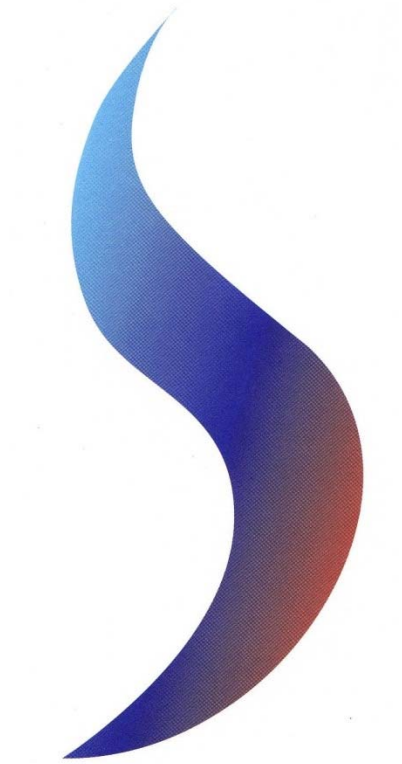
2015 Drought Plan

Main Report

July 2015



In this final Drought Plan Dee Valley Water sets out its approach to managing its supplies of water to its customers during a drought event. This Drought Plan has been prepared on the basis of the guidance contained in the Environment Agency's 'Water Company drought plan guideline' June 2011. This Plan provides a comprehensive overview of the triggers and their corresponding drought management actions that will be carried out in the event of a drought.

EXECUTIVE SUMMARY

Introduction

Dee Valley Water (DVW) is a water supply only company, providing 64 million litres of water per day to a population of over a quarter of a million in the area of north east Wales and Chester. Our customers comprise 112,000 households and 8,000 business customers. We are the smallest of the water companies existing since the privatisation of the water industry in England and Wales in 1989.

Our objective is to maintain a consistent supply of wholesome water that gives customers good value for money, during both normal operation and during a drought situation. Not only is this our statutory obligation, but it is what our research has shown customers expect.

As a water company, we are required by law to produce a Drought Plan. Part of the Drought Plan includes consulting with our customers and other main stakeholders on how we propose to manage the service we provide during a drought situation.

Towards the latter part of 2013 we carried out a pre-consultation process with our main stakeholders to ask them for their views on our previous plan so that we could use these to shape and improve our new Drought Plan. Following the pre-consultation we produced a draft Drought Plan incorporating the representations we received.

In September 2014 the draft Drought Plan was published on our website for further consultation. This time the consultation process was much wider, we sent out a series of emails and letters asking 119 customers and other stakeholders to review our plan and respond with representations. A complete list of the stakeholders that we engaged with is given in Appendix A – List of Consultees.

In light of the responses we received to the consultation, we made some changes and reissued our draft Drought Plan, we also published a list of the representations that we received along with our response. The changes we made were to provide further clarity and detail to the Plan, none of them were material to its function. The Welsh Government have now given their consent for us to publish our final Drought Plan along with supporting documents.

The sections below provide an overview of how we intend to manage our supplies of water during a drought and how we will communicate this process with our customers and other stakeholders.

Changes since the last Drought Plan

A number of improvements have been made to this Drought Plan to reflect legislative and regulatory changes that have occurred since the previous plan, and to comply with the latest guidelines and codes of practice. These changes include:

- Under the Flood and Water Management Act 2010, the Water Industry Act 1991 has been amended to grant water companies wider and more far reaching powers to restrict water use when required through Temporary Use Bans. Temporary Use Bans replace what were known as '*hosepipe bans*' allowing water companies to impose temporary use restrictions without the requirement of a Drought Order. Within our Plan we explain how we intend to use these powers in a drought situation and how this will impact our customers. We have also provided further clarity on how Temporary Use Bans differ from '*hosepipe bans*'.
- The improvement of our proposed communication plan. This details how we will communicate with our customers and other stakeholders during a drought situation.
- Inclusion of a Strategic Environmental Impact Assessment Screening Report and a Habitats Regulations Assessment Screening Report to identify any potential adverse effects that the drought options we have considered may have on the environment.

We have also expanded this Executive Summary to make our plan more accessible to a wider audience.

Drought triggers

Drought triggers indicate when a drought situation is developing and are used as decision making stages to assist in drought management. The drought triggers for DVW are dictated by the availability of water within the Dee Storage System as the River Dee is our main source of water. In turn, this means that most of our drought management actions are dictated by the Dee General Directions which govern the Dee Storage System.

The River Dee provides 87% of the water we require, the remainder being supplied from upland reservoirs and groundwater sources. The River Dee is regulated by Natural Resources Wales using reservoirs in the Welsh hills, according to the Dee General Directions[1]. For severe droughts, the General Directions define the drought triggers and the actions that we are required to take in response to these triggers. The triggers are associated with the amount of water available in the Dee Storage System. As stocks decrease, trigger points are crossed which prompt drought management actions to be taken.

We do not have any drought triggers associated with our upland and ground water sources as they provide only a small contribution to the overall supply. As such, we do

[1] The Directions are subject to the approval of the Dee Consultative Committee which comprises Natural Resources Wales, Environment Agency, United Utilities, Dŵr Cymru, Dee Valley Water and British Waterways.

not foresee a scenario whereby we would need to carry out drought management actions due to a lack of water in these sources.

The drought triggers and the actions which correspond to these triggers are shown in the table at the end of this section.

Drought management actions

Drought management actions comprise demand side actions and supply side actions, the implementation of which are determined by the triggers discussed above. Demand side actions focus on reducing demand for water from our operations or from our customers; whilst supply side actions are those that increase the availability of water.

For demand side actions, we will communicate with our customers at an early stage of a developing drought, carrying out additional water efficiency promotion and encouraging the efficient use of water.

We recognise that if we expect our customers to reduce the amount of water they consume then we should also go to similar efforts to reduce our level of leakage. We will do this by carrying out additional leakage detection and repair activities.

As the drought becomes more severe, we may have to introduce Temporary Use Bans and ultimately apply for Drought Orders in extreme situations.

Temporary Use Bans primarily restrict the use of water by domestic customers through banning hosepipes and sprinklers and are one of the most effective and significant demand side measures available. Before implementing a Temporary Use Ban we will publish information advertising the proposed actions in at least two newspapers circulating in the local area and on our website. These notices will be part of a larger communications strategy.

The activities prohibited under a Temporary Use Bans are listed in Section 36 of the Flood and Water Management Act 2010. These activities are:

- 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

To avoid any confusion to our customers, the above eleven activities will be implemented in a single phase.

Exceptions to Temporary Use Bans will be made according to the code of practice[2] and fall under three categories. These are:

- Statutory Exceptions – Specified through legislation and are on the grounds of health and safety, the environment or where businesses may be effected.
- Discretionary Universal Exceptions – Common to all water companies and primarily relate to Blue Badge holders.
- Discretionary Concessional Exceptions – Granted by individual water companies following the receipt of a representation. All exceptions are subject to our discretion and will only be granted if it is in the best interest of the community. We will consider granting an exception to customers on the company's Vulnerable Customers List, Water Sure List and to those whom have mobility issues but are not in possession of a Blue Badge. These exceptions will require customers to write or make representation to Dee Valley Water to obtain permission. A form to request and exception has been provided in Appendix H – Temporary Water Use Exception Form. More details on how to make a representation are given in section 3.3.5.

There is no formal process for objecting to restrictions under a Temporary Use Ban, we will only introduce these measures in very extreme circumstances when it is in the best interest of both customers and the environment. Objections can be lodged as a judicial review under the Human Rights Act.

A Drought Order is one of the most extreme demand side action available to us. The aim of a Drought Order is to extend existing restrictions under the Temporary Use Ban to non-domestic customers. To implement a Drought Order, we must first apply to the Secretary of State and the Welsh Government which can be a lengthy process.

With regard to supply side actions, we only have one available to us, this is the support of the River Dee with water from our Pen-y-Cae Reservoir. The volumes which we will transfer into the River Dee are determined by the Dee General Directions and are dependent on the trigger that has been crossed.

Enforcement of a Temporary Use Ban or drought order

The Water Industry Act 1991 and Water Resources Act 1991 states that anyone found guilty of breaching a Temporary Use Ban can be fined up to Level 3 (an amount of £1000 under the standard scale of fines for summary offences in the Criminal Justice Act 1982 section 32). Offenders breaching a Drought Order restriction are liable to a fine not exceeding the statutory maximum (which is an amount of up to £5000). Conviction on indictment renders an offender liable to a fine with no specified upper limit.[3]

Communications strategy

An essential part of the Drought Plan is the communications strategy that we intend to follow in the event of a drought. Effective communications can help to reduce customer

[2] United Kingdom Water Industry Research (UKWIR) 'Code of Practice and General Guidance on Water Use Restrictions

[3] Taken from the UKWIR document 'Code of Practice and General Guidance on Water Use Restrictions

demand, increase the available water for supply, reduce the impact on the environment and avoid confusion especially with respect to which activities are subject to water use restrictions.

In the event of a drought situation developing, we have a management structure that we will put place to ensure effective implementation of the drought plan including the communications strategy. A key member of the management structure is the communications coordinator who will be responsible for ensuring that communications are carried out at the appropriate time using the appropriate methods and with the relevant stakeholders.

For domestic and commercial customers, the majority of our communications will be through press, radio and television adverts, our customer call centre, bulletins on our website, promotional events, text messaging, leaflets and posters. We have an additional channel of communication with our larger commercial customers via their accounts managers. Customers identified as vulnerable or Water Sure in our billing database will also be provided with an information pack. Prior to making any communications with our domestic and commercial customers, we will liaise with the Consumer Council for Water who is the independent customer representative.

Other stakeholders such as regulators, environmental groups and local representatives will be contacted using letters, emails or telephone conversations.

The table on the next page summarises the main communication messages that we will deploy in the event of a drought situation and how these correspond to the drought triggers and actions.

Post drought actions

Temporary Use Bans will be lifted when the water resources have returned to their normal status. To determine this point, consideration will be taken of the actual level of the resources and the prevailing and projected weather conditions.

Similar to implementation, the revocation of the restrictions will be published on our website and in two local papers as per the legislation. We will then carry out a post drought review to determine the effectiveness of the Drought Plan, document the lessons learnt and identify improvements for the future.

Status	Trigger	Operational Action	Communication
Normal	Dee Storage System in Zone 1	Abstraction is only constrained by licence conditions / Lift restrictions if entering zone as part of drought recovery.	**Key message: Use water wisely** Normal water efficiency promotion and leakage management activity. Water efficiency promotion includes: fitting of cistern displacement devices, reducing the time spent in the shower, turning the tap off whilst cleaning teeth etc.
	Trigger 1 – Dee Storage System crossing the System Safe Yield Line	Maximum abstraction must not exceed Safe Yield Allocation.	
Developing Drought	Trigger 2 - Dee Storage System crossing the System Conservation Rule Curve	Dee Consultative Committee must convene within 7 days to discuss the implementation of Stage 1 Drought General Directions.	
Drought	Trigger 3 - Dee Storage System crossing Stage 1 Implementation Curve	Net reduction in abstraction of 0.4Ml/d through the augmentation of the River Dee with water from Pen-y-Cae Reservoir. Dee Consultative Committee convenes within 7 days to discuss the implementation of Stage 2 Drought General Directions. Increased leakage management activities.	**Key message: Don't waste water** Increased water efficiency promotion to customers using website and advertisements. Increase awareness of internal staff. Contact CCWater, WaterWise and WaterUK to ensure a joined up strategy is in place. Contact other stakeholders to discuss the drought situation.
Severe Drought	Trigger 4 - Dee Storage System crossing Stage 2 Implementation Curve	Net reduction in abstraction of 0.8Ml/d through the augmentation of the River Dee with water from Pen-y-Cae Reservoir. Dee Consultative Committee convenes to discuss the implementation of Stage 3 Drought General Directions. Plan to implement Temporary Use Bans	**Key message: Voluntary restrictions and Temporary Use Bans** Advertise voluntary restrictions and publish intent to impose a Temporary Use Ban using website, adverts in local paper, on the radio and on TV. Update internal staff. Maintain contact with CCWater, WaterWise and WaterUK. Meet with regulators and other stakeholders to escalate drought message.
	Trigger 5 - Dee Storage System crossing Stage 3 Implementation Curve	Introduce and enforce Temporary Use Bans. Apply for Drought Orders. Implement Drought Orders.	**Key message: Temporary Use Bans and Drought Orders** Advertise the implementation of a Temporary Use Bans and Drought Orders using website, adverts in local paper, on the radio and on TV. Update internal staff. Maintain contact with CCWater, WaterWise and WaterUK. Meet with regulators and other stakeholders to escalate drought message.

CONTENTS

1 INTRODUCTION

1.1 Overview of process

Under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003, as a water company we are legally required to prepare and maintain a Drought Plan. Drought Plans are updated every three and a half years (or earlier if necessary). This Drought Plan sets out how Dee Valley Water will "continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water, with as little recourse as reasonably possible to drought orders or drought permits[4]." This Drought Plan updates our previous plan which was produced in 2006.

We have prepared this Drought Plan in accordance with the Environment Agency's (EA) '*Water company drought plan guideline*' *June 2011*. We have also consulted with our stakeholders to gain their views on how we plan to manage a drought. Figure 1 shows an outline of the process followed to produce a Drought Plan. The yellow star indicates where we currently are in the process.

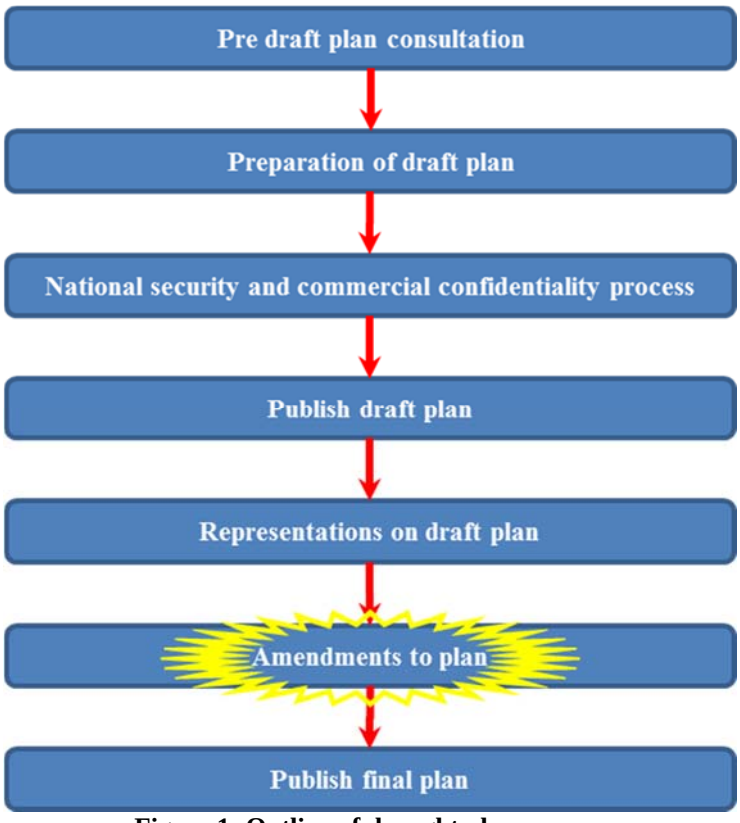


Figure 1: Outline of drought plan process

Our Drought Plan does not include details of how we will cope with incidents of extreme drought that result in a civil emergency, these are covered in our emergency plans.

[4] Water Industry Act 1991

1.2 Drought plan development

According to the EA's '*Water company drought plan guideline*' June 2011', "*a drought plan should set out the short-term operational steps a company will take before, during and after a drought. These plans are not strategic and should focus on a company's actions if a drought was to occur under present circumstances. Drought plans should show how a company would operate in a range of droughts and present enough information to customers and partners to show what decision making processes a company will make in a drought event.*" Figure 2 illustrates the process that we have followed in developing our Drought Plan, it shows the individual components and the links which exist between them. This report is set out in the recommended format that reflects this process.

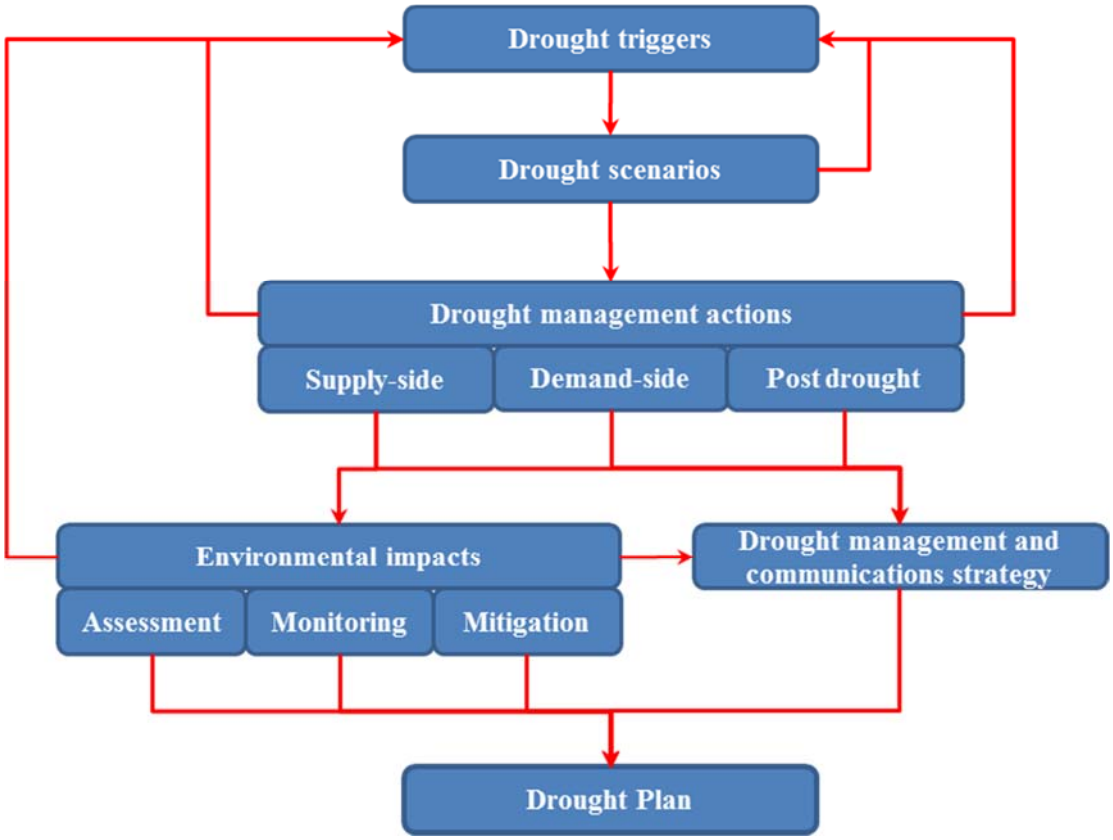


Figure 2: Drought plan development process

Drought triggers

A drought trigger is a specific event which prompts a drought management action, for example a drought trigger may be a recorded flow in a river that triggers water saving actions.

Drought scenarios

A drought scenario is a means by which the effectiveness of drought triggers are tested. The scenario is also used to demonstrate how drought management actions would be implemented given a combination of increased demands and drought conditions.

Drought management actions

A drought management action is a reaction to a drought trigger and is an action which is taken to reduce demand (demand side) or to increase supply (supply side). The action

must be consistent with our level of service, one in forty year Temporary Use Ban (TUB), which we have set out in our Water Resources Management Plan.

Environmental impacts

For all supply side actions, an assessment has to be made as to their likely environmental impacts, in particular on European sites. As well as the assessment of likely environmental impacts, a Habitats Regulation Assessment is carried out to determine if a Strategic Environmental Assessment is required.

Drought communications and management

Part of the Drought Plan is the communications plan, this details how we will communicate our drought actions effectively to implement demand side actions and minimise the impact on the environment. The Communication Plan should align with the drought triggers and detail the stakeholders who will be targeted and how.

During a drought, all triggers, actions, communications and impacts need to be monitored carefully to ensure the actual drought sequence is unfolding as predicted by the scenario. However, there needs to be enough flexibility within the plan to deal with unexpected events, as all drought sequences are different.

Following a drought, monitoring will continue to assess the impact of the drought, which can then be fed back into the Drought Plan.

1.3 Dee Valley Water

1.3.1 General

Dee Valley Water is a water supply only company, providing 64 million litres of water per day to a population of over a quarter of a million in the area of north east Wales and Chester (Figure 3). Our customers comprise 112,000 households and 8,000 business customers. We are the smallest of the water companies existing since the privatisation of the water industry in England and Wales in 1989 with the advantage of detailed local knowledge and direct customer communication. Our average household bills are currently fourth lowest of the companies in England and Wales and 19% lower than the average.

