Carbon emissions relating to tanker deliver
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan SEA environmental report for this drought plan
	Summary of additional baseline monitoring requirements	None
	Mitigation measures	None
	Impact on other activities e.g. fisheries, industry etc	Minor adverse impacts predicted in SEA environmental report on material assets and resource use (due to the increased energy use arising from tanker movements) Tankering treated water from the Integrated Resource Zone will reduce the volume of water abstracted from Ennerdale for public water supply by a commensurate amount; resulting in an increase in the volume of water retained in Ennerdale Water. The tankered volumes are relatively small (0.6-2Ml/d) compared to the volumes abstracted for public water supply (approximately 25Ml/d) and the volumes released to the River Ehen as compensation flow (up to 80Ml/d)

APPENDIX 6: CARLISLE DROUGHT OPTION FORMS: SUPPLY SIDE OPTIONS

Option Name: Castle Carrock: utilisation of dead water storage		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	Trigger 4. On reaching this trigger UU would review the circumstances associated with making this source available for supply and whether it would aid the prevailing drought situation. If so, then on crossing this trigger, we would commence actions to bring the source in to operation in line with the implementation timescale outlined below
	Deployable Output of action Ml/day	6.3 Ml/d (yield) utilising 170.7 Ml of dead storage capacity in Castle Carrock storage reservoir
	Location Area affected or whole supply zone	Carlisle Resource Zone
	Implementation timetable Preparation time, time of year effective, duration	3 months to implement. Available throughout year subject to reservoir storage levels
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	This option would seek to utilise dead water storage volume (170.7 Ml) at the base of the storage reservoir through the water treatment works by installation of temporary pumping equipment. Treatment would be through the existing Castle Carrock Water Treatment Works, with modifications to include a temporary filter plant at the front of the works. Additional treatment will be housed within the existing water treatment works site. Construction period 3 months
	Risks associated with option	Water quality problems at the water treatment works including elevated turbidity and colour
	Risk to the Environment (High/Medium/Low or unknown)	Low

Option Name: Castle Carrock (continued)		
Environmental Assessment	**Summary of likely environmental impacts** Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The drought option comprises abstraction of the dead water from Castle Carrock storage reservoir only (i.e. water that is not normally available for abstraction). The reservoir has no compensation flow and no statutory releases would be put at risk. No abstraction licence changes would be required and no reduction to the hands-off flow on the associated River Gelt river sources is proposed 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 the 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 The EA's 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 (either alone or in-combination) The River Eden Review of Consents assessed that the River Gelt abstractions alone have an adverse impact on the integrity of the River Eden SAC. However, the drought option involves abstraction of dead water from Castle Carrock storage 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 no impacts on the designated features of the River Eden SAC
	Baseline information used	Habitats Regulations Assessment Screening Report for this drought plan SEA environmental report for this drought plan
	Summary of additional baseline monitoring requirements	None required
	Mitigation measures	None required
	Impact on other activities e.g. fisheries, industry etc	Minor adverse impacts predicted in SEA environmental report on: biodiversity (flora/fauna); water; soil, geology and land use Moderate adverse impacts predicted in SEA environmental report on: landscape and visual amenity; inter-relationships There may be fish resident in the reservoir, and there may be impacts on this population dependant on the extent of drawdown. It is assumed any impacts on fish populations will be mitigated e.g. through fish rescues. Therefore the impact on biodiversity (flora/fauna) has been assessed as minor adverse Abstraction of dead water would result in increased drawdown of the reservoir. Therefore the impact on water has been assessed as minor adverse, temporary and reversible Reservoir drawdown and exposure of shoreline margins may result in minor adverse, temporary and reversible geomorphological impacts. Overall impacts on soil, geology and land use are summarised as minor adverse Temporary minor adverse effects on landscape and visual amenity are anticipated due to changes in exposure of the reservoir shoreline. The new buildings are relatively small in size and within the existing site area. In view of the fact that the reservoir levels are likely to be at their lowest during peak tourist season and the site is within the North Pennines AONB, the impact of the drought option on landscape and visual amenity is considered to be moderate adverse but temporary Key inter-relationships between topics include reservoir level impacts on biodiversity, flora and fauna, soil, geology and land use and landscape and visual amenity. Overall these have been summarised as moderate adverse

APPENDIX 7: NORTH EDEN DROUGHT OPTION FORMS: DROUGHT PERMITS/ORDERS

Option Name: Bowscar boreholes drought permit/order: increase annual licence limit to enable continuation of abstraction at the maximum daily abstraction rate		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (North Eden Resource Zone). Preceding actions could include rezoning of water supplies; customer communication actions and demand restrictions. Trigger 4 is reached when 100% of the annual licence volume for the whole North Eden borehole group (Bowscar, Cliburn, Gamblesby and Tarn Wood boreholes) has been abstracted
	Deployable Output of action Ml/day	The drought option would vary the annual licence limit (618 Ml/yr equivalent to an average abstraction rate of 1.69 Ml/d) for the Bowscar boreholes to enable the continuation of abstraction at the maximum daily abstraction rate (3.36 Ml/d). The drought option would give a benefit of 1.67 Ml/d which would help keep abstractions from other sources at sustainable levels, or in isolated supply areas, ensure that essential demands for water would continue to be met. The exact conditions of the application would be discussed fully with the EA and would depend upon the need for additional water, time of year, the overall condition of the local aquifer and prevailing environmental circumstances
	Location Area affected or whole supply zone	Local area supplied by Bowscar boreholes (North Eden Resource Zone)
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Bowscar boreholes drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Watercourses in proximity to the Bowscar boreholes are tributaries to the River Eden which is a SAC and is designated primarily for its oligotrophic to mesotrophic standing waters, its water courses of plain to montane levels and its alluvial forest habitats. The primary designated species are white-clawed crayfish, sea/brook/river lamprey, Atlantic salmon, bullhead and otter. The River Eden is also a SSSI. In addition, the North Pennine Moors SPA is in the locality. The environmental study showed that drought powers at Bowscar are unlikely to have a measurable impact on river flows; therefore no designated sites are impacted. No moderate or major adverse environmental impacts were identified in the environmental study The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, groundwater level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the Bowscar boreholes drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	As the environmental study did not identify any moderate or major adverse impacts, no mitigation measures are anticipated
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

Option Name: Gamblesby boreholes drought permit/order: increase annual licence limit to enable continuation of abstraction at the maximum daily abstraction rate		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (North Eden Resource Zone). Preceding actions could include rezoning of water supplies; customer communication actions and demand restrictions. Trigger 4 is reached when 100% of the annual licence volume for the whole North Eden borehole group (Bowscar, Cliburn, Gamblesby and Tarn Wood boreholes) has been abstracted
	Deployable Output of action Ml/day	The drought option would vary the annual licence limit (500 Ml/yr equivalent to an average abstraction rate of 1.37 Ml/d) for the Gamblesby boreholes to enable the continuation of abstraction at the maximum daily abstraction rate (1.6 Ml/d). The drought option would give a benefit of 0.23 Ml/d which would help keep abstractions from other sources at sustainable levels, or in isolated supply areas, ensure that essential demands for water would continue to be met. The exact conditions of the application would be discussed fully with the EA and would depend upon the need for additional water, time of year, the overall condition of the local aquifer and prevailing environmental circumstances
	Location Area affected or whole supply zone	Local area supplied by Gamblesby boreholes (North Eden Resource Zone)
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Gamblesby boreholes drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The site is located within the North Pennines AONB Watercourses in proximity to the Gamblesby boreholes are tributaries to the River Eden which is a SAC and is designated primarily for its oligotrophic to mesotrophic standing waters, its water courses of plain to montane levels and its alluvial forest habitats. The primary designated species are white-clawed crayfish, sea/brook/river lamprey, Atlantic salmon, bullhead and otter. The River Eden is also a SSSI. In addition, the North Pennine Moors SPA is in the locality. However the environmental study showed that drought powers at Gamblesby are unlikely to have a noticeable impact on flows in the River Eden. Therefore no designated sites are impacted. No moderate or major adverse environmental impacts were identified in the environmental study The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, groundwater level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the Gamblesby boreholes drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	As the environmental study did not identify any moderate or major adverse impacts, no mitigation measures are anticipated
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

Option Name: Tarn Wood boreholes drought permit/order: increase annual licence limit to enable continuation of abstraction at the maximum daily abstraction rate		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	If appropriate, implementation from Trigger 4 (North Eden Resource Zone). Preceding actions could include rezoning of water supplies; customer communication actions and demand restrictions. Trigger 4 is reached when 100% of the annual licence volume for the whole North Eden borehole group (Bowscar, Cliburn, Gamblesby and Tarn Wood boreholes) has been abstracted
	Deployable Output of action Ml/day	The drought option would vary the annual licence limit (592 Ml/yr equivalent to an average abstraction rate of 1.62 Ml/d) for the Tarn Wood boreholes to enable the continuation of abstraction at the maximum daily abstraction rate (2.37 Ml/d). The drought option would give a benefit of 0.75 Ml/d which would help keep abstractions from other sources at sustainable levels, or in isolated supply areas, ensure that essential demands for water would continue to be met. The exact conditions of the application would be discussed fully with the EA and would depend upon the need for additional water, time of year, the overall condition of the local aquifer and prevailing environmental circumstances
	Location Area affected or whole supply zone	Local area supplied by Tarn Wood boreholes (North Eden Resource Zone)
	Implementation timetable Preparation time, time of year effective, duration	Commencement of drought permit/order preparation from Trigger 2 Application of drought permit/order from Trigger 3 Implementation of drought permit/order from Trigger 4 Drought permit/order could be effective at all times of the year Drought permits/orders are valid for up to 6 months and can be extended for a further 6 months
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Approval of the application
	Risks associated with option	That the application, as applied for, is not approved

Option Name: Tarn Wood boreholes drought permit/order (continued)		
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low Environmental study completed in 2010
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Watercourses in proximity to the Tarn Wood boreholes are tributaries to the River Eden which is a SAC and is designated primarily for its oligotrophic to mesotrophic standing waters, its water courses of plain to montane levels and its alluvial forest habitats. The primary designated species are white-clawed crayfish, sea/brook/river lamprey, Atlantic salmon, bullhead and otter. The River Eden is also a SSSI. In addition, the North Pennine Moors SPA is in the locality. The environmental study showed that drought powers at Tarn Wood are unlikely to have a measurable impact on river flows; therefore no designated sites are impacted. No moderate or major adverse environmental impacts were identified in the environmental study The site was included within the Habitats Regulations Assessment for this drought plan but was screened out
	Baseline information used	The environmental study utilised historical data on river flow, groundwater level, ecological monitoring and water quality. In addition river cross-section measurements were taken throughout the study area to enable hydraulic modelling to translate flow changes in to habitat parameter changes (e.g. depth, velocity), and thus ecological impact. Mass-flux, trend analysis and SIMCAT water quality modelling was also undertaken
	Summary of additional baseline monitoring requirements	The 2010 environmental study included an Environmental Monitoring Plan (EMP) which set out the monitoring that would be required if a drought permit/order is implemented. In 2013, the EMP for the Tarn Wood boreholes drought permit/order was reviewed and agreed by UU and the EA
	Mitigation measures	As the environmental study did not identify any moderate or major adverse impacts, no mitigation measures are anticipated
	Impact on other activities e.g. fisheries, industry etc	The environmental study did not identify any adverse impacts on other activities

APPENDIX 8: WATER USE RESTRICTIONS ON CUSTOMERS

The management of customer demand plays an important role in assisting the assurance of security of supply, particularly during times of drought. Amendments to the Water Industry Act 1991 by the Flood and Water Management Act 2010 introduced a range of new options for managing customer demand at times of drought.