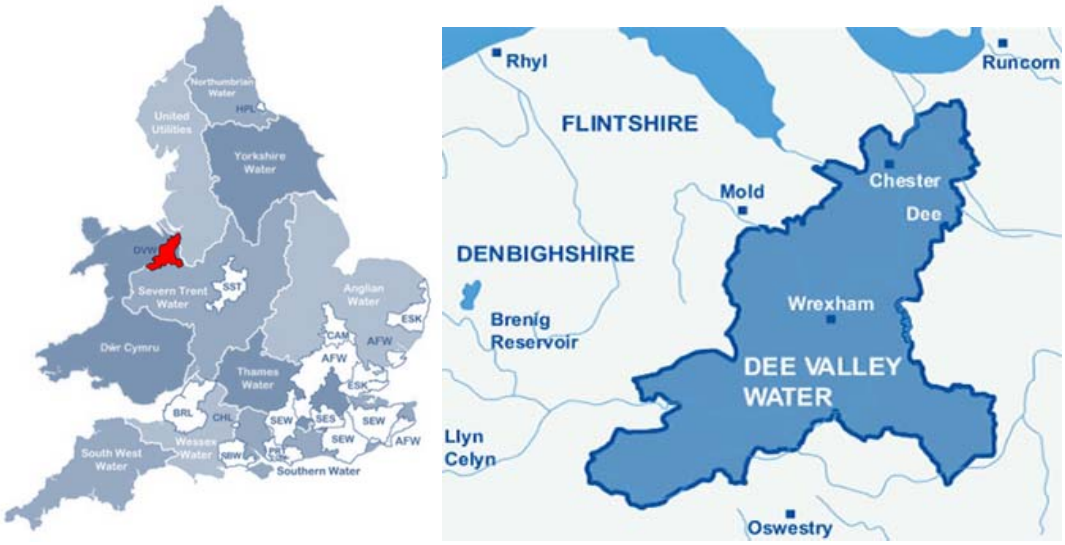


Figure 3: DVW supply area

87% of all our raw water comes from the River Dee, 7% from impounding reservoirs, with the remainder from a spring source at Llangollen and an aquifer at Mickle Trafford.

Water is treated at six treatment works and is then supplied through a network of approximately 2000km of water mains, 25 pumping stations and 37 clean water storage reservoirs.

1.3.2 Dee Consultative Committee

The River Dee is regulated by Natural Resources Wales (NRW) according to the Dee General Directions: Normal General Directions and Drought General Directions (the 'Directions') under the D&C River Authority Act. The Directions are subject to the approval of the Dee Consultative Committee which comprises NRW, EA, United Utilities, Dŵr Cymru, Dee Valley Water and Canals and Rivers Trust.

In the event of a drought, the Dee Drought General Directions define the principles and detail of the conditions under which the prescribed flows and abstractions in the catchment must be reduced. The Directions were last updated in May 2013.

NRW are responsible for making sure that there is enough water available for everyone's needs, including the natural environment. To meet this responsibility they regulate the amount of water that can be abstracted from the available resources and for times of drought this is done through a Drought Plan. The most recent version of the NRW Drought Plan for the River Dee was published in January 2012.

Due to our dependence on the River Dee for 87% of our raw water, our Drought Plan is dictated almost entirely by the Dee Drought General Directions.

1.4 Baseline water resources situation and levels of service

1.4.1 Resource zones

Since the installation of the transfer link between the Pendinas Resource Zone and Llwyn Onn Resource Zone during the AMP4 period (2005-10), we now operate two water resource zones; these are Chester Resource Zone and Wrexham Resource Zone. The integrity of these resource zones has been confirmed with NRW.

The principal supply for the Wrexham Resource Zone is the River Dee which supplies 82% of the raw water, the remaining 18% is from a series of upland reservoirs and a spring at Llangollen. Before going into supply, the majority of water is treated at two treatment works outside Wrexham, the Llwyn Onn and Legacy treatment works.

Similar to the Wrexham Resource Zone, the Chester Resource Zone is also heavily dependent on the River Dee which supplies 94% of the raw water, the remaining 6% is from an aquifer at Mickle Trafford. The main treatment works for this zone is the centrally located Boughton treatment works.

The sources owned and operated by us are shown in Figure 4 and Table 1, along with their type and the resource zone they supply.

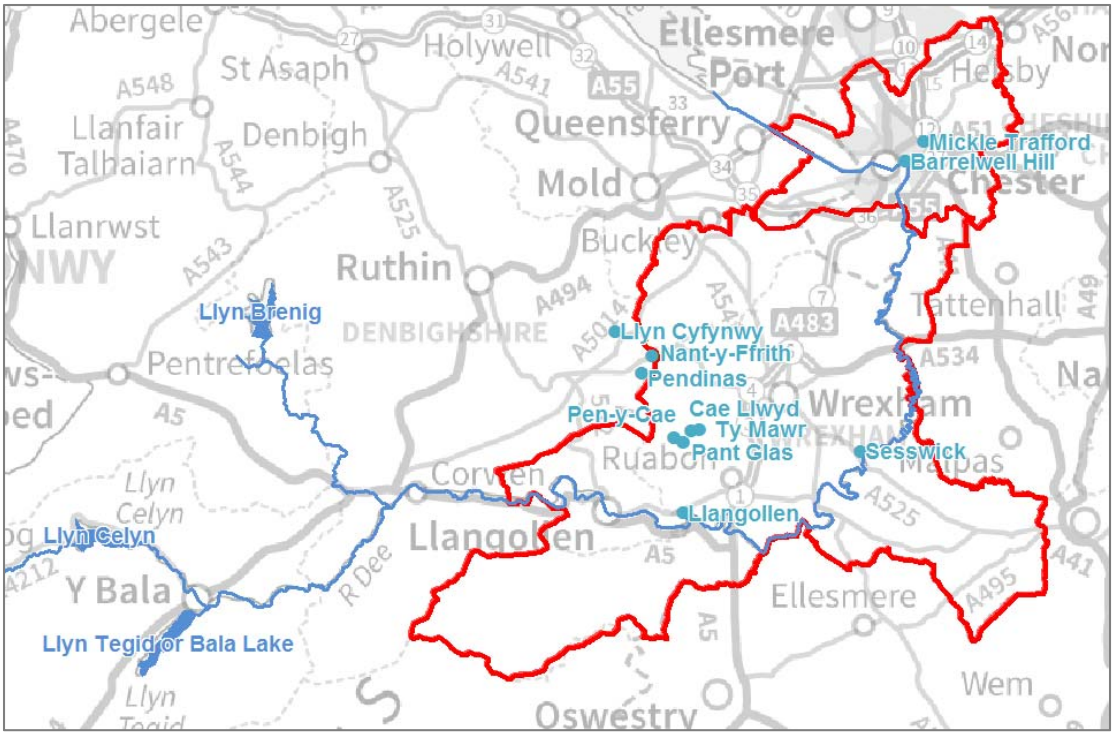


Figure 4: Source locations

Resource Zone	Source	Source Type	Output 2011/12 (Ml/d)	% of Resource Zone Output
Wrexham	Ty Mawr, Cae Llwyd and Pant Glas	Impounding reservoir	2.55	6%
	Pen y Cae	Impounding reservoir	0	0%
	Pendinas and Llyn Cyfynwy	Impounding reservoir	1.37	3%
	Nant y Ffrith	Impounding reservoir	0.64	2%
	Sesswick	River abstraction	34.55	82%
	Llangollen	Spring	2.75	7%
	Bulk Import (Negligible)	N/A	0.02	0%
Chester	Barrelwell Hill	River abstraction	21.20	94%
	Mickle Trafford	Aquifier	1.25	6%
	Bulk Import (Negligible)	N/A	0.06	0%

Table 1: Source output

1.4.2 Baseline

Within our Final Water Resources Management Plan 2013 (WRMP13) we have described our baseline water resources situation, this is reviewed on an annual basis and reported NRW and the EA. Over the twenty five years which the plan covers, we are not projecting a deficit in the supply-demand balance. Therefore we do not have any options to develop new or existing resources.

The EA's River Dee Catchment Abstraction Management Strategy (CAMS) provides an overview of catchment water resource availability within the Supply Area and for some adjoining water supply areas not under our operation. None of our abstraction licenses source water from Water Resource Management Units considered to be over licensed.

We also report a Security of Supply Index (SoSI) to regulators on an annual basis. This index is a measure that shows whether we are complying with our duty to safeguard the security of our water supplies. The SoSI does this by assessing the extent to which we can guarantee our planned level of service. Our current SoSI is 100 out of a maximum of 100.

1.4.3 Levels of service

Our planned level of service is to implement a TUB no more frequently than one in forty years. As part of the 2014 price review process we surveyed our customers to better understand their attitude towards the level of service which we provide. Although customers were willing to see a reprioritising of investment and a lower level of service, such as a higher frequency of a TUB, the reduction in bills would be minimal and perhaps jeopardise future levels of service. Therefore, on balance we propose to maintain the current level of service that our customers receive as we do not believe it is acceptable to allow levels to reduce.

We consider that rota cuts, stand pipes and tankering of water to our customers are unacceptable as a response to a drought. Therefore, although these measures are listed in the Drought Plan, they are a response to an emergency situation rather than a drought.

1.5 Consultation

1.5.1 Pre-draft

Between the 30th September and 1st November 2013 we carried out a pre-draft Drought Plan consultation process with our major stakeholders who included Consumer Council for Water (CCWater), NRW, EA, Ofwat, Welsh Government, Department for Environment, Food and Rural Affairs, Severn Trent Water, United Utilities and Dŵr Cymru Welsh Water. The aim of the pre-draft consultation process was to obtain our stakeholders views on the previous plan, so that we could use these to shape and improve this plan.

From our pre-draft consultation we received three written responses, from CCWater, Ofwat and NRW. We also discussed the responses with NRW and the EA through a series of meetings.

All three respondents suggested information which we should include in our plan and where we need to improve our previous plan. A summary of the responses are given below:

- Inclusion of a non-technical summary covering the key aspects of the Drought Plan written in such a way as to make it engaging and easily accessible to a broad range of stakeholders.
- Expansion of the communications aspect of the plan detailing how and when we will communicate with our stakeholders and what will be our key messages.
- Inclusion of customer feedback from our PR14 research.
- Provide consistency with the terms and levels of service set out in the Water Resources Management Plan.

- Clearly detail any proposed drought management actions and demonstrate that they strike a balance between meeting the customer needs and those of the environment.
- Ensure testing of the Plan is carried out under a variety of scenarios.
- Take account of all new legislation, guidance and codes of practice.

Following on from the pre-consultation process we produced a draft Drought Plan incorporating all the responses that we received. The points below are a summary of what we have done to address the above responses:

- Inclusion of an executive summary that outlines the drought triggers and drought management actions.
- Inclusion of a more detailed Management and Communications Strategy which clarifies our proposed management structure along with the member's roles and responsibilities, a list of stakeholders detailing what media will be used to engage with each group and the communications that will be made with respect to each drought trigger.
- Inclusion of the feedback from our PR14 research in the Levels of Service.
- Where appropriate, we have made reference to the relevant section of the Water Resources Management Plan.
- Incorporation of a Drought Management Action Section detailing demand and supply side actions including water efficiency measure, leakage control, TUB and Drought Orders and Drought Permits.
- Inclusion of a Scenarios Section explaining the scenarios we have considered and how we have tested for them.
- Incorporation of new legislation, guidance and codes of practice including Section 36 of the Flood and Water Management Act 2010, the EA's/Natural Resources Wales' *Drought Plan Guidelines*, Defra's *Drought Permit and Drought Order Guidelines* and the UKWIR's *Code of Practice and Guidance of Water Use Restrictions.*

1.5.2 Draft

Between the 1st September 2014 and the 27th October 2014 the draft Drought Plan was published on our website for further consultation. This time the consultation process was much wider, we sent out a series of emails and letters to 119 stakeholders including local authorities, environmental organisations, libraries and government representatives. Our aim was to engage with as broad an audience as possible. Within the emails and letters we asked our stakeholders to review our Plan and respond with representations. A complete list of the consultees that we contacted is given in Appendix A – List of Consultees.

From our draft consultation process, five written representations were submitted to the Welsh Government comprising 64 points to consider, these were from:

- Natural Resources Wales
- Environment Agency
- CCWater
- Natural England
- Guilden Sutton Parish Council

A summary of the representations that we received are given below:

- Improve the non-technical summary to make it more engaging to a wider audience.
- Provide more detail on the consultation process including the range of consultees whom were contacted and how representations have been taken into account, in particular in relation to TUBs.
- Provide additional detail on the drought triggers including 'lead in' times and drought triggers for our sources other than the River Dee.
- Include addition detail on the drought management actions such as the difference between a hosepipe ban and a TUB, what is now included in a TUB, who is exempt from a TUB and how we will enforce TUBs.
- Provide further clarity on the water efficiency measures that will be employed.
- Include the estimated savings from demand side options.
- Provide further technical detail of the proposed supply side option.
- Expand and improve the communications section to demonstrate how different audiences have been considered, how research carried out by CCWater has been considered and the key messages that will be communicated.
- In the event of a drought how will the success of the Drought Plan be measured.

Following on from the consultation process we amended our draft Drought Plan incorporating all the responses that we received. The points below are a summary of what we have done to address the above responses:

- The Executive Summary has been changed and expanded to provide a non-technical summary of the Drought Plan.
- The Consultation Section has been expanded detailing the process that has been followed.
- With regard to consulting in relation to TUBs, we contacted a broad range of consultees which included local authorities, environmental organisations, libraries and government representatives. We have tried to reach as broad an audience as possible to ensure that we have incorporated their views on TUBs. We have also expanded the TUB section of the report to: further clarify the difference between TUBs and the former hosepipe bans, further detail of who is exempt from a TUB and how we plan to enforce a TUB.
- Incorporated an explanation as to why we do not believe it is appropriate to be more specific with regard to the water efficiency measures we will employ as these will be subject to the timing of the drought e.g. promotion of water butts is not appropriate for a winter drought.
- Vulnerable/Water Sure customers have now been included as a separate stakeholder group in our communications strategy along with further details in relation to how we will communicate with them.
- Reference has been made to the research carried out by CCWater entitled '*Research into saving water – the experiences and perceptions of customers and their households*'[5] and '*Understanding drought and resilience*'[6].
- Further detail has been provided in the Post Drought Actions Section explaining how we will try to quantify the success of the application of our Drought Plan.

[5] http://www.ccwater.org.uk/wp-content/uploads/2013/12/Research-into-customer-water-saving.pdf
[6] http://www.ccwater.org.uk/wp-content/uploads/2013/12/Consumer-Council-for-Water-Understanding-drought-and-resilience.pdf

We have now produced this final Drought Plan incorporating all the representations that we received from the consultation process. A detailed list of all the representations along with our proposed actions have been included in a document entitled '*2014 Draft Drought Plan - Statement of Response*'.

The Welsh Government have now given their consent for us to publish our final Drought Plan along with supporting documents.

2 DROUGHT TRIGGERS AND SCENARIOS

2.1 General

The River Dee is regulated through the Dee General Directions by the Dee Consultative Committee. Both the Wrexham and the Chester Resource Zones are heavily dependent on the River Dee which supplies 82% and 94% of the total requirements respectively. This equates to 87% of our total requirement. Consequently our Drought Plan is dictated almost entirely by the Dee Drought General Directions. The Dee General Directions are explained further in sections 2.2 and 2.3.

Our upland resources comprise approximately 7% of our supply and feed in to the Wrexham Resource Zone. We operate these in conjunction with the Dee Storage System on the principle of keeping them as full as possible for as long as possible. The purpose of this is to provide reserve storage in the event of a drought or other incident affecting the supply from the Dee.

The remaining 6 % of our requirement is provided by a borehole at Mickle Trafford and a spring at Llangollen.

2.2 Dee General Directions

The River Dee in north Wales is the most highly regulated river in Wales. Its regulation, using Llyn Tegid, Llyn Celyn and Llyn Brenig Reservoirs, is covered by Section 9 of the Dee and Clwyd River Authority Act 1973. Llyn Celyn and Llyn Brenig Reservoirs are owned and operated by Dŵr Cymru Welsh Water in accordance with a section 20 agreement. NRW manage the releases made on a day to day basis for the scheme, which supplies water to over 2.5 million people.

In a drought, the Dee Drought General Directions define the principles and detail the conditions under which the prescribed flows and abstractions in the catchment must be reduced. These Directions were last updated in May 2013. They are subject to the approval of the Dee Consultative Committee, which is constituted under the 1973 Act. The Committee comprises representatives from NRW, EA, United Utilities, Dee Valley Water, Dŵr Cymru Welsh Water, Canals and Rivers Trust.

2.3 Surface water triggers

2.3.1 Reservoir sources

There are two reservoir systems which supply the Wrexham Resource Zone: the Ty Mawr/Cae Llwyd/Pen-y-Cae Reservoir System and the Pendinas/Nant-y-Frith/Llyn Cyfynwy Reservoir System. Figure 5 shows the two reservoir systems and how they feed into the Wrexham Resource Zone.

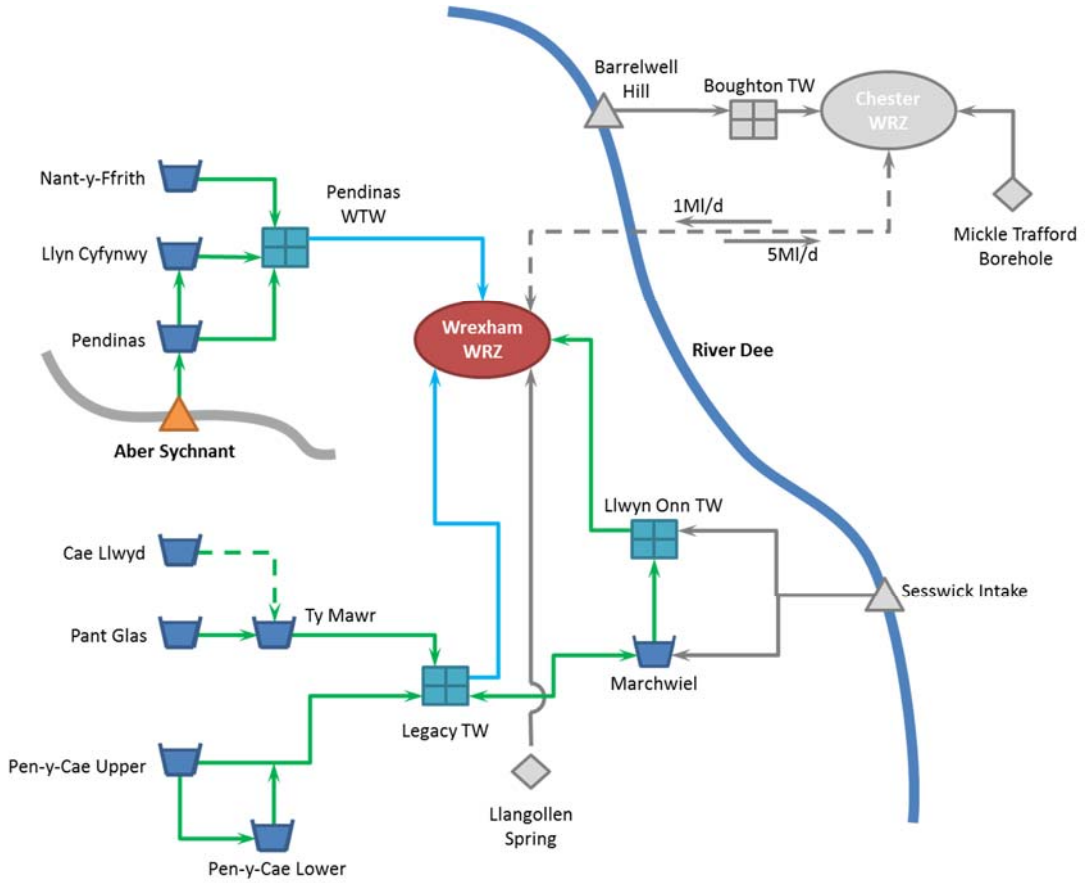


Figure 5: Dee Valley Water upland reservoir schematic

We monitor the levels within our reservoirs by taking manual reading from depth gauges, which are then input into our data management systems.

The Ty Mawr/Cae Llwyd/Pen-y-Cae and the Pendinas/Nant-y-Frith/Llyn Cyfynwy Reservoir Systems within the Wrexham Resource Zone are operated in conjunction with the Dee Storage System on the principle of keeping the reservoirs as full for as long as possible. The reason for this is to provide reserve storage in the event of a drought or another incident affecting the supply from the River Dee.

The drawdown control curves for the reservoir systems are based on the five worst historical droughts on record with the maximum allowable abstractions that do not allow the reservoirs to drop below their minimum operating volume for the 17th October. It is assumed that if the storage does not fall below this minimum operating volume for 17th October then the reservoirs will refill to their maximum capacity by the following March in time for the next summer.

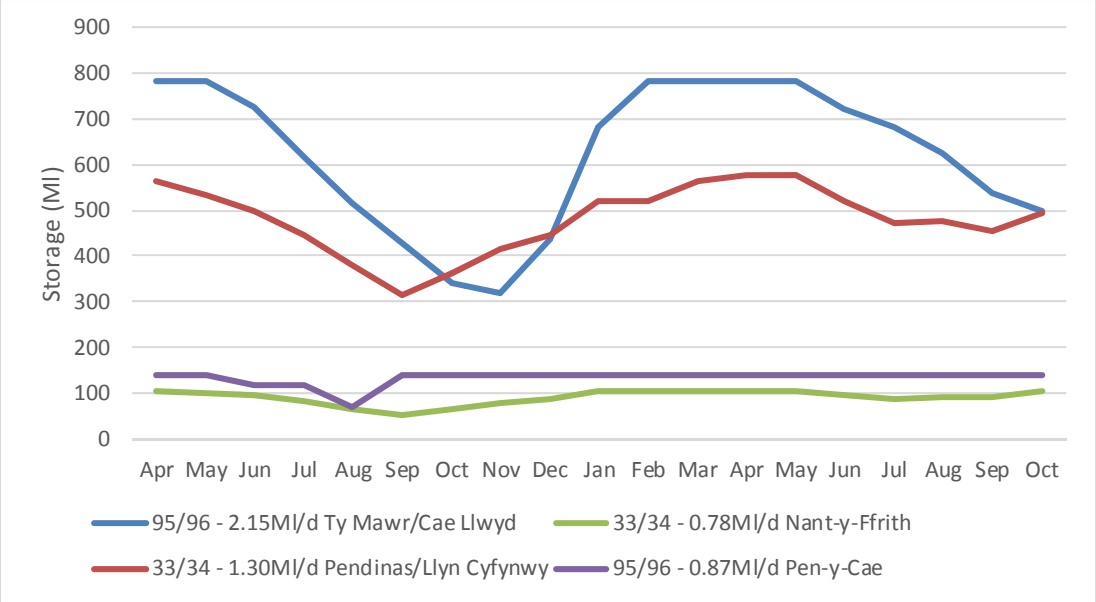


Figure 6: Reservoir system drawdown control curves

In practice during a drought sequence, the rate of drawoff from the reservoir systems will be controlled to a level that keeps the storage above the drawdown curve for the prevailing rate of drawoff whilst still providing all necessary compensation flows.