This section outlines the relevant legislation, the expected benefit of water use restrictions (as detailed in the most recent research) and the recent experience in the North West of the hosepipe ban imposed during the 2010 drought event. This section also sets out the plan for introducing the various water use restriction measures and associated triggers, together with any exemption criteria which may be applied.

Companies must demonstrate that they have implemented appropriate demand side restrictions to support drought permit/order applications (with the exception of winter restrictions).

The benefit of demand restrictions during the winter is negligible given the limited use of hosepipes for garden watering and washing motor vehicles where most usage is seen. Therefore we believe that introducing demand restrictions in winter months is not appropriate as it will not result in a reduction in demand for water. During winter drought situations, UU will continue to use enhanced communications to reinforce how customers can help save water and use water wisely inside the home, for example, by lagging pipes to prevent burst pipes in freezing temperatures. We may continue water use restrictions implemented during the summer into the winter months if there is a high risk of restrictions being required the following summer. Consequently, UU does not plan to introduce restrictions during the winter period (September to March).

This appendix should be read in conjunction with the main text in this plan on managing demand (see Section 8.3). This appendix includes additional information on:

- Demand management processes
- Water use restrictions process
- Results from customer surveys

There are three types of customer demand restrictions referred to in this plan:

- Voluntary water use restrictions
- Statutory water use restrictions (powers under Section 36 of the Flood and Water Management Act 2010 which replaced Section 76 of the Water Industry Act 1991)
- Non-essential use bans (powers under the Drought Direction 2011)

Demand Management Processes

On 1 October 2010, Section 36 of the Flood and Water Management Act 2010 replaced Section 76 of the Water Industry Act 1991. The Act introduced new powers of restriction on water usage. The following activities may be prohibited:

- Watering a garden using a hosepipe
- Cleaning a private motor-vehicle using a hosepipe
- Watering plants on domestic or other non-commercial premises using a hosepipe
- Cleaning a private leisure boat using a hosepipe
- Filling or maintaining a domestic swimming or paddling pool
- Drawing water, using a hosepipe, for domestic recreational use
- Filling or maintaining a domestic pond using a hosepipe
- Filling or maintaining an ornamental fountain
- Cleaning walls, or windows, of domestic premises using a hosepipe

- Cleaning paths or patios using a hosepipe
- Cleaning other artificial outdoor surfaces using a hosepipe

This is further supported with definitions from the Water Use (Temporary Bans) Order 2010.

Following research carried out by UKWIR in 2009 (Code of Practice and Guidance on Water Use Restrictions 2011, report ref. no. 11/WR/33/3) each of the activities outlined above has been ascribed an associated saving.

It is intended that during any restriction, all categories of usage outlined by Section 76 of the Water Industry Act 1991 will be prohibited. All of the restrictions contribute to an overall reduction in demand and are therefore necessary during times drought.

Inset appointees operate under their own instrument of appointment, as such UU has no control over demand restrictions put in place in an inset appointees area. UU only has one inset appointee in our area, Peel Water Networks Ltd. During the 2010 drought, UU and Peel agreed that it would mirror the restrictions imposed by UU. It is anticipated that this informal agreement will continue going forward.

At the time of a drought event, UU will discuss water use restrictions with neighbouring companies to ensure they are aware of the situation.

The Drought Direction 2011 relates to Ordinary Drought Order non-essential use bans which are granted by the Secretary of State. Non-essential use bans tend to cover non-domestic activities whereas water use restrictions (under Section 76 of the Water Industry Act 1991) tend to cover domestic activities, although there are exceptions. Non-essential use bans cover the following water uses:

- Watering outdoor plants on commercial premises using a hosepipe
- Filling or maintaining a non-domestic swimming or paddling pool (exclusions include pools open to the public; pools used for medical or veterinary treatment; pools in which fish or other aquatic animals are reared or kept in captivity; pools used by school pupils for school swimming lessons; filling a pool using a hand-held container filled from a tap)
- Filling or maintaining a pond (excludes ponds in which fish or other aquatic animals are reared or kept in captivity; filling a pond using a hand-held container filled from a tap)
- Operating a mechanical vehicle-washer
- Cleaning any vehicle, boat, aircraft or railway rolling stock using a hosepipe (excludes cleaning for health and safety reasons; includes trailers attached to vehicles)
- Using a hosepipe to clean exteriors and walls of non-domestic buildings (excludes cleaning for health and safety reasons)
- Using a hosepipe to clean windows of non-domestic buildings (excludes cleaning for health and safety reasons)
- Using a hosepipe to clean industrial plant (excludes cleaning for health and safety reasons)
- Using a hosepipe to suppress dust (excludes for health and safety reasons)
- Operating automatically-operating flushing cisterns in any unoccupied and closed building

Water Use Restrictions Process

In order for UU to implement statutory water use restrictions it must be satisfied that “it is experiencing, or may experience, a serious shortage of water for distribution”. In following

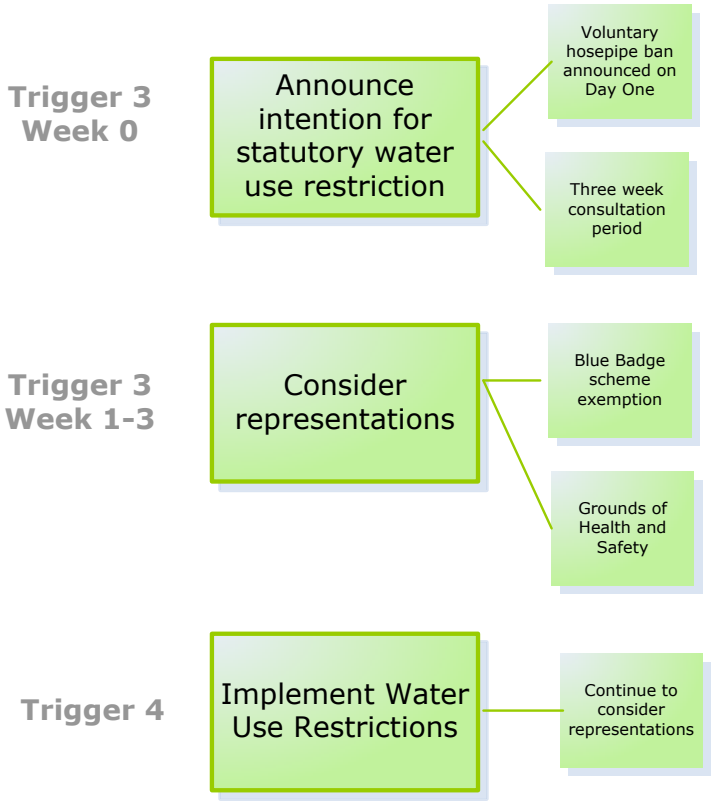
applicable legislation (Section 76 Water Industry Act 1991) UU will impose all available statutory water use restrictions at Trigger 4 to ensure sufficient action has been taken to reduce customer demand. This section explains how and at what point water use restrictions will be put in place.

The imposition of statutory water use restrictions will be at no lower than at the zonal level to avoid customer confusion and poor response rates.

In preparation for this plan, UU commissioned a survey into how demand restrictions should be implemented, including how UU should prioritise restrictions, how much notice customers require and how they wish to be communicated on issues of drought. The results of this survey can be found in the next section. Following on from the customer survey, the following process was developed to maximise the amount of water to be saved during times of drought, to meet legislative requirements and to align to the four principles in the UKWIR Code of Practice on Water Use Restrictions.

Figure A8.1: Process for implementation of water use restrictions

* Note that for Ennerdale, the voluntary water use restrictions would be imposed at Trigger 2 not Trigger 3 as per figure below



In order to encourage reduction in demand UU will implement voluntary water use restrictions at Trigger 3 (Trigger 2 at Ennerdale), commensurate with the start of the consultation period for statutory water use restrictions. The message will be conveyed through the use of press releases and coverage on UU's website, as well as through the formal legal notice.

Details on how representations may be made will be included in the formal legal notice and UU will give three weeks for representations to be made by affected parties. UU will provide a dedicated email address for the public to respond to the statutory water use restrictions consultation.

Section 76 of the Water Industry Act 1991 (as amended) stipulates the following:

- Notice must be given to those affected (no time restriction is imposed)
- As a minimum, notice must be advertised in two newspapers circulating in the area to which the restrictions apply and advertised on UU's website

Enforcement of statutory water use restrictions will occur at the end of the three week consultation period and should be in place by the time Trigger 4 is reached.

UU will take a pragmatic approach to granting exemptions and concessions for water use restrictions. Any exemption or concession will be dealt with in accordance with the UKWIR Code of Practice and Guidance on Water Use Restrictions (2011). Three main exemptions will be automatically granted:

- Concessions for businesses which may be affected
- Concessions for those holding a "Blue Badge"
- Concessions on the grounds of health and safety will also be considered

Customers may wish to apply for an exemption even if they do not consider themselves to be part of these exemption categories.

Statutory water use restrictions will be lifted when it is deemed that water resources have returned to a normal level of risk and will follow the statutory process as outlined in the Water Industry Act 1991. The results of the customer survey showed that customers do not require notice of removal of a ban.

In order for statutory water use restrictions to be lifted UU will give notice in accordance with Section 76 of the Water Industry Act 1991:

- Notice must be given to those affected
- It must be advertised in two newspapers circulating in the area to which the restriction applies and advertised on UU's website

The revocation will not come into effect until the notices above have been given.

Results from Customer Surveys

In preparation for this plan, UU wished to consult customers and key stakeholders on the new temporary restrictions introduced by the Flood and Water Management Act 2010 and also the experiences of customers and stakeholders during the drought of 2010. UU commissioned DJS Research to conduct research with these audiences and the results are presented below.

Research was conducted with the following audiences:

- Domestic Customers
- Business Customers
- Key stakeholders

400 structured telephone interviews were conducted with domestic customers. The table below shows the statistical reliability of results for a total base sample size of 400:

Figure A8.2: Statistical reliability

Base size	10% or 90%	30% or 70%	50%
400 (total sample)	± 3%	± 4.5%	± 5%

Quotas were set on gender, age, socio economic grouping and region to ensure that interviews were with a regionally representative sample of customers. Interviews were conducted with the sole or joint bill payer. Interviews lasted around 15 minutes.

50 structured telephone interviews were conducted with business customers. Interviews were achieved with a spread of businesses in terms of industrial sector and company size.

Semi-structured telephone interviews with key stakeholders lasting 20 to 30 minutes were conducted by DJS Research with representatives from the following organisations:

- British Waterways (now the Canal and River Trust)
- Consumer Council for Water
- Countryside Council for Wales
- Cumbria County Council
- Environment Agency
- Friends of the Lake District
- Friends of the River Yarrow
- Jumbles Reservoir Sailing Club
- Lake District National Park Authority
- Natural England
- RSPB
- Wigan and District Anglers

Prioritising Restrictions

None of the uses of water listed under the Flood and Water Management Act 2010 are of great importance to domestic or business customers. To illustrate, the area of most importance to customers is 'watering a garden using a hosepipe', which scores 3.3 out of 10 on a scale of how important it is that customers are able to do each activity listed under the temporary restrictions. These results re-iterate that these uses are non-essential.

Most feel that placing a restriction on 'watering a garden with a hosepipe' or 'cleaning a private motor vehicle with a hosepipe' would have the greatest impact on conserving the region's water. This is followed by 'watering plants on domestic or other non-commercial premises using a hosepipe' and 'cleaning paths or patios using a hosepipe'.