If the need to reduce the rate of drawoff from the reservoir system is triggered by the storage in the reservoirs crossing a drawdown control curve, additional water will be drawn from the River Dee to compensate. This measure will only be introduced if the Dee Drought General Directions do not specify otherwise.

The Pen-y-Cae Reservoir within the Ty Mawr/Cae Llwyd/Pen-y-Cae Reservoir System has a catchment area greater than that required to support the recharge of the Pen-y-Cae Reservoir and in addition does not have a compensation flow required as part of the abstraction licence. It is for this reason we propose using this reservoir to augment the River Dee during times of drought as per the Dee Drought Directions. See section 3.4 for more details of this supply side action.

2.4 Ground water sources

Only 5% of our total supply is provided from ground water sources. These include a spring at Llangollen and a borehole at Mickle Trafford.

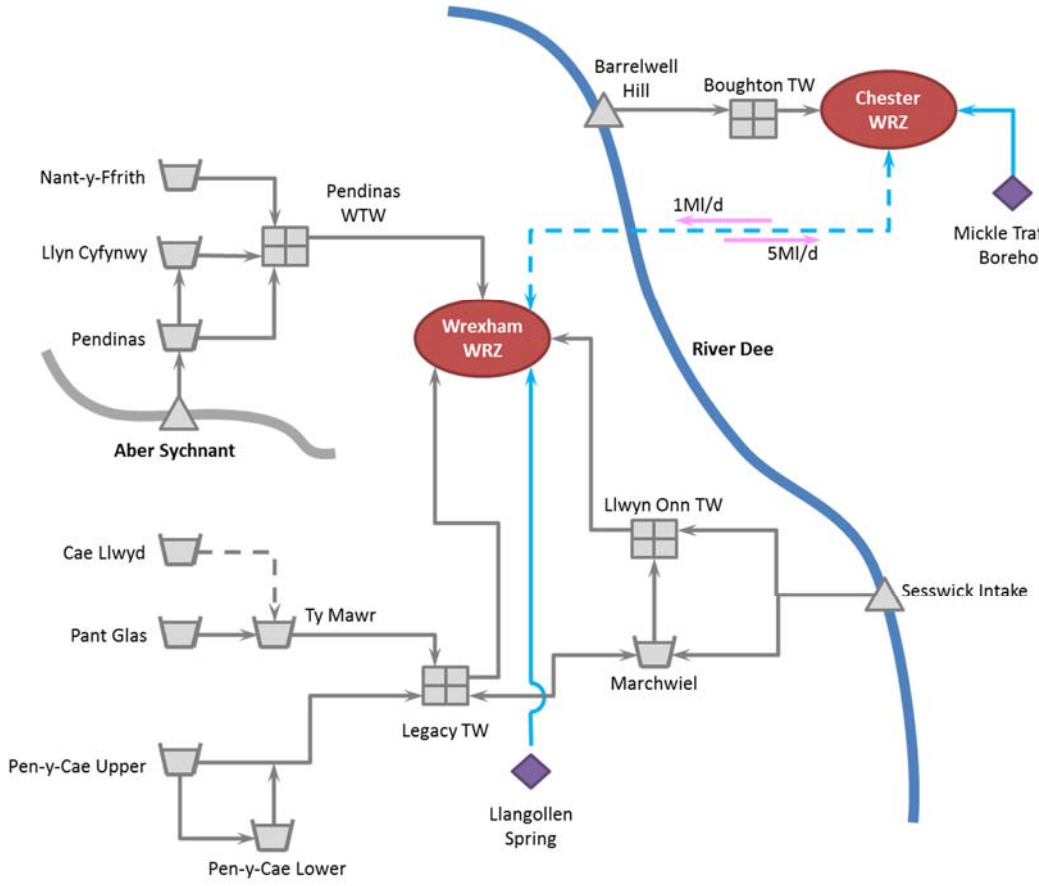


Figure 7: Dee Valley Water ground water schematic

We monitor levels at our ground water sources. However, because the areas which the sources supply are localised they are not used as strategic triggers. We would not expect a low ground water level to directly lead to the implementation of drought control measures, rather we would expect it to initiate a management response to consider an alternative means of supply.

The depth of water in our ground water sources are monitored at fifteen minute intervals using telemetry and recorded in our data management systems.

Any drought control measure required in our areas supplied by ground water would be as a result of triggers from the Dee Storage System.

To manage the risk in these areas we use a combination of monitoring, review and management response.

2.5 Historic droughts and scenarios

2.5.1 River source drought triggers

As both our Wrexham and Chester resource zones are so heavily dependent on the River Dee for their supply of water, we regard the availability of water in the river as the fundamental operational measure of a drought situation. Based on our scenario testing, which is detailed in section 2.5.3, we have found that under the five worst historical droughts on record we would always be able to meet our customer's demands as long as we manage our resources carefully. This means that the triggers and drought management actions for both our Resource Zones are those set out in the Dee Drought General Directions, in conjunction with monitoring the storage in the impounding reservoirs that we operate.

The Dee Drought General Directions specify the principles and detail under which the prescribed flows and abstractions must be reduced in a drought. During Normal General Direction the target is to achieve a minimum residual daily mean flow over Chester Weir of 4.2m^3/s. Chester Weir residual flow is calculated using flows measured at Chester Suspension Bridge by an ultrasonic flow gauge less abstraction taken by United Utilities from the Chester Weir intake.

Figure 8 shows the Llyn Celyn and Llyn Brenig regulating reservoirs and the principle abstraction points on the River Dee.

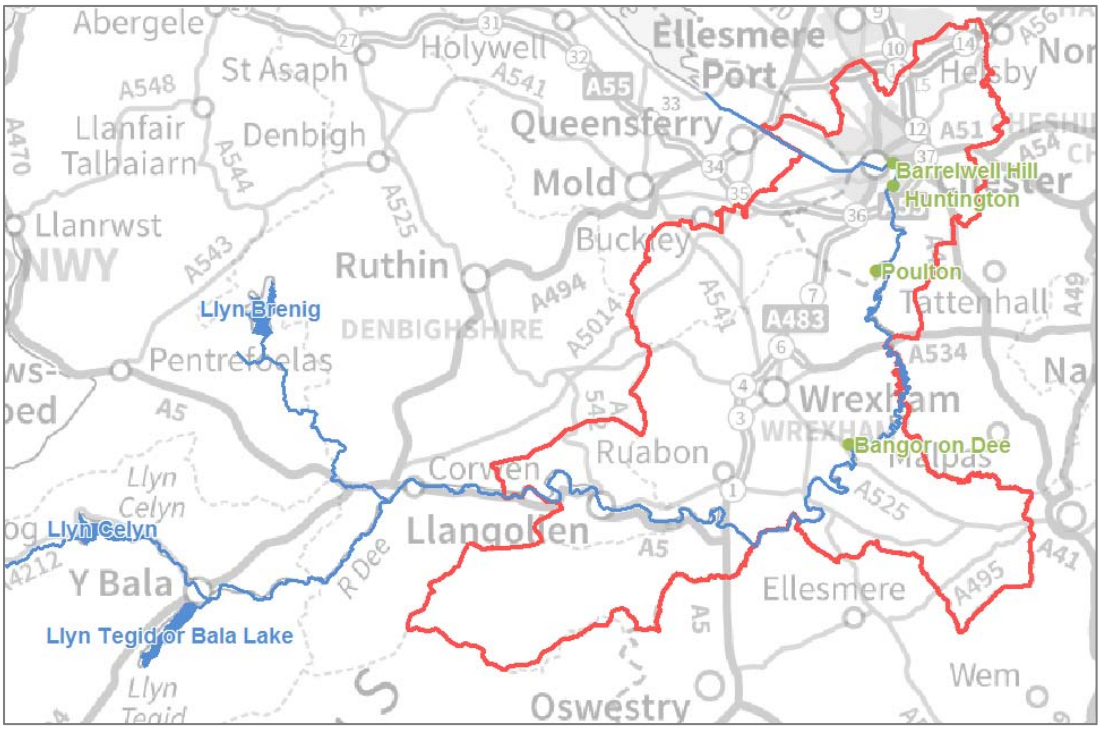


Figure 8: River Dee principle abstraction locations

The two abstraction points belonging to Dee Valley Water are Barrelwell Hill in Chester and Sesswick near Wrexham. Figure 9 shows a schematic view of these two abstraction points and how they feed in to our supply system.

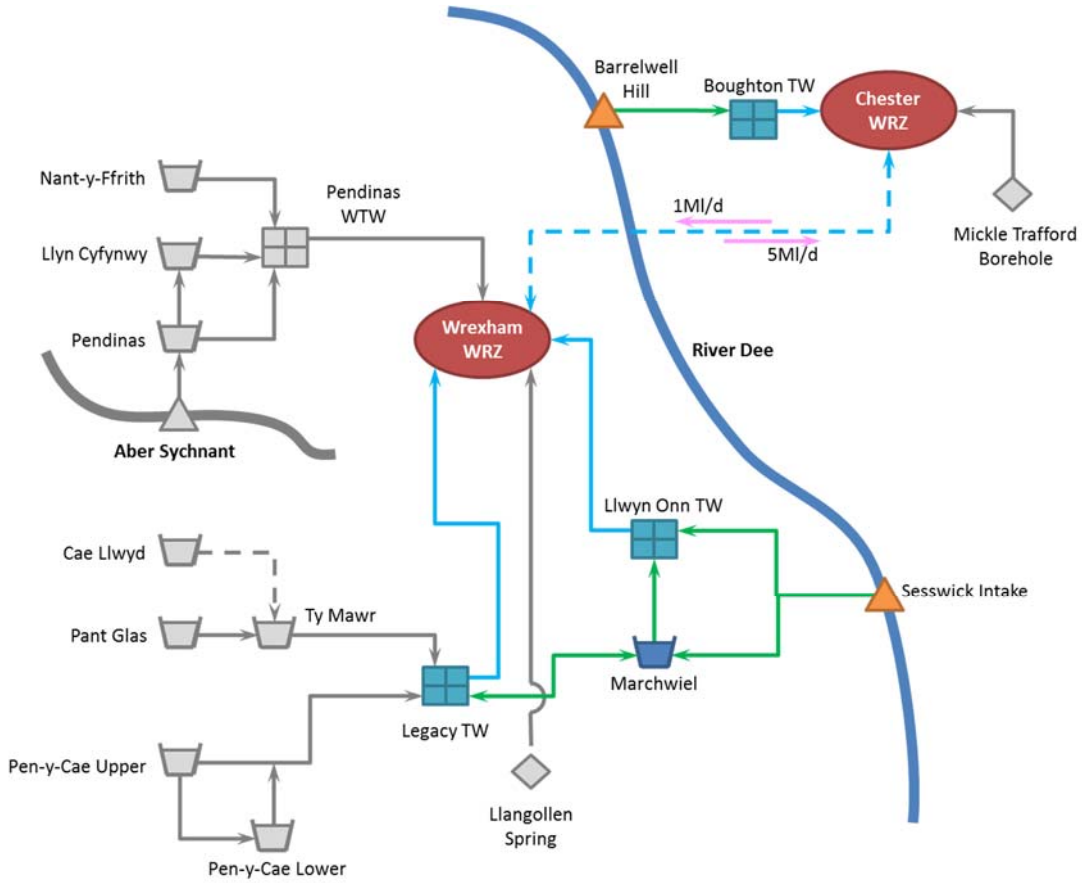


Figure 9: Dee Valley Water river source schematic

From historic data, a system conservation curve and a series of drought management curves (see Figure 10) have been developed which indicate the level of storage within the Dee Storage System and thus how much can be safely abstracted.

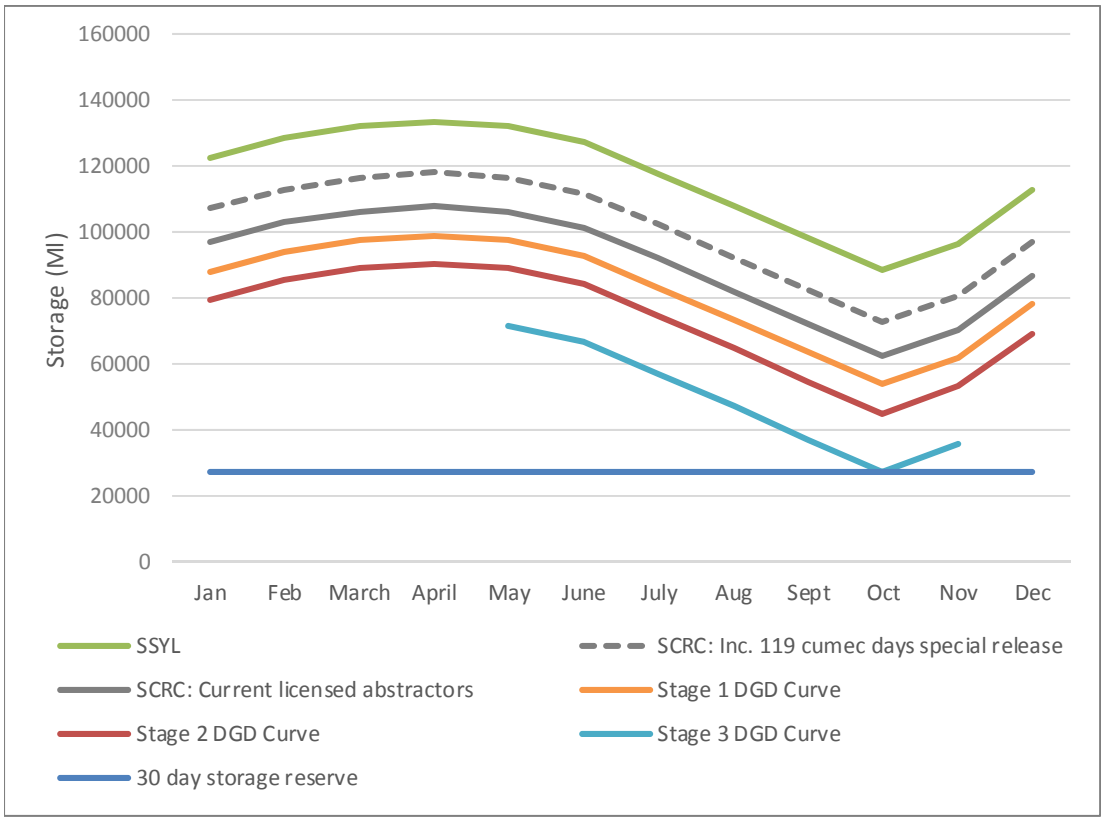


Figure 10: Dee Storage System conservation rule curve and drought management curves

Our abstraction licences associated with the River Dee detail both our gross and net abstraction. The gross abstraction relates to how much we can take out of the river at our abstraction points and does not consider how much water is returned downstream following the sewage treatment process. Net abstraction is equal to the gross abstraction less the water which is returned downstream following the sewage treatment process. For our Sesswick abstraction, it is assumed that 90% of the water abstracted is returned to the river through the Five Fords STW. However, for the Barrelwell Hill abstraction, because the water is returned to the river downstream of Chester Weir (the location where the river flows are measured) at the Sealand Road STW, it is assumed that the net and gross abstractions are equal and that no water is returned to the river. Table 2 shows how the Dee Valley Water allowable gross and net abstractions vary depending on the level of storage within the Dee Storage System.

Scenario	Zone	Gross (Ml/d)	Nett (Ml/d)
Authorised abstraction	1	78.0	41.1
Safe yield allocation	2	70.3	36.6
Stage 1 maximum allocation	3	70.3-65.3[7]	36.2
Stage 2 maximum allocation	4	70.3-60.3[2]	35.8

Table 2: Dee Valley Water abstraction agreements

Above System Safe Yield Line

At times of unsupported river flow, and times when the total storage in Llyn Celyn and Llyn Brenig are above the 'System Safe Yield Line' (SSYL), we are allowed to abstract within our authorised abstraction limits.

[7] The gross abstraction will be dependent on how the reduction in net abstraction is made

Trigger 1 – Crossing of System Safe Yield Line
At times when the river is supported and when the total storage in Llyn Celyn and Llyn Brenig has crossed the SSYL but is above the System Conservation Rule Curve' (SCRC) we are required to restrict our abstraction to the 'Safe yield allocations'.

Trigger 2 – Crossing of System Conservation Rule Curve
When the storage in Llyn Celyn and Llyn Bernig falls below the SCRC, Drought General Directions maybe introduced. When the system is expected to fall below this curve, the Dee Consultative Committee will meet to discuss the implementation of the Stage 1 Drought General Directions. This meeting must take place within seven days of the storage falling below the SCRC. The general principal of operation of Stage 1 Drought General Directions is that any reduction in residual flow over Chester Weir below 4.2m^3/s should be matched by an equivalent reduction in net abstraction by designated abstractors.

Trigger 3 – Crossing of Stage 1 Implementation Curve
When the system reaches the Stage 1 implementation curve the amount of water we are able to abstract is reduced by 0.4Ml/d (0.2Ml/d from both the Sesswick and Barrelwell Hill abstractions). Table 2 shows the stage 1 maximum gross and net allocations. The gross allocations are shown as a range as they are dependent on how we choose to make the required abstraction reductions (either supply side, demand side or river augmentation). We must deliver the required reductions in abstraction within seven days of the storage crossing the SCRC.

Our chosen means of implementing the reduction in abstraction of 0.4Ml/d will be by augmenting the River Dee with the same volume from our Pen-y-Cae Reservoir. The exact details of how we will augment the River Dee with this water are still to be determined and incorporated into the Dee General Directions. Based on the scenario modelling we have done so far, we have considered the five worst historical droughts on record and we believe that we could provide the necessary augmentations under all these conditions. The only restrictions we have on this source are those of the abstraction licence which limit us to taking a maximum annual volume of 2.49Ml/d or a maximum daily volume of 3.41Ml/d. We still have further modelling work to do in relation to the augmentation of the River Dee with water from Pen-y-Cae Reservoir to finalise the exact details of how it will be carried out in practice.

When the storage falls below the Stage 1 implementation line the Dee Consultative Committee will again meet to discuss the implementation of Drought General Directions Stage 2. As with Stage 1 the meeting must be within seven days of the storage falling below the Stage 1 implementation line.

Trigger 4 – Crossing of Stage 2 Implementation Curve
When the system reaches the Stage 2 implementation curve we have to make further reductions in the amount of water we abstract. The reductions are equivalent to those made during Stage 1, 0.4Ml/d total within 7 days of the system reaching the Stage 2 implementation curve. Stage 2 drought measures are only expected to occur with a frequency of around one in forty years.

The further reduction in abstraction of 0.4Ml/d will be through the same means as for Stage 1 measures, augmentation of the River Dee from Pen-y-Cae Reservoir. As

indicated above, we still have further modelling work to do to finalise the exact details of how the augmentation will be carried out in practice

Under Stage 2 regulation the River Dee will be regulated to less than natural flows.

Trigger 5 – Crossing of Stage 3 Implementation Curve

If the storage approached the Stage 3 curve despite the implementation of all the measures under Stages 1 and 2, the Dee Consultative Committee would meet to discuss the available options. The trigger line for Stage 3 measures has never been crossed in any of the historic drought sequences modelled for the Dee Storage System. Stage 3 drought measures would include introducing TUBs and applications for Drought Orders and Permits.

Any drought management actions that have been implemented will only be revoked when the Dee Storage System has returned to a normal status. This is equivalent to crossing Trigger 2 and moving above the System Conservation Rule Curve.

Figure 11 summarises the triggers and actions of the River Dee Drought General Directions.