Stakeholders feel that all the restrictions listed should be imposed and that, if anything, the Act does not take things far enough i.e. potentially there should be more restrictions on water usage that water companies can impose.

However, they question how successful any imposed ban would be, as water companies are relying on all customers putting the ban into practice.

Communications

The majority of domestic (87%) and business customers (70%) were aware of the 2010 hosepipe ban. Most had found out about it via the television and this is domestic customers' preferred way of finding out about the start and finish of future restrictions. Businesses would prefer to be targeted either via the television, local press or letter.

Domestic customers are generally happy to have 1 week notice or less that a ban is going to be implemented, though stakeholders would argue that a longer period is needed to inform and educate them. Businesses (depending on their use of water) may need longer, with some stakeholders even suggesting up to a month for factories using water as part of the process or other businesses reliant on water.

Stakeholders want to be informed of planned restrictions in advance of customers and ideally 1-3 weeks in advance.

Generally less time is needed to inform customers that the ban is ending, although a fifth (19%) of domestic and a quarter (24%) of businesses claim they did not find out that the 2010 hosepipe ban had been lifted. It could be argued however, that this was not a bad thing. Again, stakeholders want more notice that a ban is ending – generally 1-2 weeks, although some appreciate that this is not always possible.

Objections

It is unlikely that many domestic customers, businesses or stakeholders would object to any restrictions, but if they did most would want to telephone UU.

They feel that United Utilities should make customers aware of the objections process and most stakeholders feel that any objections/exemptions should be out in the public domain.

Domestic customers generally feel that exemptions shouldn't be granted (66%), but half of businesses (48%) and stakeholders feel that they should and, in most cases, they feel that the emergency services and other businesses reliant on the use of water should be exempted.

A few feel that exemptions should be made to vulnerable households, however, some stakeholders question how this would work in practice.

Attitudes towards the 2010 Hosepipe Ban and Saving Water

Domestic customers (75%) and to a lesser extent businesses (68%), felt that the 2010 hosepipe ban was necessary, with few (one in 6) affected by it.

Most were neutral in their feelings towards the ban, however a fifth of domestic customers (20%) felt negatively towards it.

All but one of the stakeholders interviewed felt that last year's ban was necessary but some question how much impact it had, because its success is largely down to whether customers are aware of it and whether they abide by it.

Some stakeholders felt that if future restrictions were phased in, over two stages, that this would allow customers more time to get used to the idea. However, others felt that a two phased approach would just serve to confuse customers.

Something like a hosepipe ban is difficult to impose and water companies have to rely on customers abiding by it for it to be effective.

By educating customers on the benefits of saving water throughout the year, as well as informing them about the positive things that UU is doing to save water e.g. its leakage reduction programme, UU will start to change customer attitudes.

Positively though, the research has shown that customer attitudes to saving water are starting to change, with a significant shift in those agreeing that they make a conscious effort to save water (74% agreed with this when we conducted a survey with a representative sample of 800 UU customers in 2009, compared to 80% in this consultation). Further evidence of consumers' changing attitudes towards this can be found in a recently published survey commissioned by the Wildfowl & Wetlands Trust (http://www.wwt.org.uk/latest-news/poll-results-highlight-public-concern-over-flooding-and-water).

APPENDIX 9: COMMUNICATION PLAN DETAILS

Following the identification of the potential for a drought situation to develop, it is essential that UU commences liaison with a range of interested parties. The following table summarises the key audiences and the media used to communicate with them in times of drought:

Figure A9.1: Media used to communicate to various audiences

Audience	Media
Customers	Press advertisements (ads); radio ads; TV ads; UU website; Service Enquiries and Billing Call Centre messages/recorded messages; water efficiency events; water efficiency road shows; water efficiency product offers (e.g. water butts, showerheads); customer mailshots
Media	Proactive and reactive press statements; organising media interviews with senior managers
MPs/ Department for Communities and Local Government	Letter; phone call
Environment Agency	Letter; phone call; newsletter; regular meetings
Defra	Letter; phone call; newsletter
Ofwat	Letter; phone call; newsletter
Consumer Council for Water	Letter; phone call; newsletter
Drinking Water Inspectorate	Letter; phone call; newsletter
Water UK	Letter; phone call; newsletter
Natural England/Natural Resources Wales	Letter; phone call; newsletter; meetings (as appropriate)
Local environmental and stakeholder groups including local businesses/National Parks/local councils/neighbouring water companies/Peel Water Networks Ltd./fire service/navigation authorities	Letter; phone call; newsletter; meetings (as appropriate)
UU employees	UU intranet announcement; core brief; Email; Questions and Answers; posters; communications to operations employees

Examples of press adverts conveying the types of messages that may be used on reaching Trigger 2, Trigger 3 (introduction of voluntary water use restrictions) and Trigger 4 (introduction of statutory water use restrictions) are shown in Figures A9.2-A9.4. Note that, for Ennerdale, the messages relating to implementation of voluntary water use restrictions at Trigger 3 in the following text should be interpreted as applying to Trigger 2.

This plan set out the triggers that UU uses as decision points to guide us in determining what drought action measures to take in any particular drought event. The table in Figure A9.5 maps these triggers to communication actions to show at what stage we would anticipate undertaking communication with various organisations. Organisations would only be contacted if drought powers of interest to them are being considered. For example, the Windermere Lake User Forum is particularly interested in a drought permit/order at Windermere. Figure A9.6 shows the key messages to be communicated at each trigger, although the detailed message will be determined in the particular drought event.

Some communications activity can be undertaken within a few days of crossing triggers, but other activities can take longer. For example, advertisements will need design work within a drought event to ensure they reflect the particular situation and some local newspapers are only published weekly. UU will circulate weekly update reports to its regulators and undertake weekly telephone conferences with a Multi-Agency Drought Group comprising senior managers from the EA, UU,

Natural England, Canal and River Trust and others as appropriate. This approach worked well in the 2010 drought.