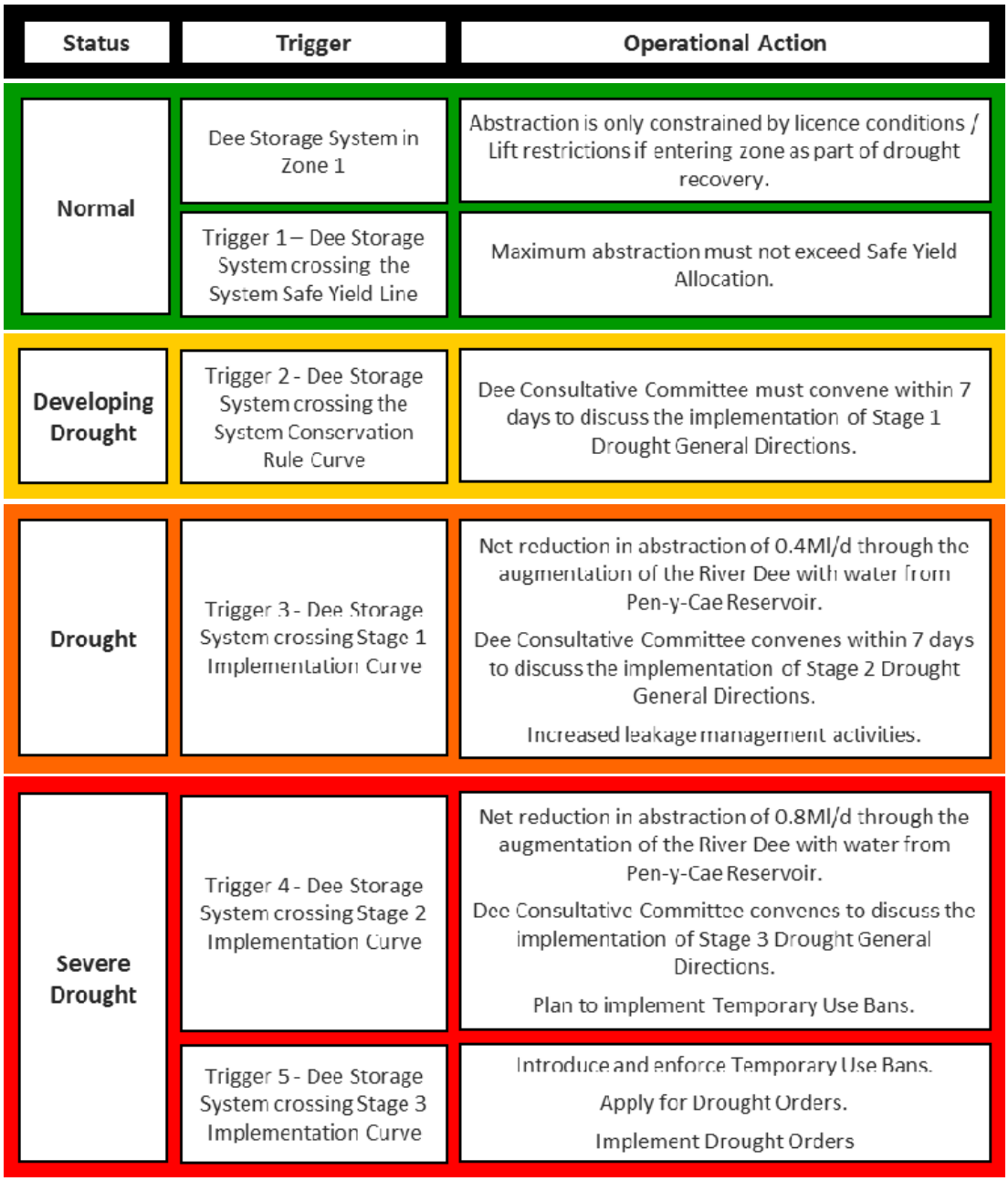


Figure 11: Trigger and action diagram for the Dee Drought General Directions

2.5.2 Historic droughts

In the past century the North West of England and North Wales have suffered a number of droughts differing in severity and geographical coverage. The following historic droughts were most severe in our supply area and Dee Drought Direction measures would be required if the same sequences were to be repeated:

- 1933/34 – Two season drought lasting from August 1933 to October 1934
- 1937/38 – Two season drought lasting from October 1937 to October 1938
- 1976/77 – Single season drought lasting from August 1976 to January 1977
- 1984 –Single season drought lasting from July to September 1984
- 1995/96 – Single season drought lasting from October 1995 to March 1996

NRW have modelled the Dee Storage System to predict how the system would respond to a historic drought using records going back to 1927. With current levels of abstraction, Stage 3 restrictions would never have been required whilst Stage 2 restrictions would only have been required for seven drought sequences. Figure 12 shows when the measures would have been required.

2.5.3 Scenarios

To ensure the robustness of our Drought Plan we have carried out scenario testing to demonstrate that our drought management actions could be effectively implemented given a range of drought conditions and elevated demands.

For our scenario modelling, we identified periods when Stage 1 and Stage 2 Dee Drought Direction measures would have been implemented if current abstraction volumes had been in place. Figure 12 shows when the measures would have been required.

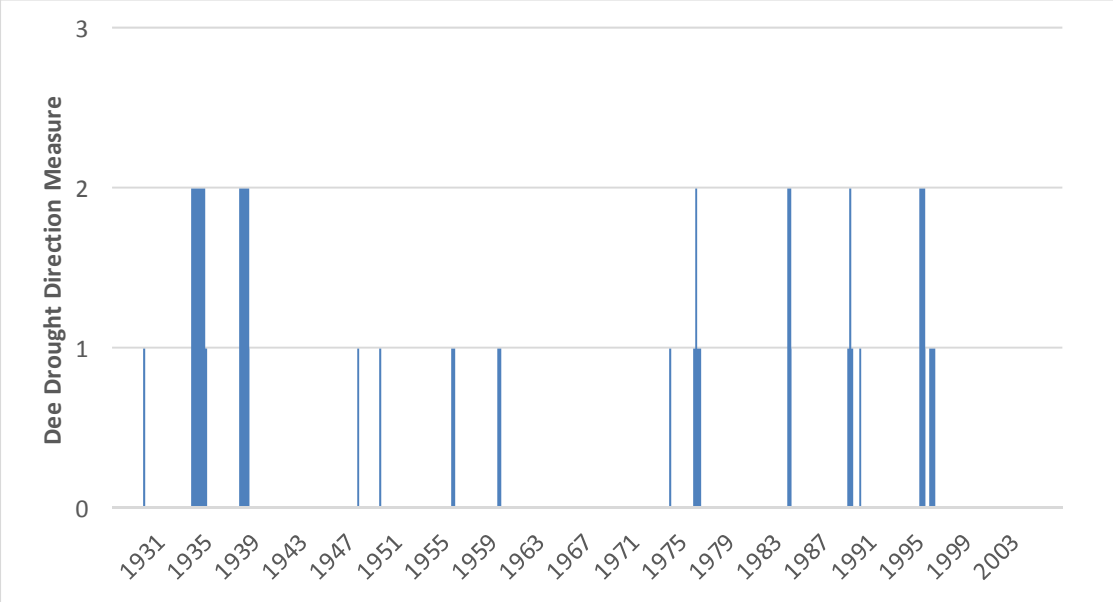


Figure 12: Historic implementation of Dee Drought Direction measures

From this data we selected the five worst historical droughts that occurred.. The years selected were 1933/34, 1937/38, 1976/77, 1984 and 1995/96. The actual dates when the restrictions were imposed are detailed in Appendix C – Scenario modelling.

We have then combined this sequence of information with our reservoir runoff models to determine the maximum continuous volume of water we could abstract during a historic drought sequence without going below the minimum operating volume on the 17th October. It is assumed that if the storage does not fall below this minimum operating volume for 17th October then the reservoirs will refill to their maximum capacity by the following March in time for the next summer. For each scenario, we began the modelling with the reservoirs full at the start of April prior to the implementation of the Dee Drought Direction measures and then carried out a continuous level of abstraction until the October after the measures were lifted. The droughts that resulted in the lowest abstraction were either 1933/34 or 1995/96 depending on the reservoir. Figure 13 and Table 3 show the results of the scenarios, based on these scenarios we would be able to abstract 4.23Ml/d (Pen-y-Cae is not included as it is assumed that this water will be used solely for augmentation) in addition to our allowances from our groundwater sources and the River Dee.

Drought Period	Reservoir	Abstraction (Ml/d)
1995/96	Ty Mawr and Cae Llwyd	2.15
1933/34	Pendinas and Llyn Cyfynwy	1.30
1933/34	Nant-y-Ffrith	0.78
	Total	**4.23**

Table 3: Maximum abstraction volume to ensure minimum operating volume on17th October

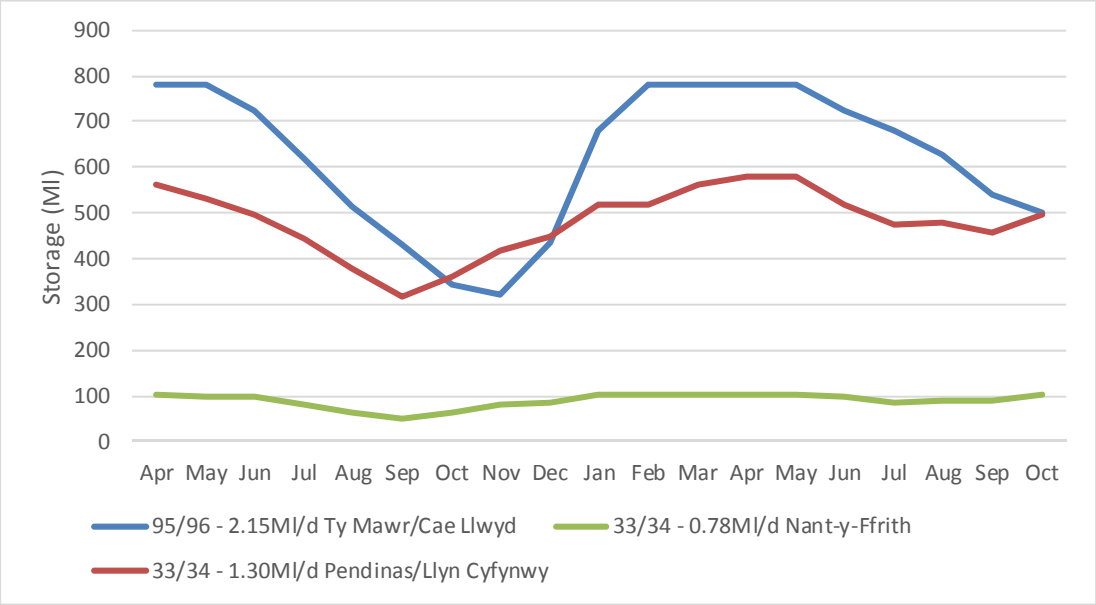


Figure 13: Drought scenario drawdown curves

Using the tables from the Water Resources Management Plan, we have altered the deployable output of our reservoir sources to reflect the figures in Table 3 and calculated a drought supply/demand balance for each resource zone (Chester and Wrexham). The tables below show an extract of the calculations from the Water Resources Management Plan tables.

Component	Units	2014/15	2015/16	2016/17	2017/18	2018/19
Distribution input	Ml/d	42.23	41.60	41.54	41.69	41.72
Water Available For Use (own sources)	Ml/d	46.77	46.77	46.77	46.77	46.77
Total Water Available For Use	Ml/d	46.07	46.07	46.07	45.77	45.77
Target headroom (climate change component)	Ml/d	0.01	0.01	0.02	0.02	0.03
Target headroom (All other components)	Ml/d	3.10	3.13	3.16	3.19	3.21
Target Headroom	Ml/d	3.11	3.14	3.17	3.21	3.24
Available Headroom	Ml/d	3.84	4.47	4.52	4.07	4.04
Supply Demand Balance	Ml/d	0.73	1.33	1.35	0.87	0.80

Table 4: Wrexham base line water supply summary

Component	Units	2014/15	2015/16	2016/17	2017/18	2018/19
Distribution input	Ml/d	24.05	24.00	23.94	23.88	23.82
Water Available For Use (own sources)	Ml/d	30.53	30.47	30.42	30.37	30.31
Total Water Available For Use	Ml/d	30.59	30.53	30.48	30.42	30.37
Target headroom (climate change component)	Ml/d	0.02	0.05	0.07	0.09	0.12
Target headroom (All other components)	Ml/d	1.88	1.88	1.88	1.88	1.88
Target Headroom	Ml/d	1.91	1.93	1.95	1.98	2.00
Available Headroom	Ml/d	6.54	6.54	6.54	6.54	6.55
Supply Demand Balance	Ml/d	4.63	4.61	4.58	4.57	4.55

Table 5: Chester base line water supply summary

For both zones the supply/demand balance is always positive over the period which this drought plan covers. In summary, this means that the amount of water that customers require, including a headroom allowance (to allow for uncertainties in estimates and climate change reductions), is always less that the amount of water available from our resources. As long as we manage our resources carefully during a drought, we will always have enough water to supply our customers.

2.6 Data sources

Data monitoring with respect to the Dee Storage System is carried out by NRW and includes a number of gauges within the catchment area. The principle gauging station uses an ultrasonic flow gauge at the Chester Suspension Bridge less the United Utilities abstraction taken at Chester Weir. This is used to calculate the Chester Weir residual flow.

On a weekly basis NRW produce a summary of the Dee Storage System stocks which is emailed to all members of the Dee Consultative Committee. The summary states the present level of regulation on the system and includes the current stock within the Llyn Celyn and Llyn Brenig Reservoirs along with a chart displaying the reservoir storage with respect to the control curves.

An example of the weekly summary report is given in Appendix B – Dee Storage System Stock Summaries.

Data associated with our own resources and operations such as rainfall, reservoir levels, ground water levels, abstraction rates, compensation flow releases, leakage and water

demand are retrieved daily from our data management systems. This information is used to produce a range of routine reports on either a weekly or monthly basis which help us monitor and manage our resources.

The main report we produce is a Water Resources Report which is reviewed by senior management at their monthly meetings. Our internal report includes the current stock within our Ty Mawr/Cae Llwyd, Pen-y-Cae and Pendinas/Nant-y-Frith/Llyn Cyfynwy Reservoir Systems as well as duplicating the information from the Dee Storage System summary. For both our own sources and the Dee Storage System we also indicate the storage for the same period last year and the current position with respect to the specific control curves. Monthly and 12 monthly rolling rain fall data is also included in the Water Resources Report, this provides an additional means of monitoring the current situation as well as increasing awareness throughout the business.

The levels of storage within our own sources along with our abstraction is also provided to NRW on a weekly basis.

2.7 Supply arrangements

Our main arrangements are those detailed in the Dee General Directions which are administered through the Dee Consultative Committee. This has been detailed in sections 1.3.2 and 2.2.

We also have a number of small supply agreements with United Utilities, Severn Trent and Dŵr Cymru. These are a mixture of emergency feeds and feeds to small areas. In the event of a drought these customers would be subject to restrictions imposed by ourselves rather than the companies that physically supply their water. This is because these customers pay their bills to Dee Valley Water and therefore only expect to receive communications from Dee Valley Water.

There are no inset appointments in either of our water resources zones and we are not aware of the potential for any in the future. In the event that an inset appointment was to be granted, we would expect the appointee to mirror any drought restrictions which we implement.

2.8 Forecasting

Our main means of forecasting a drought is through our Water Resources Report which is discussed on a monthly basis at a senior managers meeting. The report contains current and historic data in relation to levels of storage in our own reservoirs and in the Dee Storage System, rainfall, demand and leakage. It also summarises our storage availability. If levels of storage were to drop below what were expected or if there had been an extended period without rainfall we would also begin to monitor external hydrological reports and refer to external forecasts as means of predicting potential drought conditions. More information in relation to the Water Resources Report is given in section 2.6.

In relation to the River Dee, NRW monitor the rate of fall in the Dee Storage System in combination with other hydrological data to project the expected timescales for crossing key triggers. We receive these reports on a weekly basis.

3 DROUGHT MANAGEMENT ACTION

3.1 Introduction

Drought management actions comprise demand side actions and supply side actions, the implementation of which are determined by triggers (discussed in Section 2) that relate to how much water is available in the Dee Storage System. The chart below shows the various drought management actions that will be implemented as the status of the Dee Storage System changes from normal through to severe drought.

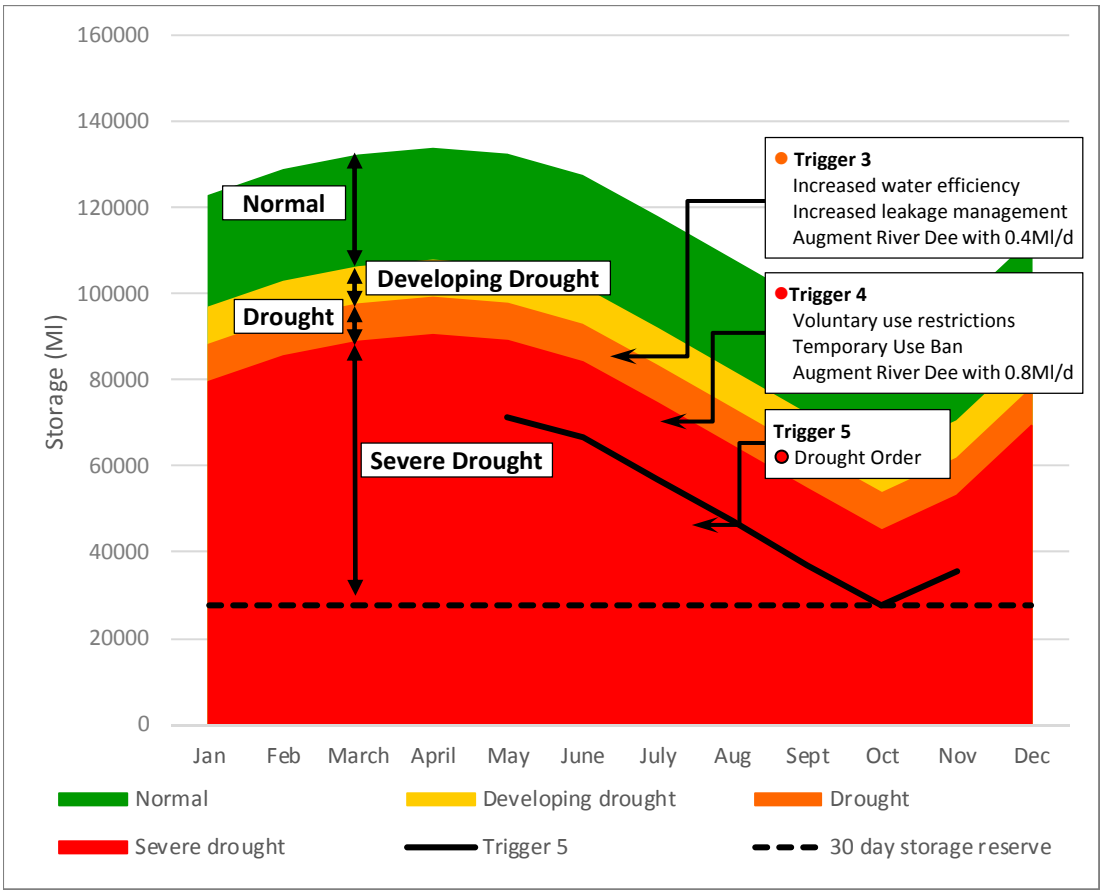


Figure 14: Drought management actions and their associated triggers

Demand side actions focus on reducing demand for water, how these are implemented is dependent on the time of year. For example, it is not relevant to ask people not to use hosepipes during the winter, however, promoting pipe lagging to reduce the number of bursts is. The list below provides a summary of the demand side actions that are available to us:

- Water efficiency measures – During normal operational conditions we ask our customers to try and reduce the amount of water they use through various efficiency measures, these include: fitting a cistern displacement device, reducing the time spent in the shower, turning off the tap whilst cleaning their teeth etc. We also carry out water efficiency property surveys and education within schools. We would intensify our water efficiency promotion as the Dee Storage System moves from a developing drought to a drought, this is trigger 3.

- Increased leakage management – An additional action that we can take to reduce the demand for water during a drought, is to increase our leakage management activities. We would increase the number of resources that we allocate to finding and fixing leaks as the Dee Storage System moves from a developing drought to a drought, this is trigger 3.
- Voluntary use restriction – As a drought becomes more severe we would ask our customers to make voluntary use restrictions, these primarily include not using a hosepipe or sprinkler. A voluntary use restriction is not compulsory. We would implement voluntary use restrictions as the Dee Storage System moves from a drought to a severe drought, this is trigger 4.
- Temporary Use Bans – If the drought severity were to increase further, we may have to implement a TUBs. TUBs restrict the use of water by domestic customers through banning hosepipes and sprinklers. We are able to enforce TUBs by imposing fines. We would start the process of implementing a TUB as the Dee Storage System moves from a drought to a severe drought, this is trigger 4.
- Drought Order – The most extreme demand side action available to us is imposing a Drought Order. The aim of a Drought Order is to extend existing restrictions under the TUB to non-domestic customers. We would start the process of implementing a Drought Order on trigger 5.

Supply side actions are those that increase the availability of water within the system. We only have one supply side option available to us, the augmentation of the River Dee with water from Pen-y-Cae Reservoir. As the status of the Dee Storage System moves from developing drought to drought we would start augmenting the river with 0.4Ml/d of water, this is trigger 3. On trigger 4, as the status of the system moves from drought to severe drought we would increase the augmentation from 0.4 Ml/d to 0.8Ml/d.

3.2 Demand-side actions

3.2.1 Water efficiency

As part of our normal operations we promote the efficient use of water to both household and non-household customers. Our household water efficiency strategy is based principally on the extension of optional metering, supply pipe leakage control and the distribution of free cistern displacement devices.

Our free meter option is offered to all domestic customers, an application form for this can be found on our website. If a customer opts for being charged by volume using a free meter and change their mind, they can revert back to being charged a rateable value any time up to one month after the date of the fourth quarterly bill.

For supply pipe leakage control, we have a subsidised supply pipe repair policy, which is offered to all domestic customers for the first two leaks. More details of the subsidised supply pipe repair policy can be found on our website.

We distribute cistern displacement devices to customers on request or they can order them from the 'Save Water Save Money' website[8]. Shower regulators and timers are also available free of charge on the 'Save Water Save Money' website.

As part of our holistic approach to water efficiency, we have a schools educational programme where a third party provide water efficiency lessons on our behalf.