Figure A9.2: example of press adverts conveying the types of message that may be used following Trigger 2

Figure A9.3: example of press advert conveying the type of message that may be used following Trigger 3 (introduction of voluntary water use restrictions)

Figure A9.4: example of press advert conveying the type of message that may be used following Trigger 4 (introduction of statutory water use restrictions)

Figure A9.5: Organisations that UU may contact following the crossing of triggers

Group	Organisation	Stakeholders contacted by trigger			
		Trigger 1	Trigger 2	Trigger 3	Trigger 4
Regulators/ Government	Environment Agency	✓	✓	✓	✓
	Natural England	✓	✓	✓	✓
	Natural Resources Wales	✓	✓	✓	✓
	Ofwat		✓	✓	✓
	Water UK		✓	✓	✓
	Drinking Water Inspectorate		✓	✓	✓
	Consumer Council for Water		✓	✓	✓
	Defra		✓	✓	✓
National Park Authorities			✓	✓	✓
Neighbouring Water Companies			✓	✓	✓
Inset appointees	Peel Water Networks Ltd.	✓	✓	✓	✓
Local Councils and MPs	All local MPs			✓	✓
	Department for Communities and Local Government			✓	✓
	County Councils			✓	✓
	Borough Councils			✓	✓
	Unitary Authorities			✓	✓

Group	Organisation	Stakeholders contacted by trigger			
		Trigger 1	Trigger 2	Trigger 3	Trigger 4
Local Resilience Forums		✓	✓	✓	✓
Navigation Authorities			✓	✓	✓
Fire Service				✓	✓
Local Environmental Organisations and Stakeholder Interest Groups including local businesses			✓	✓	✓

Please note that Table A9.5 is neither exhaustive nor mandatory, and communication actions would depend on the nature of the specific drought event (e.g. if we are considering applying for a drought permit at Ullswater we would consult with local businesses and affected individuals).

Figure A9.6: Key messages for communication

Trigger	Audience	Key Messages
Trigger 1	Customers	Please use water wisely Order a free water saver's pack Visit our online water efficient house Please report leaks using LeakLine
	Regulators and Stakeholders	We have crossed Trigger 1 – the risk of drought is higher than normal Assessment of current water resources situation UU is developing a drought action plan with the EA and implementing a drought management structure Please support us by promoting water efficiency and using your organisation's social media to raise general awareness of water efficiency
Trigger 2	Customers	The weather has been drier than normal and therefore reservoirs are lower than normal for the time of year Please use water wisely Order a free water saver's pack Visit our online water efficient house Please report leaks using LeakLine
	Regulators and Stakeholders	We have crossed Trigger 2 – UU is implementing drought actions to manage the possible drought Assessment of current water resources situation Updates on the actions UU is taking Please us support by promoting water efficiency and using your organisation's social media to raise general awareness of the dry weather and the need to save water
Trigger 3	Customers	Assessment of current water resources situation UU is taking action to safeguard water supplies Please use water wisely and report any leaks to help protect water supplies and the environment Please support voluntary water use restrictions (if restrictions are introduced) We are consulting on the introduction of statutory water use restrictions (if appropriate)
	Regulators and Stakeholders	We have crossed Trigger 3 Assessment of current water resources situation Updates on the actions UU is taking (including water use restrictions and drought permit/order applications if appropriate) Please support us by promoting water efficiency and restricting your own use of water where

Trigger	Audience	Key Messages
		appropriate (e.g. vehicle washing) and using your organisation's social media to raise general awareness of the drought
Trigger 4	Customers	Assessment of current water resources situation UU is taking action to safeguard water supplies Please continue to use water wisely and report any leaks to help protect water supplies and the environment Statutory water use restrictions are in place (if restrictions are introduced) Drought permits/orders are in place (if they are introduced)
	Regulators and Stakeholders	We have crossed Trigger 4 Assessment of current water resources situation Updates on the actions UU is taking (including water use restrictions and drought permit/order applications if appropriate) Please support us by promoting water efficiency and restricting your own use of water where appropriate (e.g. vehicle washing) and using your organisation's social media to raise general awareness of the drought

APPENDIX 10: DROUGHT PLAN CONSULTATION DETAILS

DRAFT DROUGHT PLAN 2013 CONSULTATION

Preparation of our Final Drought Plan 2013 involved regular meetings with the EA to discuss the technical aspects of the plan and with the EA, NE and Countryside Council for Wales regarding the environmental aspects. In addition, updates on drought plan progress have been shared with the EA at our regular bi-monthly liaison meetings.

UU met with representatives from Yorkshire Water on 29 June 2011 specifically to discuss our approaches to drought planning. This enabled us to compare best practice and gain awareness of the approach that the neighbouring company will take in a drought.

Following the 2010 drought and UU's application for a drought permit at Windermere, several questions regarding Windermere lake levels were raised by interested parties. In 2011-12 UU held several meetings with Holker Estate, representatives of Windermere Lake User Forum and the Environment Agency to review wider issues of water management at Windermere. This resulted in a revised Windermere Waterbank Agreement being agreed in December 2012. UU will continue to contribute to these discussions. For the review of the Windermere drought permit/order environmental study (which commenced in 2012) we have established a local stakeholder group to ensure they can contribute to the study, in addition to a project steering group including the Environment Agency. We follow this same approach to consultation for all our drought permit/order environmental studies.

Extensive public consultation was undertaken in the preparation of our Final Drought Plan 2013 including a pre-consultation workshop in Penrith on 18 September 2012 to discuss the water supply issues affecting West Cumbria, followed by a press release to raise awareness of the issues to the wider public. Our Draft Drought Plan 2012 was published for consultation between 22 November 2012 and 11 January 2013 and placed on our website and issued to a wide range of statutory and non-statutory consultees including national and local organisations with environmental, health, fisheries, conservation, access, recreation, wildlife, rivers and tourism interests. In addition, three workshops were held across the northwest, to which all consultees were invited, to help explain the draft plan and a press release was issued. We received 19 responses to the consultation and published a Final Drought Plan 2013 on 13 June 2013.

DRAFT DROUGHT PLAN 2014 CONSULTATION

In producing this Final Drought Plan 2014 we continuously consulted with Defra, the Environment Agency and Natural England regarding the Ennerdale drought options and the environmental assessment of the drought order impacts. Updates on drought plan progress have been shared with the EA at our regular bi-monthly liaison meetings.

On 12 September 2013 we notified Ofwat, Defra, Welsh Government, Natural Resources Wales, Consumer Council for Water, Environment Agency and Natural England of our intention to update our Final Drought Plan 2013 (published on 13 June 2013). Pre-consultation responses were received from Defra, EA and NE and the issues raised have been included in this plan.

An updated Draft Drought Plan was submitted to the Secretary of State on 22 November 2013 and we were given permission to proceed to public consultation on 13 January 2014. The draft plan was open for public consultation between 13 January 2014 and 17 February 2014. The draft plan was placed on UU's website and issued to a wide range of statutory and non-statutory consultees including national and local organisations with environmental, health, fisheries, conservation, access, recreation, wildlife, rivers and tourism interests. We organised a West Cumbria workshop for stakeholders on 10 February 2014 at which the drought plan consultation was discussed.

On 14 January 2014 we issued a press release to inform customers of the draft drought plan consultation. We were interviewed for breakfast news on BBC Radio Cumbria and the local BBC TV and ITV news. Figure A10.1 shows the coverage we received. In total 322,499 readers/listeners were reached.

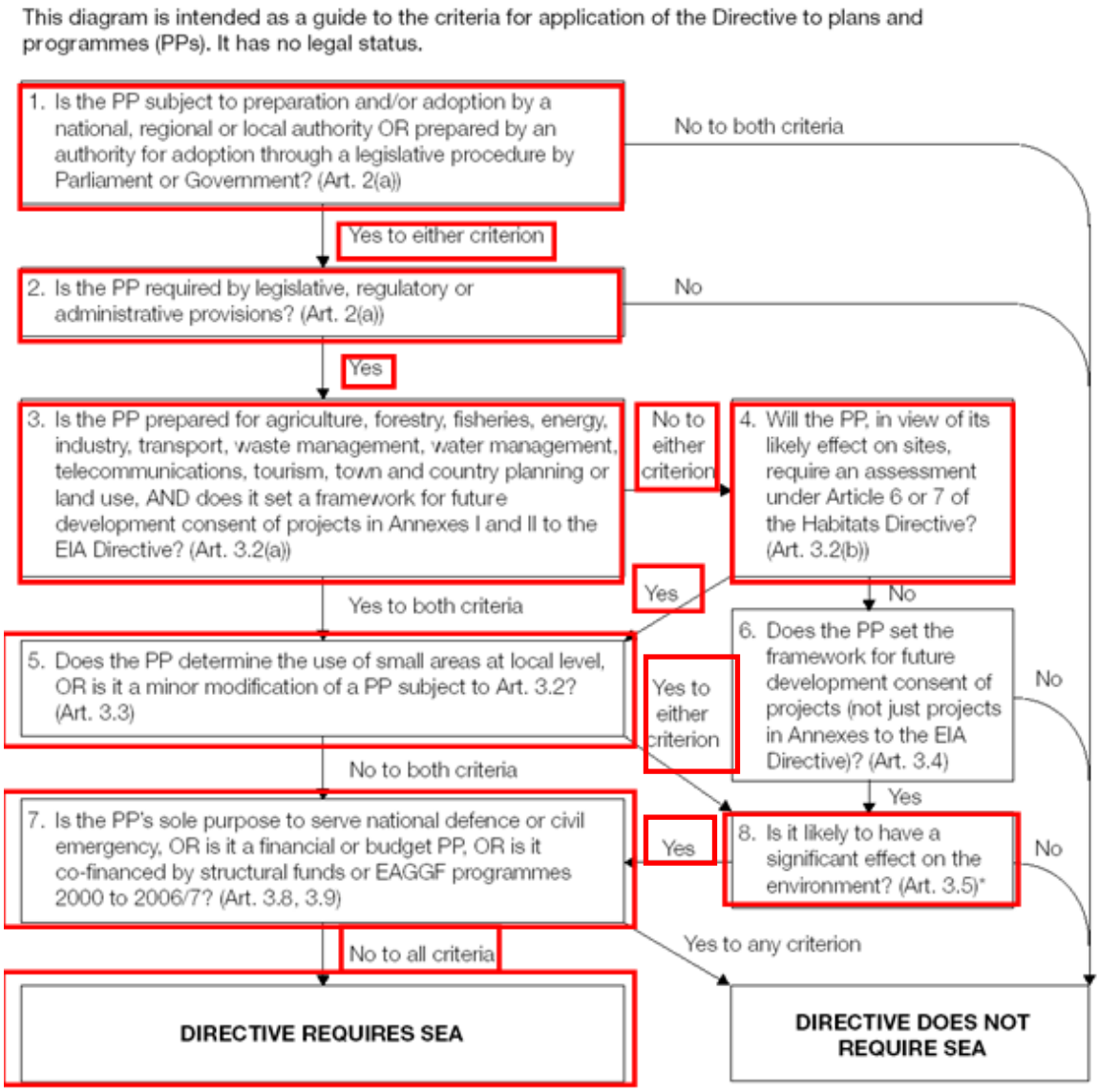
Defra received 22 representations on the 2014 draft drought plan. All comments have been carefully considered and a statement of response has been produced that explains how the comments have been taken in to account. The statement of response and a Revised Draft Drought Plan was published on our website and sent to all 22 respondents on 14 March 2014. Following direction from the Secretary of State, this Final Drought Plan was produced and made publicly available.