For our non-household customers we carry out water use audits and offer self-audit packs on request. For our larger customers we provide a Key Accounts Manager and offer additional services relating to advice on leakage detection, water efficiency and security of supply.

For more information on water efficiency and our water efficiency policy see section 3.6.2 of our Water Resources Management Plan and the water efficiency part of our website. From the water efficiency page you can also find links to other organisation that provide water efficiency information such as the Carbon Saving Trust, Save Water Save Money and Resources Efficient Wales.

Whilst the above water efficiency promotions are carried out as part of normal operations, during a drought event we would employ additional methods such as radio and newspaper adverts to enhance their publicity. We would consider using some or all of the following methods:

- Local radio adverts
- Local newspaper adverts
- Texting customers
- Social media
- Information on customer bills and billing leaflets
- General water efficiency messages
- Garden water efficiency messages
- Household water efficiency messages
- Winter water efficiency messages – e.g. lag pipes to prevent bursts
- Free issue of water saving devices for use in toilet cisterns
- Promotion of water efficiency and provision of water efficiency devices at local events, such as flower shows
- Joint initiatives with other organisations to promote water efficiency (e.g. housing associations, large employers, local groups)

The type of promotion used would be dependent on the nature of the drought event and would take into consideration the geographical context, the time of year (winter or summer) and the population centres likely to be affected. In the event that a drought was to occur in the winter, we would not promote garden water efficiency but we would promote lagging pipes to prevent bursts.

We would increase our promotional activities when the Dee Storage System moves from a developing drought to a drought, this is trigger 3. The preparation and implementation time for increasing water efficiency promotion will be entirely dependent on the chosen form of media. Updating our website can be carried out within

[8] http://www.savewatersavemoney.co.uk/deevalley/free-water-saving-products

hours, local radio and newspaper adverts may take two weeks whilst messages on bills will be reliant on the issuing cycle.

An example of an advert that we may use on our website or in a local newspaper is given in Appendix D – Example adverts for water efficiency and voluntary restrictions.

Status	Trigger	Operational Action
Drought	Trigger 3 - Dee Storage System crossing Stage 1 Implementation Curve	Increased water efficiency promotion to customers using website and advertisements. Methods used and messages promoted will be dependent on the geographical context, the time of year and the populations centres affected.

Figure 15: Implementation of increased water efficiency promotion

3.2.2 Leakage control

As part of our Water Resources Management Plan we carried out an analysis to evaluate our Social and Economic Level of Leakage (SELL). As the name suggests, SELL is the most sustainable level at which we will manage our leakage that provides best value for money to our customers whilst not adversely affecting society and the environment. More details on how we calculated the SELL value can be found in section 5.3.5 our Water Resources Management Plan. Whilst leakage control is a long term activity, during a drought, if we expect our customers to make an effort in reducing demand then it is only appropriate for us to make a similar effort in relation to leakage detection and repair activities.

In a drought event, additional leakage detection and repair activities will be implemented, these will take effect when the Dee Storage System reaches trigger 3.

Through working overtime and redeploying personnel, additional members of staff could be made available to leakage detection activities in the short term. A similar reorganisation would be required to fix the expected increase in repairs. Based on historic achievements, there is the potential for us to reduce leakage approximately 1.5Ml/d below the SELL value of 10.17Ml/d. Leakage levels close to 8.5Ml/d have been achieved in the past, however these were as a response to severe winter weather as opposed to a drought. Whether we could reallocate enough resources to achieve this reduction would depend on the necessity of other business needs at the time. Figure 16 shows a graphical representation of our reduction in SELL as part of increased leakage management activities.

In the event that a drought extended into the longer term we would consider contracting outside resources to prevent other areas of the business suffering due to the redeployment of staff. The ability to do this would be dependent on whether the drought is localised (northwest) or nationwide.

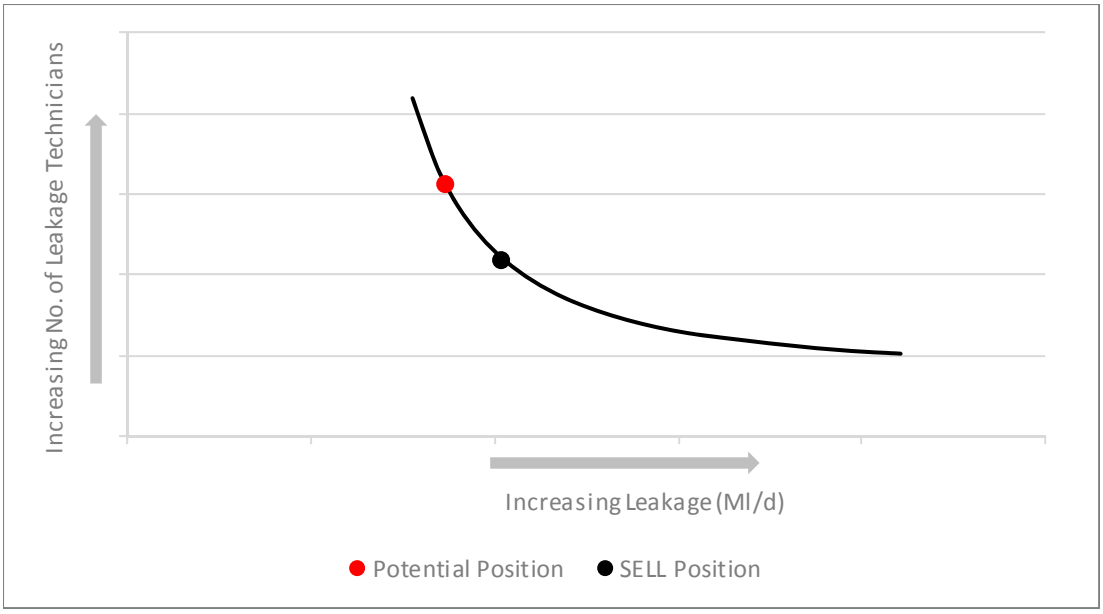


Figure 16: Active leakage control curve

Drought conditions have been shown to increase leakage due to increased movement in the soil as the soil moisture deficit increases. In this case, it may mean that the additional leakage detection resources that we propose will be required to simply maintain current levels rather than reduce them.

In order to achieve the projected savings a number of measures would be required outside normal operational activities, these are:

- Increased leakage management meetings
- Increased data analysis to improve targeting of areas
- Increased leakage detection activities such as sounding and step tests
- Increased reservoir and trunk mains surveys
- Contact councils to request that notice periods are reduced for carrying out work on a highway
- Accelerate pressure management schemes that have already been identified
- Optimise existing pressure management schemes
- Further promote our free leak repair line

The exact means by which we would target leakage reduction during a drought would be dependent on the geographical context of the drought, the time of year (winter or summer) and the expected savings.

We would increase our leakage detection activities when the Dee Storage System moves from a developing drought to a drought, (this is trigger 3). The preparation and implementation time for increasing leakage detection activities is in the order of a month; however, there are caveats as the levels of savings that could be achieved would not be instantly apparent, rather only becoming apparent over a period of weeks or months.

Status	Trigger	Operational Action
Drought	Trigger 3 - Dee Storage System crossing Stage 1 Implementation Curve	Increased leakage management activities. Begin to deploy additional resources to find and fix.

Figure 17: Implementation of increased leakage management activities

3.3 Temporary water use restrictions

3.3.1 Code of practice and guidance on water use restrictions

In spring 2013 an update to the UKWIR *Code of Practice and Guidance on Water Use Restrictions* was published which incorporated the lessons learnt during the 2011/12 drought. The code of practice relates to existing legislation covering water use restriction:

- TUBs on water as provided for in Section 76 of the Water Industry Act 1991, as amended by Section 36 of the Flood and Water Management Act 2010 and detailed in The Water Use (Temporary Bans) Order 2010.
- Ordinary Drought Orders, as provided for in Sections 73 to 81 and Schedules 8 and 9 of the Water Resources Act 1991 and detailed in the Drought Direction 2011.
- Emergency Drought Orders as defined in the Water Resources Act 1991.

The code of practice sets out a framework for evaluating whether and how water use restrictions should be implemented during a drought event. Its aim is to ensure that all water companies are consistent in their management of water use restrictions so that their customers can be reassured that their interests have been considered and to minimise the risk of confusion in relation to policies of neighbouring water companies.

The processes outlined in sections 3.3.3, 3.5 and 3.6 are based on the above code of practice to ensure that we meet our statutory obligations in the event that we have to impose water use restrictions on our customers.

Within this document we refer to temporary water use restrictions or Temporary Use Bans (TUBs) rather than to hosepipe bans which may have been used in previous documents. This change in terminology is to reflect the relatively recent legislative changes that the government has introduced.

3.3.2 Voluntary use restrictions

Prior to introducing a TUB, we would encourage a reduction in demand through voluntary use restrictions. We would publish an advert on our website and possibly in local newspapers asking customers to follow voluntary use restrictions. The focus of the restrictions will be to avoid the use of hosepipes and sprinklers. These activities are similar to those covered by a TUB but the message for voluntary use restrictions will be simple and concise: avoid using hosepipes and sprinklers to reduce the risk it being

confused with a TUB. An example of the advert is given in Appendix D – Example adverts for water efficiency and voluntary restrictions.

We would implement voluntary use restrictions when the Dee Storage System moves from a drought to severe drought, this is trigger 3, at the same time as publishing a notice to implement a TUB (see below). It is hoped that by implementing a voluntary use ban at the same time as advertising the intention to implement a TUB will avoid spikes in demand before the restrictions take place.

The preparation and implementation time for promoting voluntary use restrictions would be as per water efficiency promotion; dependent on the chosen form of media.

3.3.3 Temporary Use Bans (TUBs)

Since the introduction of Section 36 of the Flood and Water Management Act 2010, water companies have wider and more far reaching powers to restrict water use. When required, the following activities may be prohibited through a TUB:

- 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

We would start the process of implementing a TUB as the Dee Storage System moves from a drought to a severe drought, this is trigger 4, subject to the outcome of a meeting of the Dee Consultative Committee. The preparation and implementation time for imposing a TUB is between one and three weeks. Figure 18 shows the process of implementing a TUB along with the anticipated timescales.

We do have the option of phasing in the above restrictions, however we think this would be difficult to communicate to our customers and lead to unnecessary confusion. In addition, we do not think it is fair to imply that some activities are 'more important' than others by prohibiting them later on in the process. Therefore we would impose all eleven of the above restrictions at the same time. This policy is in line with our neighbouring companies: United Utilities, Severn Trent and Dŵr Cymru.

The savings resulting from imposing TUB are generally restricted to the summer period due to the limited use of hosepipes for garden watering and cleaning of motorised vehicles during the winter. Therefore we do not plan to impose any restrictions during the winter months (October-March) regardless of our water resources situation. However, we may extend restrictions which are already in place into the winter months if we believe them to be beneficial. As indicated above, any decision to implement a TUB would be decided through the Dee Consultative Committee.

3.3.4 Geographical coverage

If the need arose for us to implement a TUB we would do so companywide. This is necessary as both our water resource zones are dependent on the Dee Storage System and therefore both subject to the same drought management actions. We also believe this would avoid confusion which may result from a more geographically targeted application. We do though reserve the right to impose restrictions at a lower level than companywide if we feel it is in our customers' best interest.

3.3.5 Exceptions

As set out in the legislation and the UKWIR Code of Practice, we will allow exceptions to the TUB for certain customers. The exceptions fall under three categories. These are:

- Statutory Exceptions – Specified through legislation and are on the grounds of health and safety, the environment or where businesses may be effected.
- Discretionary Universal Exceptions – Common to all water companies and primarily relate to Blue Badge holders.
- Discretionary Concessional Exceptions – Granted by individual water companies following the receipt of a representation. All exceptions are subject to our discretion and will only be granted if it is in the best interest of the community. We will consider granting an exception to customers on the company's Vulnerable/Water Sure Customer Lists and to those whom have mobility issues but are not in possession of a Blue Badge. These exceptions will require customers to write or make representation to Dee Valley Water to obtain permission. A form to make a representation has been provided in Appendix H – Temporary Water Use Exception Form. Review of the representations will be the responsibility of the Drought Management Team, specifically the Technical/Data and Stakeholder Leads.

A more detailed list for each TUB category can be found in Appendix G – Restricted activities for TUBs and Drought Orders and their expected exceptions.

Clarification of what is and is not included in the above exceptions will be provided in the notice published to inform customers of our intention to impose restrictions. Any exceptions listed under discretionary may be rescinded if the perceived savings are determined necessary and beneficial.

Customers may also apply for an exception even if they do not consider themselves to be included within any of the exception categories. A copy of the proposed form that will require completing and returning to ourselves is given in Appendix H – Temporary Water Use Exception Form. Details of how to make a representation will also be given in the notice that we will publish prior to imposing restrictions.

There is no formal process for objecting to restrictions under a TUB, we will only introduce these measures in very extreme circumstances when it is in the best interest of both customers and the environment. Objection can be lodged as a judicial review under the Human Rights Act.

3.3.6 Implementation of restrictions

In the event that we would need to impose restrictions we would publish our intention to do so through a notice on our website and in two local newspapers. The format of the notice would follow that recommended in the UKWIR Code of Practice, a copy of this has been included in Appendix E – Temporary use ban notice example. Included in the notice will be details of activities which are exempt from the restriction. In addition to the formal notification a short leaflet would also be made available summarising the notice.

The approximate timescales and process that we expect to follow to implement a TUB are shown in Figure 18.

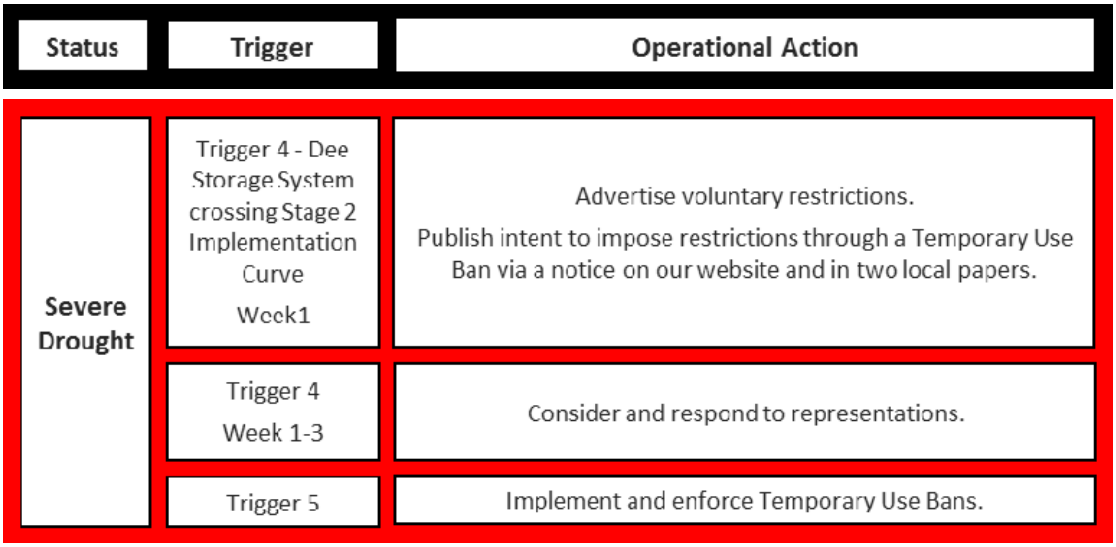


Figure 18: Process for implementing a voluntary restriction Temporary Use Ban

Based on historical data there is no instance when a TUB would have been required. As such, the above timescales are only indicative in that we estimate we would need three weeks to implement a TUB. Publishing our intention to implement a TUB will be based on the gradient of the fall in storage of the Dee Storage System and the projected date of crossing trigger 5.

3.3.7 Revocation of restrictions

TUBs will be lifted when the water resources have returned to their normal level of risk. To determine this point consideration will be taken of the actual level of the resources and the prevailing and projected weather conditions.

Similar to implementation, the revocation of the restrictions will be published on our website and in two local papers. An illustration of the wording for the revocation of restrictions is given in Appendix F – Revocation of restrictions example.

3.4 Supply-side actions

As detailed in sections 2.5.1 and 2.5, in a drought, the Dee Drought General Directions define the principles and detail the conditions under which the prescribed flows and abstractions within the catchment must be reduced. Under normal operation we always

assume ‘Safe yield allocations’ as the Dee Storage System regularly crosses Trigger 1 the *Safe Yield Line*.

During a drought, we are required to further reduce our abstractions (below ‘*Safe yield allocations*’) by specified volumes depending on the storage in the Dee Storage System. How we make these reductions is our own choice, they can be through reducing abstraction i.e. using less water ourselves and asking our customers to use less water, or by augmenting the River Dee with water from a different source.

Our preferred choice is to augment the River Dee using water from our Pen-y-Cae Reservoir via the Trefechan Brook. This is primarily because augmenting the River Dee is within our own controls so we can guarantee the overall reductions in abstractions. Asking customers to make reductions and reducing the amount of water we use through activities such as leakage management, has numerous dependencies and therefore a less certain outcome. As discussed in section 2.5.3, further work is required to determine the exact details of the augmentation process.

Under our abstraction licence agreements for Pen-y-Cae Reservoir, we do not provide a compensation flow into the Trefechan Brook. This means that in the event of a drought, the stream bed may initially be dry leading to some losses prior to the augmentation water reaching the River Dee. To try and further understand the possible magnitude of these losses, we are considering a test to monitor the discharge from Pen-y-Cae Reservoir and the corresponding inflow into the River Dee. Before doing this careful consideration must be made as to the prevailing conditions at the time of the test. Carrying out the test in winter, when the ground is water logged, would not provide accurate results, however carrying out the test during dry conditions may pose an unnecessary risk.

The preparation and implementation time for augmentation of the River Dee with water from our Pen-y-Cae Reservoir would be less than a week.

In our previous Drought Plan, the augmentation method that we selected was to use water from our Talwrn borehole. However, since this plan water quality concerns have been raised with regard to this borehole suggesting that the water from it may not be suitable for augmenting the River Dee. In addition, significant capital and operational expenditure is required to the pumps to make them fit for purpose. It has therefore been decided that the risks and costs of utilising Talwrn borehole are too great and that using water from Pen-y-Cae Reservoir is more suitable.

3.5 Drought Orders and Permits

3.5.1 Drought Orders and Permits

Drought Orders and Permits are a means by which further action can be taken to mitigate the impact of a drought by either increasing water supply or further restricting water use.

To implement a Drought Order or Permit, we must first apply to either the Secretary of State, Welsh Government or NRW for approval. Whether we apply to the Secretary of State or the Welsh Government will be dependent on the area where the Drought Order

is to be implemented, England or Wales. The application and approval process can be lengthy and may take a number of weeks/months, it is therefore essential that the requirement of an order or permit is established as soon as possible.

Before a Drought Order or Permit would be granted by the Secretary of State, Welsh Government or NRW, we would be expected to demonstrate that we have already exercised all means available to restrict domestic demand as far as possible.

The preparation and implementation time for imposing a Drought Order is up to six weeks. Figure 19 shows the process of implementing a Drought Order along with the anticipated timescales.

Ordinary Drought Orders

The Water Resources Act 1991 (WRA 1991) empowers the Secretary of State or the Welsh Government to make provision for ordinary and emergency Drought Orders. Under these provisions, as a Water company, we can apply for ordinary Drought Orders that:

- Authorise us to take water from any specified source
- Authorise us to prohibit or limit the use of water for any purpose set out in the direction
- Authorise us to discharge water to any place specified
- Authorise NRW to prohibit or limit any person taking water from a specified source
- Prohibit or limit NRW from taking water from a specified source
- Suspend or modify existing supply and discharge permits and obligations
- Authorise NRW to suspend or vary effluent discharge

Within this plan we have only considered the option of applying for a Drought Order to prohibit or limit the use of water. The Drought Direction 2011 sets out those purposes that companies can prohibit or limit under the WRA 1991. These are as follows:

- Watering outdoor plants on commercial premises;
- Filling or maintaining a non-domestic swimming or paddling pool
- Filling or maintaining a pond
- Operating a mechanical vehicle-washer
- Cleaning any vehicle, boat, aircraft or railway rolling stock
- Cleaning non-domestic premises
- Cleaning a window of a non-domestic building
- Cleaning industrial plant
- Suppressing dust
- Operating a cistern in any building that is unoccupied and closed

The main aim of this type of Drought Order is to extend existing restrictions that have been imposed on domestic customers, through the implementation of TUBs, to non-domestic customers. We would start the process of implementing a Drought Order on trigger 5.

In addition to the above we can also apply for emergency Drought Orders which allow us to restrict supplies to customers through the imposition of rota cuts and the

introduction of standpipes. However, as stated in 1.4.3, we deem the imposition of these measures as part of a drought to be unacceptable and as such we would only implement them in an emergency not as part of a drought plan.

Drought permits
A drought permit allows us to take water from specified sources by suspending conditions of our abstraction licences or by reducing compensation flows from our upland reservoirs. None of the measures included within a Drought Permit are part of our drought plan and as such no allowance has been made for their application.

3.5.2 Geographical coverage

As per TUBs, the imposition of a Drought Order would be at company level.

3.5.3 Exceptions

As set out in the legislation and the UKWIR Code of Practice, we will allow exceptions to a Drought Order for certain customers. The exceptions that we will grant fall into the same three categories detailed in section 3.3.5: Statutory Exceptions, Discretionary Universal Exceptions and Discretionary Concessional Exceptions. A more detailed list for each Drought Order Purpose of Use category can be found in Appendix G – Restricted activities for TUBs and Drought Orders and their expected exceptions.

Persons requesting an exemption should do so by making a representation to either the Secretary of State or the Welsh Government. Details of how to do so will be given in the notice published on our website.

3.5.4 Implementation of a Drought Order

Any requirement to implement a Drought Order would be determined though the Dee Consultative Committee. In the event that a Drought Order was required we would first have to serve notice on the persons or bodies to whom the notice applied. We would then publish the notice, for a period of at least seven days in one or more local newspapers, in the London Gazette, on our website and at numerous other places within the community. It is during this seven day period that persons or bodies which the Drought Order would impact can make representations to either the Welsh Government or the Secretary of State.

The format of the notice would follow that recommended in the UKWIR Code of Practice, a copy of this has been included in Appendix I – Drought Order notice example. Included in the notice will be details of activities which are exempt from the order. In addition to the formal notification a short leaflet would also be made available summarising the notice.

Following on from serving and publishing the notice we would then apply to either the Welsh Government or the Secretary of State (depending on the geographical location the order was applicable to) for the Drought Order.

The details of how to apply for a Drought Order are given in the Defra document *Drought permits and drought orders, Information from the Department of*

Environment, Food and Rural Affairs, Welsh Assembly Government and the Environment Agency[9].

Figure 19 outlines the process and approximate timescales of applying for and implementing a Drought Order. An allowance of 28 days has been made from the point of submission of the application to the implementation of the Drought Order. It should be noted that these timescales are only approximate and the commencement date of serving the notice would be estimated based on the projected rate of decline in the Dee Storage System storage and the need to allow 28 days for approval of the submission.

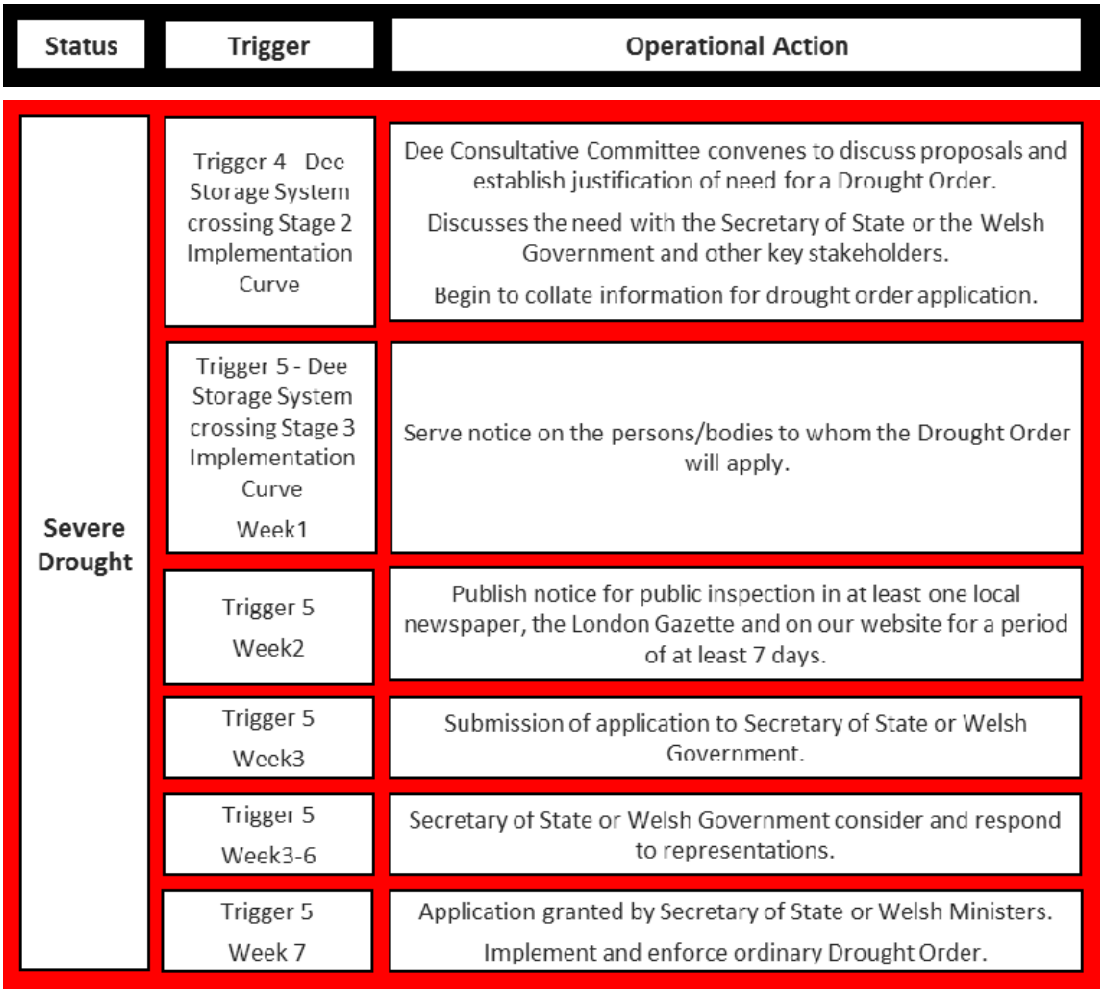


Figure 19: Process for implementing a drought order

Based on historical data there is no instance when a Drought Order would have been required. As such, the above timescales are only indicative in that we estimate we would need six weeks to apply for and implement a Drought Order. Serving notice on those whom the order applies will be based on the gradient of the fall in storage of the Dee Storage System and the prevailing conditions.

[9]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69441/drought-permits-drought-orders.pdf

3.5.5 Revocation of a Drought Order

Under normal circumstances a Drought Order is issued for a period of six months and can then be extended for a further six months if required.

We may revoke restrictions imposed as part of the Drought Order prior to the end of the six month period if our water resources have returned to their normal level of risk. To determine this point, consideration will be taken of the actual level of the resources and the prevailing and projected weather conditions.

Similar to implementation, the revocation of the Drought Order will be published on our website and in two local papers. An illustration of the wording for the revocation of restrictions is given in Appendix F – Revocation of restrictions example.

3.5.6 Emergency Drought Orders

Our drought plan does not include the use of Emergency Drought Order for reasons outlined in section 1.4.3. Planning for Emergency Drought Orders as part of a normal drought is not an acceptable level of service for our customers.

Emergency Drought Orders allow us to restrict the supply of water to our customers through the imposition of rota cuts and/or the introduction of standpipes and exits to deal with the very remote possibility of an extreme drought.

Implementing Emergency Drought Order are part of our emergency contingency plans. We stress that the probability of having to carry these out as part of a drought is extremely low.

3.6 Potential drought permit and order sites

Not applicable.

3.7 Enforcement of a Temporary Use Ban or Drought Order

The Water Industry Act 1991 and Water Resources Act 1991 states that anyone found guilty of breaching a TUB can be fined up to Level 3 (an amount of £1000 under the standard scale of fines for summary offences in the Criminal Justice Act 1982 section 32). Offenders breaching a Drought Order restrictions are liable to a fine not exceeding the statutory maximum (which is an amount of up to £5000). Conviction on indictment renders an offender liable to a fine with no specified upper limit.

3.8 Demand management savings

We have estimated demand management savings using the UKWIR 2007 methodology entitled '*Modelling the impact of restrictions on demand during drought*' which was based on the drought experienced in the South East of England during 2005/06. However it should be noted that there were some caveats to the methodology such as care should be taken when drawing inference from the analysis with application to other areas and future media campaigns may be significantly different to those carried out in 2005/06.

As it is many years since we employed drought measures for a sustained period of time in our supply area, we have little experience to base our assumptions on and to quantify the results of the analysis. Table 6 shows the estimated savings that would be achieved through implementing the proposed demand side saving options, the percentage values are the savings represented as a percentage of the resource zone distribution input.

Resource zone	Demand side saving options (Ml/d)			
	Drought		Severe drought	
	Increased water efficiency promotion	Increased leakage management activities	Temporary Use Ban implementation	Drought Order implementation
Wrexham	0 - 0.24 (0.57%)	0 - 1.0 (2.35%)	0 - 0.92 (2.16%)	0 - 0.64 (1.51%)
Chester	0 - 0.16 (0.67)	0 - 0.5 (2.07%)	0 - 0.63 (2.61%)	0 - 0.28 (1.14%)

Table 6: Estimated savings from demand side drought management actions

The estimated savings are slightly different to those stated in our previous plan as we have reviewed the assumptions behind the estimates, this included the volume of non-household use that is sensitive to drought restrictions and the expected reduction in household consumption in relation to increased water efficiency promotion and TUBs.

4 ENVIRONMENTAL IMPACTS

4.1 Environmental assessment

The options developed as part of the Drought Plan that would be implemented to ensure that we can provide an adequate supply of wholesome water to our customers with as little recourse as reasonably possible to Drought Orders or Drought Permits are:

- Drought publicity
- Increased leakage detection and repair activity
- Water use restrictions
- Implementation of ordinary Drought Orders
- Augmentation of the River Dee with water from Pen-y-Cae Reservoir

The only one of these options that requires construction work is the increased repair activity as a result of additional leakage detection. For this option it can be argued that the leaks identified would require fixing at some point in the future and by carrying out increased leakage detection is just bringing the fix activity forward and not creating additional minor construction work.

There are six designated sites (either SAC[10], SPA[11], Ramsar[12] or a combination) within or partially within our Supply Area. The only sites where the identified drought options pose a risk of adverse impacts are the River Dee and Bala Lake SAC, the Dee Estuary SAC/SPA/Ramsar and the Berwyn and South Clwyd Mountains SAC/SPA. The drought option which poses a risk is our intention to augment the River Dee with water abstracted from Pen-y-Cae Reservoir which is located within the Berwyn and South Clwyd Mountains.

It was identified that the River Dee and in turn the Dee estuary may be impacted through non-toxic contamination (changes in sedimentation, thermal regime, turbidity etc) as water will be transferred from Pen-y-Cae Reservoir into the river. However, this was deemed unlikely as under normal conditions additional water in Pen-y-Cae Reservoir (which is not abstracted for use) feeds the River Dee via Trefechan Brook. The risk of non-toxic contamination impacting abstractors downstream (United Utilities) of the augmentation site was also considered to be unlikely.

It was also identified that the Berwyn and South Clwyd Mountains could be impacted through the augmentation of the River Dee with water from Pen-y-Cae Reservoir which is located within the SAC/SPA. However, this was also deemed unlikely as we do not plan to abstract below the minimum operating volume or outside our abstraction licence.

From the HRA screening appraisal we have concluded that neither the River Dee and Bala Lake SAC nor the Berwyn and South Clwyd Mountains SAC/SPA would be adversely impacted by the augmentation of the River Dee with water abstracted from Pen-y-Cae Reservoir.

[10] Special Area of Conservation
[11] Special Protection Area
[12] Wetlands of international importance

The SEA screening appraisal has also concluded that the drought options identified within the Drought Plan will not lead to any significant environmental impacts on the current baseline environment within the Supply Area and no new developments are required which will necessitate an environmental impact assessment

4.2 Environmental data provision and monitoring plan

From the SEA screening appraisal we have concluded that none of our drought options are likely to cause any significant adverse environmental impacts.

The only possible situation that may require additional monitoring would be if a drought was to last longer than any of the historic scenarios that we have modelled. If this situation was to occur it may result in additional water being abstracted from our reservoirs. Utilisation of storage below the minimum operating volume could adversely impact the fish within the reservoirs. To mitigate the effects of abstracting below the minimum operating volume, additional monitoring would be undertaken; this would include, but not be limited to, the following measurements:

- Dissolved oxygen levels
- Alkalinity
- Turbidity
- pH levels

4.3 Mitigation measures

If necessary, aeration systems would be installed in the reservoirs to increase oxygen levels and minimise fish distress. Any netting and transfer of fish would be arranged during the drought as soon as environmental conditions were below an acceptable standard. Further investigations in relation to these options would be carried out prior to their implementation. The exact format and detail of the processes involved would be dependent on the circumstances and nature of the drought.

5 MANAGEMENT AND COMMUNICATIONS STRATEGY

5.1 Introduction

An essential part of the Drought Plan is the communications strategy that we intend to follow in the event of a drought. Effective communications can help to reduce customer demand, increase the available water for supply, reduce the impact on the environment and avoid confusion especially with respect to which areas are subject to water use restrictions.

This section explains the management structure that will be put in place prior to the start of a drought, the actions that will be taken in relation to the triggers identified in section 2 and the lessons that have been learnt from previous droughts.

5.2 Management structure

The management structure that will be put in place when it is recognised that a drought is likely to develop is shown in Figure 20.

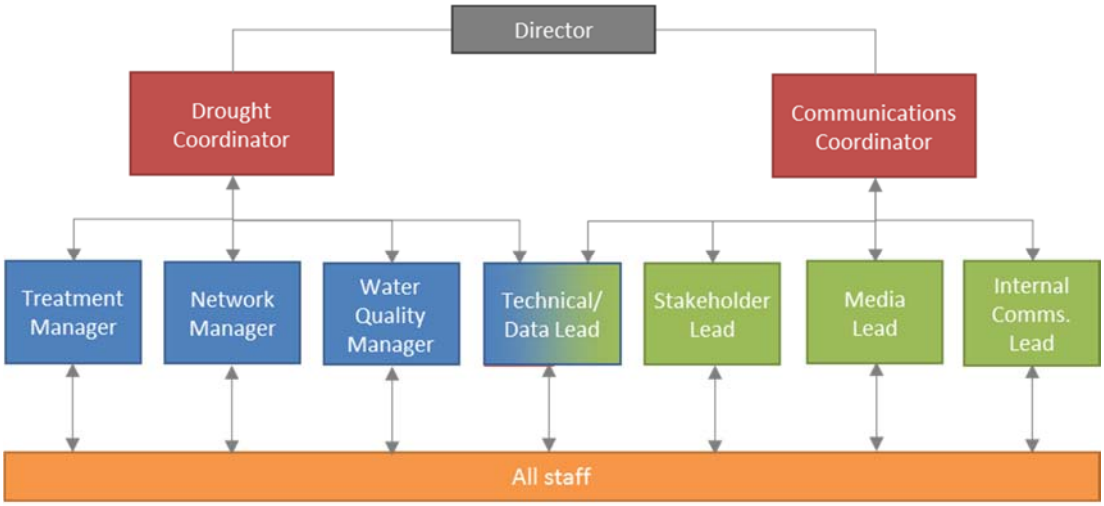


Figure 20: Drought management structure

Although the above structure shows discreet roles, Dee Valley Water is a small company with 170 employees, therefore it is likely that a single person will carry out a number of roles at any time.

The drought management team will convene on Trigger 3 prior to any drought action being carried out (increased leakage management activities or water efficiency promotion)

5.3 Roles and responsibilities

Table 7 details the roles and responsibilities of the drought management team.

Role	Responsibility
Drought coordinator	Overall responsibility for managing the response to the drought through the implementation of the Drought Plan and for monitoring the development of the drought.
Communications coordinator	Responsible for ensuring that communications are carried out using appropriate methods, with the relevant groups/stakeholders and at the appropriate times in relation to the triggers. Works closely with the stakeholder, media and internal communications leads. Coordinates communications between Dee Valley Water and key stakeholders which include Other Water Companies, Natural Resource Wales, Environment Agency and CCWater.
Treatment manager	Responsible for operating water resources and water treatment works.
Network manager	Responsible for the operation of the network including leakage control.
Water quality manager	Responsible for any water quality incidents that may arise.
Technical/Data Lead	Responsible for collecting and collating all the data associated with the drought and presenting it to the Drought Coordinator. The technical/data lead will also provide any data or assistance that is required by the communications team. Also responsible for technical communications with specific stakeholders such as the Dee Consultative Committee, Natural Resources Wales, Environment Agency and other water companies. Joint responsibility with the stakeholder lead for reviewing any representations that are made to Temporary Use Bans.
Stakeholder lead	Coordinates communications between Dee Valley Water and key stakeholders such as United Utilities and Dŵr Cymru communications teams, Natural Resources Wales' and the Environment Agency's communication teams and CCWater. Also coordinates communications between Dee Valley Water and other stakeholders such as domestic and non-domestic customers, public services, environmental groups, MPs and local authorities, community based institutions etc. Joint responsibility with the technical/data lead for reviewing any representations that are made to Temporary Use Bans. Joint responsibility with the media lead for communications with vulnerable/Water Sure customers.
Media lead	Responsible for all media communications such as newspaper adverts, leaflet drops and promotional stands. Joint responsibility with the stakeholder lead for communications with vulnerable/Water Sure customers.
Internal communications lead	Keeps all aspects of the business informed on current strategies and developments.

Table 7: Drought management team roles and responsibilities

5.4 Communications plan

5.4.1 Introduction

In section 3, we set out our drought triggers along with their corresponding drought actions. The drought actions detail the measures that we will take as the drought develops and the triggers are reached. For this communications plan we have taken the

same drought triggers and mapped them to a series of communication actions. This plan shows what communications we would anticipate being carried out with each trigger and whom (stakeholders) the communications will be with. It also indicates the subject of the communications message along with the frequency.

5.4.2 Stakeholders

Under normal conditions water resources are monitored using a Water Resources Report. This report is discussed on a monthly basis at the senior managers meeting. The report contains current and historic data in relation to levels of storage in our own reservoirs and in the Dee Storage System, rainfall, demand and leakage. As the storage in our own resources and the Dee Storage System move from normal to developing drought, we would increase the frequency of which the Water Resources Report will be discussed.

Customers

It is our responsibility to communicate effectively and efficiently with our customers. With whom we communicate and the messages and the timings of these communications are detailed in Table 8 and Table 9. We will work closely with CCWater, NRW, EA, other water companies and other bodies such as Waterwise and local representative groups to ensure clarity and consistency. Prior to any communications with customers we will review our plans with CCWater as they are the independent customer representative

In the event we have to introduce a TUB we will use a number of channels of communication such as newspapers, television and radio to inform our customers. Special consideration will be taken with regard to vulnerable/Water Sure customers as we recognise that these people may be the most difficult to engage with.

In the unlikely event that a Drought Order has to be implemented, we will endeavour to contact customers that are likely to be directly affected by these measures to minimise any adverse impacts.

We recognise that we may receive elevated levels of customer contacts with requests for more information, water saving devices or meter requests. We have additional facilities which we can use to deal with higher volumes of customer contacts and we will employ them if necessary.

Dee Consultative Committee

One of our principal means of coordinating our operational and communications actions will be through the Dee Consultative Committee which comprises NRW, EA, United Utilities, Dŵr Cymru, Dee Valley Water and Canals and Rivers Trust. An additional group that will convene in the event of a drought is the Wales Drought Liaison Group which comprises NRW, Dŵr Cymru and the Welsh Government. NRW and Dŵr Cymru are common to both these groups. The liaison process through these two groups will ensure consistency of messaging for customers and provide the opportunity for joint working with the potential for joint campaigns, advertising, newsletters, press releases and press conferences.

Other Stakeholders

We will liaise with other stakeholders during a drought by disseminating information using letters, telephone calls and emails. The stakeholders whom we will contact will be dependent on how the drought evolves. As demonstrated by our list of consultees, we have a comprehensive list of organisations and individuals whom we will consider contacting.

Table 8 provides a list of stakeholders whom we may communicate with prior to and during a drought along with the type of media we would use. Exactly whom would be contacted and when would depend on the development of the drought, geographical area impacted and the issues arising e.g. we would only contact the Drinking Water Inspectorate if there was a risk to water quality.

Group	Stakeholder	Media
Domestic and commercial customers	Consumer Council for Water	Letter, telephone, email, meetings
	Domestic customers	Press, radio and television advertisements, Dee Valley Water website, customer call centre, promotional events, leaflets, posters
	Vulnerable customers Water Sure customers	Press, radio and television advertisements, Dee Valley Water website, customer call centre, promotional events, leaflets, posters, letters
	Commercial customers	Dee Valley Water website, customer account managers (telephone), customer call centre, promotional events, leaflets, letters
	Citizens Advice Bureau	Letter, telephone, email
Regulators	Dee Consultative Committee	Telephone, email, meetings
	Drinking Water Inspectorate (DWI)	Letter, telephone, email
	Welsh government	Letter, telephone, email
	Defra	Letter, telephone, email
	Natural Resources Wales	Letter, telephone, email, meetings
	Environment Agency	Letter, telephone, email, meetings
	Ofwat	Letter, telephone, email, meetings
	Natural England	Letter, telephone, email
Environmental and other relevant interest organisations and groups	Local wildlife groups and campaign groups	Letter, telephone, email
	Friends of the Earth	Letter, telephone, email
	World Wildlife Fund for Nature (WWF)	Letter, telephone, email
	Royal Society for the Protection of Birds (RSPB)	Letter, telephone, email
	Campaign to Protect Rural England	Letter, telephone, email
	Angling Tust	Letter, telephone, email
	Local fisheries bodies and groups	Letter, telephone, email
	Waterwise	Letter, telephone, email
	WaterUK	Letter, telephone, email
	Resources Efficient Wales	Letter, telephone, email

Group	Stakeholder	Media
MPs and Local Authorities	Councils	Letter, telephone, email
	MPs	Letter, telephone, email
	MEPs	Letter, telephone, email
Representative bodies	e.g. confederation of British Industry, NFU, Chambers of Trade and Commerce, Countryside Landowners and Business Association, Horticultural Trade Association	Letter, telephone, email
Community based institutions and organisations	Parish councils	Letter, telephone, email
	Town councils	Letter, telephone, email
Public services	Fire service	Letter, telephone, email, meetings
	Health authorities	Letter, telephone, email, meetings
	Police service	Letter, telephone, email
Press and media	Newspapers	Press statements, interviews with senior managers Letter, telephone, email to arrange advertisements and other publications
	TV	Press statements, interviews with senior managers Letter, telephone, email to arrange advertisements and other publications
	Radio	Press statements, interviews with senior managers Letter, telephone, email to arrange advertisements and other publications
Water companies	United Utilities, Dŵr Cymru and Severn Trent.	Letter, telephone, email, meetings
Sports interest groups	Angling clubs	Letter, telephone, email
	Canoe clubs	Letter, telephone, email
	Sailing clubs	Letter, telephone, email
	Other clubs relying on the use of water for irrigation e.g. cricket clubs	Letter, telephone, email
Waterways and navigation	Canal and Rivers Trust	Letter, telephone, email
	Canal authorities	Letter, telephone, email
Dee Valley Water employees		Intranet, email, posters, team meetings, news letter

Table 8: Stakeholders who may be contacted during a drought

5.4.3 Triggers and communications

From the triggers that were identified in section 2.3, we have developed a series of corresponding communications that we will carry out to ensure we provide a clear and consistent message to all our stakeholders and customers at the appropriate time. Table 9 shows the communications along with the trigger, the person responsible for carrying out the communicaions and the intended audience. It is assumed that our communications with NRW, the EA and neighbouring water companies will mainly be carried out within the Dee Consultative Committee. However, it is recognised that additional contacts will have to be made with other aspects of these organisations.