Figure A10.1 Draft Drought Plan 2014 publicity

Date	Media outlet	Distribution area	Audience	Headline	Prominence
14/1/2014	BBC Online	Cumbria and web		United Utilities planning to protect Ennerdale Water	
15/1/2014	BBC Radio Cumbria	All Cumbria	19,000	Running dry. Interview with Dr Blackwell	7am Breakfast news and throughout day
15/1/2014	BBC Radio Cumbria	All Cumbria	19,000	Viable water supply. Interview with West Cumbria Rivers Trust	8am News interview
15/1/2014	BBC Radio Cumbria	All Cumbria	17,000	Cumbrian water supply	5pm Drivetime programme
15/1/2014	ITV Border	All Cumbria	48,000	West Cumbria's water future	Regional evening TV news item
15/1/2014	BBC Look North	All Cumbria and North East	186,000	Water shortage worries	Regional evening TV news item
23/1/2014	Whitehaven News	Whitehaven and Copeland	12,260	Hunt is on for new local water sources	P11, page lead
24/1/2014	Workington Times & Star	Allerdale	16,239	Strong flow of opinions wanted on water	P9
24/1/2014	Keswick Reminder	Keswick	5,000	Search launched for new Cumbrian water supply	P5
TOTAL adult readers/listeners			**322,499**		

APPENDIX 11: SEA ROUTE MAP

The following diagram is taken from the Office of the Deputy Prime Minister's guide to SEA (ODPM, 2005).



*The Directive requires Member States to determine whether plans or programmes in this category are likely to have significant environmental effects. These determinations may be made on a case by case basis and/or by specifying types of plan or programme.

APPENDIX 12: ENNERDALE COMPENSATORY MEASURES

The conclusions of HRA screening assessment for this drought plan were that the Ennerdale drought order option in Appendix 4 had the potential for significant effects alone and in-combination with the existing abstraction licence at Ennerdale Water. Therefore an Appropriate Assessment was undertaken in consultation with Natural England and the Environment Agency. The Appropriate Assessment could not conclude no adverse effects. Options with the potential to adversely impact the integrity of a European site can only be adopted subject to there being no alternative solutions, where the Secretary of State is satisfied that there are imperative reasons of overriding public interest and with the adoption of suitable compensatory measures.

Summary of proposed compensatory measures

A package of compensatory measures has been proposed by United Utilities, under the advice of Natural England and the Environment Agency, to provide compensation in proportion to the impact to the River Ehen SAC from the effect of continued abstraction (to no later than 2025) and a drought order at Ennerdale Water acting in combination. There is the potential for significant adverse effects on both designated species as a result of continued abstraction and a drought order. The nature of potential impact can be described qualitatively as insufficient recruitment and/or a delay in recruitment recovery of the freshwater mussel population, and loss of salmon year class and/or reduced spawning upstream of Ennerdale Water. The actual extent and duration of impact is impossible to predict and quantify, and will depend on weather patterns in the region until abstraction is ceased. In order to account for this uncertainty, a flexible compensation package comprising physical ecological measures, supported by research measures, has been proposed.

The aim of the proposed package of measures is to enable the recruitment of more mussels and salmon, primarily in the River Ehen SAC, and to undertake research and monitoring to understand how this would best be achieved. It is considered that the River Ehen SAC has the most suitable conditions for the compensatory measures to be successful and therefore the most preferred option is to focus most of the compensation within the site. Additional measures will provide compensation for salmon in other Cumbrian lakes and rivers, including other Natura 2000 sites. The measures are therefore planned to both prevent and compensate for potential further damage to the River Ehen SAC.

The package consists of:

- Change of land use in perpetuity adjacent to the River Ehen SAC in the area of high mussel population density to remove risks to both freshwater mussels and salmon and thereby contribute to the protection of the Natura 2000 network
- A project officer to facilitate conservation actions in order to promote sustainable recruitment and utilisation of available potential natural habitat for both designated species in the River Ehen
- Artificial encystment of freshwater mussel glochidia to enhance recruitment in the population of the River Ehen SAC once river bed conditions are suitable
- Additional improvement works on the Ennerdale Water (part of Ennerdale SSSI) and River Ehen catchment to reverse damage and remove the risk of further damage to the River Ehen SAC. This may include the removal of redundant infrastructure. The nature and scale of the improvement works will be informed by the research measures
- Revocation of abstraction licences and associated infrastructure at Crummock Water and Dash Beck (SAC and SSSI) and at Chapel House Reservoir and Over Water (SSSI). This will restore natural functioning and improve salmon migration in a number of designated and undesignated Cumbrian lakes and rivers. Infrastructure removal will be informed by the supporting research measures
- Improvement works in an undesignated freshwater mussel priority recovery catchment to support a trial reintroduction programme

- A research trial reintroduction of freshwater mussels and artificial encystment in an undesignated priority recovery river in close proximity to the River Ehen SAC to contribute to the body of knowledge associated with freshwater mussel recovery efforts
- Seven research studies designed to inform the scope and monitor the effectiveness of the physical ecological compensatory measures and to improve the body of knowledge regarding factors which threaten the overall coherence of Natura 2000, particularly relating to the River Ehen SAC. The research will inform the future management of the abstraction and the implementation of the package of compensatory measures

There is already considerable research, monitoring and physical action currently being delivered by United Utilities and other organisations focused on restoring the River Ehen SAC to favourable condition. The package of compensatory measures proposed by United Utilities will provide additional knowledge and ecological actions over and above the actions that are normal practice for the management of the SAC. These actions will reduce the adverse effects over time and will bring the River Ehen SAC towards favourable condition. This means that there may not be a requirement for all of the measures in the package and that the likelihood of requiring additional compensatory measures will therefore reduce over time. United Utilities will begin to implement the package of measures as soon as reasonably practicable and will review the package at regular intervals in accordance with timescales agreed with Environment Agency and Natural England until cessation of abstraction at Ennerdale Water.