Trigger/Status	Audience	Lead	Communication
Normal Conditions **Trigger 1**	Regulators and Stakeholders	Stakeholder lead Technical/data lead	Summary of the stocks in the Dee Storage System received from Natural Resources Wales. Summary of the stocks in our own sources provided to Natural Resources Wales. The above are provided regardless of the trigger, the interval will be dependent on the drought conditions.
Developing Drought **Trigger 2**	Customers	Stakeholder lead Media lead	No direct communications with customers required. Discuss with CCWater proposals for communications in relation to increased water efficiency promotion.
	Regulators and Stakeholders	Stakeholder lead Technical/data lead	Meeting of the Dee Consultative Committee to discuss the possibility of implementing Stage 1 restrictions.
Drought **Trigger 3**	Customers	Stakeholder lead Media lead	Increase water efficiency promotion to customers as per discussions with CCWater; promotion maybe targeted at specific areas or have specific messages depending on circumstances. Discuss with CCWater proposals for communications in relation to the implementation of voluntary use restrictions and Temporary Use Bans.
	Internal	Internal comms. lead	Increase leakage control measures. Internal staff made aware of the drought situation, the increased water efficiency promotion to customers and increased leakage control.
	Regulators and Stakeholders	Stakeholder lead Technical/data lead	Implementation of the Stage 1 restrictions. Meeting of the Dee Consultative Committee to discuss the possibility of implementing Stage 2 restrictions. Contact WaterWise, WaterUK and CCWater, ensure a joined up strategy. Contact other stakeholders and inform them of the drought situation.
Severe Drought **Trigger 4**	Customers	Stakeholder lead Media lead	Promote voluntary restrictions as per discussions with CCWater. Publish and promote intent to impose restrictions through a Temporary Use Ban on our website and in local newspapers. Communications will be as per discussions with CCWater. Indicate the timescales of when the Temporary Use Ban will come into place (14-21 days). Send an information pack to vulnerable/Water Sure customers via post. Included in the pack will be the notice for the Temporary Use Ban, a list of statutory and discretionary universal exceptions and details of how to apply for a discretionary concessional exception. Change focus of the home page of the company website indicating the above restrictions. Discuss with CCWater proposals for communications in relation to serving notice on customers whom will be subject to a Drought Order.
	Internal	Internal comms. lead	Internal staff kept up to date on a weekly basis of the drought situation, the promotional activity towards customers and the imminent implementation of a Temporary Use Ban.

Trigger/Status	Audience	Lead	Communication
	Regulators and Stakeholders	Stakeholder lead Technical/data lead	Implementation of the Stage 2 restrictions. Meeting of the Dee Consultative Committee to discuss the possibility of implementing Stage 3 restrictions and applications for a Drought Order. Regular meetings of the Dee Consultative Committee to discuss the drought situation. Contact Welsh Government and/or Secretary of State to discuss the possibility of implementing a drought order. Continued contact with WaterWise, WaterUK and CCWater. In the event that other water utilities are a suffering similar drought, WaterUK will report on the national situation and present it in a consistent manner in the national media. Escalate drought message with other stakeholders and inform them of the drought situation.
Severe Drought **Trigger 5**	Customers	Stakeholder lead Media lead	Publish and enforce the Temporary Use Ban as per discussions with CCWater. Increase emphasis/urgency in relation to water efficiency and minimising the use of water. Convey the seriousness of the situation. Ensure messages to customers are clear and concise. Avoid promoting multiple messages such as Temporary Use Ban and increased water efficiency, focus on the highest priority. Serve notice on customers whom will be subject to a Drought Order. Endeavour to contact those customers who may be directly affected by a Drought Order. Publish notice for public inspection. Implement Drought Order assuming the Welsh Government and/or the Secretary of State approve application.
	Internal	Internal comms. lead	Internal staff kept up to date on a weekly basis of the drought situation, the promotional activity towards customers and the imminent implementation of a Drought Order. Ensure all staff know when the Temporary Use Ban is implemented and what this means. Ensure all staff know when the Drought Order is implemented and what this means. Ensure all staff know the difference between the Temporary Use Ban and the Drought Order and that both will run in parallel.
	Regulators and Stakeholders	Stakeholder lead Technical/data lead	Submit Drought Order application to the Welsh Government and/or the Secretary of State. Regular meetings of the Dee Consultative Committee to discuss the drought situation. Continued contact WaterWise, WaterUK and CCWater. In the event that other water utilities are suffering similar drought WaterUK will report on the national situation and present it in a consistent manner in the national media. Inform other stakeholders of the Temporary Use Ban and Drought Order.
Post Drought Communications	Customers	Stakeholder lead Media lead	Clear publications will be made to inform customers of the removal of restrictions, distinctions will be made between Temporary Use Ban and Drought Order.
	Internal	Internal comms. lead	Internal staff kept up to date on a weekly basis until all restrictions are removed. A clear distinction will be made between Temporary Use Ban and Drought Order.

Trigger/Status	Audience	Lead	Communication
Crossing Trigger 2 in an upwards direction	Regulators and Stakeholders	Stakeholder lead Technical/data lead	Regular meetings of the Dee Consultative Committee until all restrictions and supply side measures are removed. Inform all stakeholders previously contacted of the removal of restrictions. A clear distinction will be made between Temporary Use Ban and Drought Order.

Table 9: Triggers and associated communications

5.5 Lessons learned from previous droughts

The drought of 2011/12 affected much of the UK but particularly the east, south-east and south of England. During this drought a number of water companies introduced TUBs which was for the first time following the enactment of the Flood and Water Management Act of 2010. Implementing TUBs for the first time highlighted some of the difficulties that were encountered. Differences in the interpretation and use of TUBs, combined by the varying geographical coverage and intensity of the drought made it difficult to provide clear and consistent messaging/communications.

As part of the experience gained from the 2011/12 drought, the UKWIR code of Practice and Guidance on Water Use Restrictions has been revised and a series of actions developed to incorporate the lessons learnt:

- Companies, regulators and government to work together
- Coordinate communications
- Adopt a common phased approach, considering socio-economic factors
- Adopt a common approach to exceptions

Prior to producing this Plan we reviewed the above actions and have included them in our management actions. We recognise that a joined up strategy for managing a drought will provide the best response for our customers, ourselves and the environment and we have endeavoured to incorporate this throughout the plan.

6 POST DROUGHT ACTIONS

We define the end of a drought as being when the water resources have returned to their normal level of risk. Indicators we would use to signify a drought was ending are:

- A period of rainfall at or above the average for the time of the year
- Flows within the River Dee are at acceptable levels for the time of year and above the required trigger point
- Storage within our reservoirs is at or above the reservoir control curves

The above indicators will be reviewed in combination by the drought management team and through the Dee Consultative Committee to ensure that all our water resources are no longer at risk.

A post-drought review will be carried out by the Drought Management Team shortly after the drought has end. A preliminary meeting will be held to determine the initial understanding of the effectiveness of the options that were implemented. This will provide early feedback which may be required where there is a risk that drought conditions could be re-entered within the near future. It will also provide a better understanding of exactly how we are going to measure the effectiveness of the plan and assist with the preparation of a 'lessons learnt' report that will be used to modify and improve a future Drought Plan. Examples of how the effectiveness of implemented drought management actions may be measured both quantitatively and qualitatively include:

- A comparison of the actual environmental impacts of the drought and those anticipated
- Effectiveness of the environmental monitoring
- Effectiveness of any mitigation measures that were implemented to minimise any environmental impact
- The effectiveness of the different methods of communication employed to inform customers and other stakeholders such as:
    - Change in the number of website hits that were received as the severity of the drought increased
    - The number of adverts (TV, radio or newspaper) that were issued and where they were issued
    - Number of requests for more information that were received
    - The additional number of water saving devices that were requested
    - The additional number of water saving devices that were actively distributed
    - The number of text messages that were sent out
    - Discussions with CCWater and other stakeholders to gain an understanding of how they perceived the our communication strategy worked
- Identification of addition infrastructure investment required
- Success of the supply side measures in particular the augmentation of the River Dee with water from Pen-y-Cae Reservoir, this may include:
    - Measurements of any losses that were incurred between Pen-y-Cae Reservoir and the River Dee via Trefechan Brook
    - Ease with which any supply side measures were implemented

    - Discussions with the EA and NRW to understand how the implementation of any supply side measure was from their perspective
- Success of demand side measures in particular the implementation of TUBs and Drought Orders, this may include:
    - Reduction in leakage
    - Addition resources used to achieve any reduction in leakage
    - Reduction in distribution input
    - Reduction in demand from households and non-households further subdivided into measured and unmeasured customers
    - Reductions in demand for our domestic consumption monitor
- Identification of any aspects of the Water Resources Management Plan that may require updating
- Review of neighbouring water companies' experiences and what lessons they may have learnt

Following an initial draft of the 'lessons learnt' report we then plan to discuss our findings with our main stakeholders which will include: NRW, EA, United Utilities, Dŵr Cymru (possibly through the Dee Consultative Committee) and CCwater. We may also consider expanding our discussions to other stakeholders depending on the drought management actions that were taken.

7 COMPENSATION

We are required under Condition Q of our licence conditions to make a payment to customers where essential household water supplies are interrupted as a result of restrictions authorised by emergency drought orders. This includes water supplies for purposes such as cooking, washing, drinking; and flushing the toilet.

It does not include uses such as watering the garden, car washing or filling a pool. Although this measure is not part of the Guaranteed Standard Scheme (GSS), it does mean that customers have access to compensation if essential supplies are not maintained.

We will pay household customers £15 for each day (or part day) that the water supply is interrupted or cut off. The maximum compensation entitlement is equal to the average household bill for the previous year.

We will pay business customers, in the same circumstances, £55 a day (or part day). The maximum amount payable is the water charge paid by the customer in the previous year. If, however, the customer has not paid a full year's water charge, or a third party is responsible for the water charges, the maximum is set at £500.

There is no entitlement to a payment under Condition Q if the circumstances are so exceptional that it was viewed unreasonable to expect the company to avoid the interruption.

8 FUTURE WORK

8.1 Scenario modelling

As part of the continued development of our planning process we are assessing the potential benefit of creating a computer model of our resources so that we can carry out more detailed scenario testing. If we were to do this, we would then look to combine the model of our resources with that of NRW's for the Dee Storage System to give a comprehensive overview of the entire resource system.

A particular benefit to producing a computer model is that we could model a more diverse range of scenarios than we have done now and not only look at scenarios that are based on historic data but look at worst case scenarios that have not occurred to date.

We would also look to use the model to assist us in finalising how we will use water from Pen-y-Cae Reservoir to augment the River Dee. The details of this process would then be documented in the Dee General Directions.

8.2 Trefechan Brook stream bed losses

As mentioned in section 3.4, we are anticipating that there may be some losses to the stream bed of Trefechan Brook if we were to use it to augment the River Dee with water from our Pen-y-Cae Reservoir. To try and further understand the possible magnitude of these losses, we are considering a test to monitor the discharge from Pen-y-Cae Reservoir and the corresponding inflow into the River Dee. Before doing this careful consideration must be made as to the prevailing conditions at the time of the test. Carrying out the test in winter, when the ground is water logged, would not provide accurate results, however carrying out the test during dry conditions may pose an unnecessary risk.

GLOSSARY OF TERMS

Term	Definition
Abstraction	Removal of water from a source of supply (surface or groundwater).
Abstraction licence	The authorisation granted by the Environment Agency or Natural Resources Wales to allow the removal of water.
AONB	Area of outstanding natural beauty.
Augmentations	The support of a river by an additional supply.
Catchment	The area from which precipitation and ground water will collect and contribute to the flow of a specific river.
Catchment Abstraction Management Strategy	A strategy produced by the Environment Agency/Natural Resources Wales for managing water resources at a local level.
Compensation flow	Water released from reservoirs in order to maintain a certain flow or level further downstream of the river.
Consumer Council for Water	Organisation representing the interests of water customers
Dee Consultative Committee	A committee which comprises Natural Resources Wales, United Utilities, Dŵr Cymru, Dee Valley Water and British Waterways. The committee supports Natural Resources Wales in the establishment and the implementation operational control rules known as the Dee General Directions.
Dee Drought Directions	Specifies the principles and detail under which the prescribed flows, and abstractions must be reduced in a drought more severe than the design drought.
Dee General Directions	A set of principles which detail the regulation of the River Dee, using Llyn Tegid, Llyn Celyn and Llyn Brenig Reservoirs.
Dee Normal Directions	Specifies the principles and detail under which the prescribed flows are maintained in the River Dee under normal operations.
DEFRA	Department of the Environment, Food and Rural Affairs
Demand	The amount of water required for use, includes customer demand and leakage.
Deployable output	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 capabilities.
Dissolved Oxygen Levels	A relative measure of the amount of oxygen that is dissolved within water.
Drought	A general term covering prolonged periods of below average rainfall resulting in low river flows and/or low recharge to groundwater, imposing significant strain on water resources and potentially the environment.
Drought Order	A means where Water Companies and/or Environment Agency /Natural Resources Wales apply to Welsh Ministers or the Secretary of State for the Environment for the imposition of restriction in the uses of water or to take water from a source.
Drought Permit	Issued by the Environment Agency/Natural Resources Wales in order to allow a Water Company to abstract water outside of the normal terms of an Abstraction Licence during a drought period.
Drought Trigger	A specific event/incident which triggers a drought action to occur.
DWI	The Drinking Water Inspectorate - Organisation that regulates drinking water quality in England and Wales.
EA	Environment Agency
Emergency Drought Order	A means by which a Water Company can restrict the supply of water to its customers through the imposition of rota cuts and/or the introduction of standpipes to deal with the very remote possibility of an extreme drought.
Gauging station	A site where the flow of a river is measured.
Groundwater	Water that is contained in underground rocks.
Habitat	Place in which a species or community of species lives, with characteristic plants and animals.
HRA	Habitats Regulations Assessment - Process for identifying the implications of the drought plan options for European designated sites (SAC, SPA and RAMSAR).

Term	Definition
Hydrology	The study of the Earth's water, in particular of water under and on the ground before it reaches the ocean and before it evaporates.
Leakage	Water lost from a supply network between the point of supply and the point of demand.
Level of Service	Reliability of water supply to a Water Company's customers expressed as s frequency of the imposition of water use restrictions.
Ml/d	Mega litres per day (Mega - million)
NRW	Natural Resources Wales
Ofwat	Office of Water Services (the economic regulator of the water industry in England and Wales).
pH	pH is a measure of the acidity of an aqueous solution . Pure water is neutral, with a pH close to 7 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 of Wetlands of International Importance especially as Waterfowl Habitat" it is an intergovernmental treaty signed in Ramsar, Iran in 1971.
Regulated river	A river where the flow is augmented through the addition of water from another source.
Reservoir control curves	A graph showing managed reservoir levels which are expected to occur during normal weather conditions and levels which act as triggers when levels fall during dry weather, to warn of possible drought.
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 Environment Agency/Natural Resources Wales 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 Environment Agency/Natural Resources Wales to determine if they need to be altered. The 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.
SAC	Special Area of Conservation - Designated under the EU Habitats Directive. Together with SPAs these for the Natura 2000 network of protected sites.
SoS	The Secretary of State for Defra (Department for Environment, Food and Rural Affairs).
SPA	Special Protection Area - Designated under the EU Directive on the conservation of wild birds. Together with SACs these for the Natura 2000 network of protected sites.
SSSI	Site of Special Scientific Interest - Designated under the Countryside and Rights of Way (CRoW) Act 2000.
STW	Severn Trent Water PLC
Telemetry	A means of collecting information by unmanned monitoring stations using a computer that is connected to the public telephone system.
Temporary Use Ban (TUB)	A means by which a water company can restrict water use as provided by Section 36 of the Flood and Water Management Act 2010.
Turbidity	A measure of the cloudiness/haziness of water.
UKWIR	United Kingdom Water Industry Research Limited - Organisation jointly funded by all UK water and waste water service suppliers.
UU	United Utilities Water PLC
Voluntary Water Use Restrictions	Prior to the introduction of Temporary Use Bans, voluntary water use restrictions would be implemented. As the name suggests customers are asked to voluntarily reduce their water consumptions.

APPENDIX A – LIST OF CONSULTEES

No.	Drought Plan Consultee List
1	Ofwat
2	Secretary of State for the Environment, Food and Rural Affairs
3	Natural Resources Wales
4	Environment Agency
5	Welsh Government
6	Natural England
7	Severn Trent Water
8	United Utilities
9	Dŵr Cymru Welsh Water
10	North Wales Wildlife Trust
11	RSPB Wales
12	Cheshire Wildlife Trust
13	Friends of the Earth Cymru
14	Campaign for the Protection of Rural Wales
15	Friends of the Meadows
16	English Heritage
17	Alyn & Deeside Assembly Member
18	Alyn & Deeside Member of Parliament
19	City of Chester Member of Parliament
20	Clwyd South Assembly Member
21	Clwyd South Member of Parliament
22	Delyn Assembly Member
23	Delyn Member of Parliament
24	North Wales Region Assembly Member
25	North Wales Region Assembly Member
26	Wrexham Assembly Member
27	Wrexham Member of Parliament
28	Flinthsire County Council
29	Denbighshire County Council
30	Cheshire West & Chester Council
31	Wrexham County Borough Council
32	Horticultural Trade Association
33	Cheshire & Warrington Local Enterprise Partnership
34	NFU North West
35	Canal and Rivers Trust
36	Citizens Advice Bureau - Wrexham
37	Citizens Advice Bureau - Chester
38	Consumer Council for Water Wales
39	Customer Challenge Panel
40	Abenbury Community Council
41	Acton Community Council
42	Aldford Saighton and District Parish Council
43	Bagillt Community Council
44	Bangor Isycoed Community Council
45	Broughton and Bretton Community Council
46	Broughton Community Council
47	Brymbo Community Council
48	Caia Park Community Council
49	Cefn Community Council
50	Ceiriog Uchaf Community Council
51	Chirk Town Council
52	Christleton Parish Council
53	Churton Parish Council
54	Coedpoeth Community Council

No.	Drought Plan Consultee List
55	Dodleston and District Parish Council
56	Eaton, Eccleston and Claverton Parish Council
57	Erbistock Community Council
58	Esclusham Community Council
59	Farndon Parish Council
60	Glyn-Traian Community Council
61	Great Boughton Parish Council
62	Gresford Community Council
63	Guilden Sutton Parish Council
64	Gwersyllt Community Council
65	Hanmer Community Council
66	Hawarden Community Council
67	Higher Kinnerton Community Council
68	Holt Community Council
69	Hope Community Council
70	Isycoed Community Council
71	Leeswood Community Council
72	Llanasa Community Council
73	Llandegla Community Council
74	Llanfynydd Community Council
75	Llangollen Community Council
76	Llangollen Rural Community Council
77	Llansantffraid Glyn Ceiriog Community Council
78	Llantysilio Community Council
79	Llay Community Council
80	Maelor South Community Council
81	Marchwiel Community Council
82	Minera Community Council
83	Mollington Parish Council
84	Nannerch Community Council
85	Offa Community Council
86	Overton Community Council
87	Pen-y-Cae Community Council
88	Penyffordd Community Council
89	Poulton and Pulford Parish Council
90	Rhosddu Community Council
91	Rhosllanerchrugog Community Council
92	Rossett Community Council
93	Rowton Parish Council
94	Ruabon Community Council
95	Saltney Town Council
96	Sealand Community Council
97	Treuddyn Community Council
98	Upton-by-Chester and District Parish Council
99	Willington - Worthenbury Community Council
100	Chester Library
101	Blacon Library
102	Lache Library
103	Upton Library
104	Hoole Library
105	Great Boughton Library
106	Bishops High Library
107	Tarvin Library
108	Tattenhall Library

No.	Drought Plan Consultee List
109	Malpas Library
110	Brynteg Library
111	Cefn Mawr Library
112	Chirk Library
113	Coedpoeth Library
114	Gwersyllt Library
115	Llay Park Resource Centre
116	Overton Library
117	Rhos Library
118	Ruabon Library
119	Wrexham Library

APPENDIX B – DEE STORAGE SYSTEM STOCK SUMMARIES

Eich cyf/Your ref: Dee Complex Reservoir Stocks

Ein cyf/Our ref: 3E/WR/OPS/5

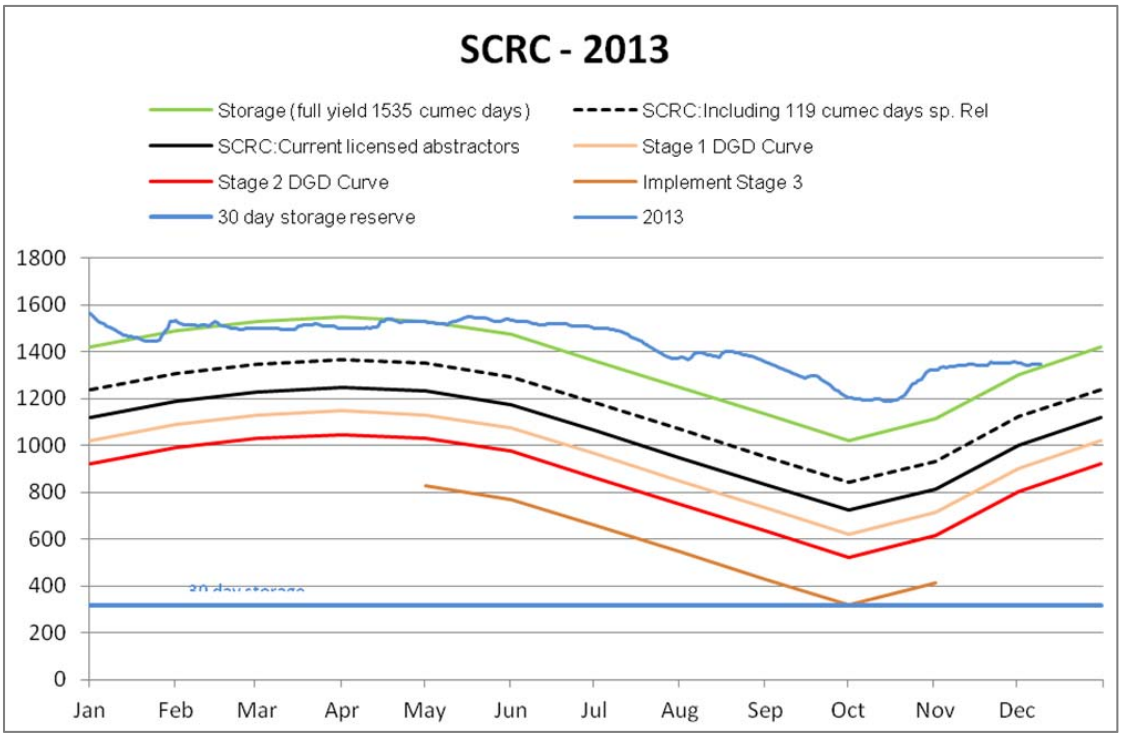
From: FWDO-Dee@cyfoethnaturiolcymru.gov.uk

Report Date: Monday 9th December 2013

Note: - No Regulation requirement.

Abstractors may abstract within the constraints of existing licences.
See Dee General Directions Appendix 3.4.1 - Abstractors should also ensure confirmation of any change to abstraction is notified to NRW as soon as possible.

Celyn	Brenig	Total	Total Full System	% Full	% Change
637.2	711.0	1348.21	1536 *	87.77	-0.11



Please note: It is important and the responsibility of all Water Companies to notify Natural Resources Wales staff, of daily forecasted abstraction (contact details at the top of this report).

During dry weather conditions, there is a minimum **48 hours** notice required for any increase or decrease of forecasted abstraction. It is assumed that all abstraction is at a continuous rate.
N.B. Adjustment to Total Full System 1536 cumec days to comply with revised Dee General Directions.
All figures in cumec days - Llyn Tegid stock not included.

APPENDIX C – SCENARIO MODELLING

Historic drought scenarios

The data in the table below is a summary of the data provided by NRW from their Aquator model of the Dee Storage System. The coloured bands in the table below indicate the periods that have been used for the drought scenarios modelling.

Date	Restriction type	Stage 1 Restrictions No. Days	Stage 2 Restrictions No. Days
09/07/1929	Start of Stage 1 restrictions	33	
11/08/1929	End of restrictions		
20/08/1933	Start of Stage 1 restrictions	20	
09/09/1933	Start of Stage 2 restrictions		272
08/06/1934	End of Stage 2 start of Stage 1 restrictions	8	
16/06/1934	Start of Stage 2 restrictions		99
23/09/1934	End of Stage 2 start of Stage 1 restrictions	31	
24/10/1934	End of restrictions		
19/11/1934	Start of Stage 1 restrictions	31	
20/12/1934	End of restrictions		
10/10/1937	Start of Stage 1 restrictions	9	
19/10/1937	Start of Stage 2 restrictions		99
26/01/1938	End of Stage 2 start of Stage 1 restrictions	37	
04/03/1938	End of restrictions		
20/04/1938	Start of Stage 1 restrictions	23	
13/05/1938	Start of Stage 2 restrictions		21
03/06/1938	End of Stage 2 start of Stage 1 restrictions	7	
10/06/1938	End of restrictions		
03/11/1947	Start of Stage 1 restrictions	21	
24/11/1947	End of restrictions		
11/10/1949	Start of Stage 1 restrictions	14	
25/10/1949	End of restrictions		
20/11/1955	Start of Stage 1 restrictions	40	
30/12/1955	End of restrictions		
14/10/1959	Start of Stage 1 restrictions	16	
30/10/1959	End of restrictions		
06/11/1959	Start of Stage 1 restrictions	31	
07/12/1959	End of restrictions		
01/07/1974	Start of Stage 1 restrictions	4	
05/07/1974	End of restrictions		
06/08/1976	Start of Stage 1 restrictions	17	
23/08/1976	Start of Stage 2 restrictions		34
26/09/1976	End of Stage 2 start of Stage 1 restrictions	19	
15/10/1976	End of restrictions		
21/11/1976	Start of Stage 1 restrictions	67	
27/01/1977	End of restrictions		
07/07/1984	Start of Stage 1 restrictions	21	
28/07/1984	Start of Stage 2 restrictions		54
20/09/1984	End of Stage 2 start of Stage 1 restrictions	10	

Date	Restriction type	Stage 1 Restrictions No. Days	Stage 2 Restrictions No. Days
30/09/1984	End of restrictions		
15/09/1989	Start of Stage 1 restrictions	3	
18/09/1989	End of restrictions		
03/10/1989	Start of Stage 1 restrictions	15	
18/10/1989	Start of Stage 2 restrictions		4
22/10/1989	End of Stage 2 start of Stage 1 restrictions	45	
06/12/1989	Start of Stage 2 restrictions		13
19/12/1989	End of Stage 2 start of Stage 1 restrictions	22	
10/01/1990	End of restrictions		
12/09/1990	Start of Stage 1 restrictions	19	
01/10/1990	End of restrictions		
03/10/1990	Start of Stage 1 restrictions	1	
04/10/1990	End of restrictions		
20/10/1995	Start of Stage 1 restrictions	18	
07/11/1995	Start of Stage 2 restrictions		104
19/02/1996	End of Stage 2 start of Stage 1 restrictions	41	
31/03/1996	End of restrictions		
19/09/1996	Start of Stage 1 restrictions	40	
29/10/1996	End of restrictions		
26/01/1997	Start of Stage 1 restrictions	18	
13/02/1997	End of restrictions		

Ty Mawr / Cae Llwyd Reservoir Complex Worst Case Drought Scenario

Runoff data for drought scenarios

Month	Daily Run Off Figures									
	Drought 1		Drought 2		Drought 3		Drought 4		Drought 5	
	20/08/1933	24/10/1934	10/10/1937	10/06/1938	06/08/1976	27/01/1977	07/07/1984	30/09/1984	20/10/1995	31/03/1996
January	8.01	8.35	18.48	17.83	13.54	13.02	15.38	7.39	24.61	10.29
February	11.91	0.73	28.31	7	11.47	36.21	16.5	5.86	24.21	16.54
March	7.74	8.37	10.33	2.08	8.01	14.37	4.3	6.6	11.99	9.26
April	1.51	10.26	15.19	-1.49	3.29	6.71	0.6	10.17	3.01	11.9
May	1.63	4.28	5.78	2.99	1.13	6.25	-0.18	5.99	4.75	7.26
June	1.74	1.1	2.05	4.94	0.48	9.78	0.71	6.3	0.43	0.38
July	-0.72	0.26	0.89	6.21	0.56	1.16	-0.06	1.42	-1.07	1.05
August	-1.81	3.94	0.17	6.6	-0.07	0.63	0.25	4.72	-0.96	0.61
September	-2.74	0.73	-0.22	1.52	11.49	0.89	1.24	-0.41	-0.42	-0.55
October	8.28	8.42	7.33	11.49	28.26	1.36	8.83	1.87	-0.5	1.07
November	4.4	4.72	6.67	16.24	6.57	19.76	22.4	17.23	1.66	12.97
December	2.6	21.19	10.25	16.88	13.88	18.64	8.77	13.39	6.12	9.94

Flow and volume details

Compensation Flows to Nant-y-Grogfrin and Pentre Bychan Brook	0.22 Ml/d
Ty Mawr Volume (Full)	606.45 Ml
Cae Llwyd Volume (Full)	175.50 Ml
Total Storage Volume (Full)	781.96 Ml
Minimum Operating Volume	88.28 Ml
Minimum Operating Volume 17th October if reservoir is to refill by March	319.00 Ml

Refill sequence

Compensation Flow – The flow that has to be released in to the Nant-y-Grogfirn and Pentre Bychan Brook according to the abstraction licence.
Demand – Min. – The maximum daily volume that can be abstracted from the reservoir complex which does not result in the volume of water stored dropping below the minimum operating volume.
Demand – Refill – The maximum daily volume that can be abstracted from the reservoir complex which does not result in the volume of water stored dropping below the minimum operating volume on the 17th October, this minimum operating volume is such that the reservoir complex should refill by the following March in time for the following summer.
Outflow Demand Min. – The total outflow from the reservoir complex under the minimum demand scenario (Compensation Flow + Demand Min)
Outflow Demand Refill – The total outflow from the reservoir complex under the refill scenario (Compensation Flow + Demand Refill)
Inflow – Inflow of water into the reservoir complex based on the daily runoff sequence.
Net Monthly Flow Demand Min. – The sum of the inflow and the outflow for the minimum scenario (Inflow + Outflow Demand Min)*No. days in the month.
Net Monthly Flow Demand Refill – The sum of the inflow and the outflow for the refill scenario (Inflow + Outflow Demand Refill)*No. days in the month.
Total Storage Demand Min. – Total storage in the reservoir complex when subject to a minimum daily demand scenario.
Total Storage Demand Refill. – Total storage in the reservoir complex when subject to a refill daily demand scenario.

For Ty Mawr/Cae Llwyd, the critical drought was 1995/96 when the lowest volume could be abstracted from the reservoirs.

Year	Month	Compensation Flow (Ml/d)	Demand – Min. (Ml/d)	Demand – Refill (Ml/d)	Outflow Demand Min. (Ml/d)	Outflow Demand Refill (Ml/d)	Inflow (Ml/d)	Net Monthly Flow Demand Min. (Ml)	Net Monthly Flow Demand Refill (Ml)	Total Storage Demand Min. (Ml)	Total Storage Demand Refill (Ml)
1995	Apr	0.22	3.41	2.15	3.63	2.37	3.01	-18.60	19.20	763.36	781.96
1995	May	0.22	3.41	2.15	3.63	2.37	4.75	34.72	73.78	781.96	781.96
1995	Jun	0.22	3.41	2.15	3.63	2.37	0.43	-96.00	-58.20	685.96	723.76
1995	Jul	0.22	3.41	2.15	3.63	2.37	-1.07	-145.70	-106.64	540.26	617.12
1995	Aug	0.22	3.41	2.15	3.63	2.37	-0.96	-142.29	-103.23	397.97	513.89
1995	Sep	0.22	3.41	2.15	3.63	2.37	-0.42	-121.50	-83.70	276.47	430.19
1995	Oct	0.22	3.41	2.15	3.63	2.37	-0.50	-128.03	-88.97	148.44	341.22
1995	Nov	0.22	3.41	2.15	3.63	2.37	1.66	-59.10	-21.30	89.34	319.92
1995	Dec	0.22	3.41	2.15	3.63	2.37	6.12	77.19	116.25	166.53	436.17
1996	Jan	0.22	3.41	2.15	3.63	2.37	10.29	206.46	245.52	372.99	681.69
1996	Feb	0.22	3.41	2.15	3.63	2.37	16.54	374.39	410.93	747.38	781.96
1996	Mar	0.22	3.41	2.15	3.63	2.37	9.26	174.53	213.59	781.96	781.96
1996	Apr	0.22	3.41	2.15	3.63	2.37	11.90	248.10	285.90	781.96	781.96
1996	May	0.22	3.41	2.15	3.63	2.37	7.26	112.53	151.59	781.96	781.96
1996	Jun	0.22	3.41	2.15	3.63	2.37	0.38	-97.50	-59.70	684.46	722.26
1996	Jul	0.22	3.41	2.15	3.63	2.37	1.05	-79.98	-40.92	604.48	681.34
1996	Aug	0.22	3.41	2.15	3.63	2.37	0.61	-93.62	-54.56	510.86	626.78
1996	Sep	0.22	3.41	2.15	3.63	2.37	-0.55	-125.40	-87.60	385.46	539.18
1996	Oct	0.22	3.41	2.15	3.63	2.37	1.07	-79.36	-40.30	306.10	498.88

Pendinas / Llyn Cyfynwy Reservoir Complex Worst Case Drought Scenario

Runoff data for drought scenarios

Month	Daily Run Off Figures									
	Drought 1		Drought 2		Drought 3		Drought 4		Drought 5	
	20/08/1933	24/10/1934	10/10/1937	10/06/1938	06/08/1976	27/01/1977	07/07/1984	30/09/1984	20/10/1995	31/03/1996
January	3.72	3.79	6.62	6.31	4.87	6.17	6.71	3.50	8.29	4.38
February	3.66	1.43	7.20	3.11	3.06	7.35	3.85	1.86	6.74	3.81
March	3.56	2.82	4.78	1.42	2.98	5.13	2.75	2.96	4.35	3.88
April	0.91	3.45	3.21	0.12	1.20	1.96	0.51	3.02	1.14	2.66
May	0.49	1.58	2.36	1.28	1.22	1.44	0.44	2.34	1.59	2.29
June	0.25	-0.56	-0.40	1.63	-0.77	2.58	1.00	1.42	-0.60	0.14
July	-0.28	-0.06	0.08	2.09	-0.48	0.56	-0.10	0.37	-0.70	-0.33
August	-0.70	1.62	0.26	2.35	-0.76	-0.27	1.04	1.39	-0.63	1.48
September	-0.64	0.72	0.13	0.56	5.99	0.17	2.65	0.43	1.37	0.40
October	2.91	2.65	2.81	3.26	8.50	1.96	6.50	1.06	2.28	2.73
November	3.27	3.19	3.49	5.90	3.71	6.14	6.59	5.42	2.68	5.99
December	2.40	6.42	4.29	6.23	4.23	6.40	5.86	6.13	4.50	4.58

Flow and volume details

Compensation Flows to Aber Sychnant	0.14 Ml/d
Pendinas Volume (Full)	282.79 Ml
Llyn Cyfynwy Volume (Full)	295.52 Ml
Total Storage Volume (Full)	578.31 Ml
Minimum Operating Volume	195.22 Ml
Minimum Operating Volume 17th October if reservoir is to refill by March	315.22 Ml

Refill sequence

For Pendinas / Llyn Cyfynwy, the critical drought was 1933/34 when the lowest volume could be abstracted from the reservoirs.

Year	Month	Compensation Flow (Ml/d)	Demand – Min. (Ml/d)	Demand – Refill (Ml/d)	Outflow Demand Min. (Ml/d)	Outflow Demand Refill (Ml/d)	Inflow (Ml/d)	Net Monthly Flow Demand Min. (Ml)	Net Monthly Flow Demand Refill (Ml)	Total Storage Demand Min. (Ml)	Total Storage Demand Refill (Ml)
1933	Apr	0.14	1.50	0.84	1.64	0.98	0.91	-32.55	-15.75	545.76	562.56
1933	May	0.14	1.50	0.84	1.64	0.98	0.49	-46.61	-29.25	499.14	533.30
1933	Jun	0.14	1.50	0.84	1.64	0.98	0.25	-52.52	-35.72	446.63	497.59
1933	Jul	0.14	1.50	0.84	1.64	0.98	-0.28	-70.62	-53.26	376.00	444.32
1933	Aug	0.14	1.50	0.84	1.64	0.98	-0.70	-83.51	-66.15	292.49	378.17
1933	Sep	0.14	1.50	0.84	1.64	0.98	-0.64	-79.07	-62.27	213.42	315.90
1933	Oct	0.14	1.50	0.84	1.64	0.98	2.91	28.24	45.60	241.67	361.51
1933	Nov	0.14	1.50	0.84	1.64	0.98	3.27	38.20	55.00	279.87	416.51
1933	Dec	0.14	1.50	0.84	1.64	0.98	2.40	12.51	29.87	292.38	446.38
1934	Jan	0.14	1.50	0.84	1.64	0.98	3.79	55.68	73.04	348.07	519.43
1934	Feb	0.14	1.50	0.84	1.64	0.98	1.43	-15.94	-0.26	332.12	519.16
1934	Mar	0.14	1.50	0.84	1.64	0.98	2.82	25.64	43.00	357.77	562.17
1934	Apr	0.14	1.50	0.84	1.64	0.98	3.45	43.61	60.41	401.37	578.31
1934	May	0.14	1.50	0.84	1.64	0.98	1.58	-12.86	4.50	388.52	578.31
1934	Jun	0.14	1.50	0.84	1.64	0.98	-0.56	-76.58	-59.78	311.93	518.53
1934	Jul	0.14	1.50	0.84	1.64	0.98	-0.06	-63.77	-46.41	248.16	472.12
1934	Aug	0.14	1.50	0.84	1.64	0.98	1.62	-11.65	5.71	236.51	477.82
1934	Sep	0.14	1.50	0.84	1.64	0.98	0.72	-38.17	-21.37	198.34	456.46
1934	Oct	0.14	1.50	0.84	1.64	0.98	2.65	20.28	37.64	218.62	494.10

Nant-y-Ffrith Reservoir Complex Worst Case Drought Scenario

Runoff data for drought scenarios

Month	Daily Run Off Figures									
	Drought 1		Drought 2		Drought 3		Drought 4		Drought 5	
	20/08/1933	24/10/1934	10/10/1937	10/06/1938	06/08/1976	27/01/1977	07/07/1984	30/09/1984	20/10/1995	31/03/1996
January	1.35	1.34	2.33	2.15	1.68	2.09	2.23	1.44	2.80	1.53
February	1.90	1.12	3.22	1.73	1.77	3.18	2.07	1.43	3.09	2.03
March	1.36	1.22	1.78	0.85	1.24	1.89	1.24	1.18	1.76	1.47
April	0.87	1.53	1.85	0.56	0.92	1.42	0.73	1.48	1.09	1.46
May	0.64	0.95	1.15	0.83	0.94	0.93	0.64	1.17	1.01	1.19
June	0.70	0.57	0.66	1.10	0.58	1.55	0.86	1.20	0.41	0.75
July	0.33	0.44	0.51	1.14	0.31	0.54	0.49	0.57	0.44	0.52
August	0.23	0.93	0.48	1.22	0.43	0.54	0.72	0.98	0.11	0.60
September	0.33	0.74	0.61	0.79	2.60	0.27	1.14	0.61	1.11	0.68
October	1.20	1.24	1.18	1.46	2.73	0.53	1.70	0.75	0.65	1.33
November	1.29	1.30	1.43	2.17	1.88	2.31	2.61	2.07	1.82	2.19
December	0.98	2.31	1.57	2.19	1.71	2.10	2.01	1.99	1.51	1.61

Flow and volume details

Compensation Flows	N/A
Nant-y-Ffrith Volume (Full)	102.98 Ml
Minimum Operating Volume	6.08 Ml
Minimum Operating Volume 17th October if reservoir is to refill by March	51.08 Ml

Refill sequence

For Nant-y-Ffrith, the critical drought was 1933/34 when the lowest volume could be abstracted from the reservoirs.

Year	Month	Compensation Flow (Ml/d)	Demand – Min. (Ml/d)	Demand – Refill (Ml/d)	Outflow Demand Min. (Ml/d)	Outflow Demand Refill (Ml/d)	Inflow (Ml/d)	Net Monthly Flow Demand Min. (Ml)	Net Monthly Flow Demand Refill (Ml)	Total Storage Demand Min. (Ml)	Total Storage Demand Refill (Ml)
1933	Apr	0	1.03	0.78	1.03	0.78	0.87	-4.73	2.77	98.25	102.98
1933	May	0	1.03	0.78	1.03	0.78	0.64	-12.11	-4.36	86.14	98.62
1933	Jun	0	1.03	0.78	1.03	0.78	0.70	-9.97	-2.47	76.17	96.15
1933	Jul	0	1.03	0.78	1.03	0.78	0.33	-21.63	-13.88	54.54	82.27
1933	Aug	0	1.03	0.78	1.03	0.78	0.23	-24.88	-17.13	29.65	65.14
1933	Sep	0	1.03	0.78	1.03	0.78	0.33	-21.13	-13.63	8.53	51.51
1933	Oct	0	1.03	0.78	1.03	0.78	1.20	5.28	13.03	13.81	64.54
1933	Nov	0	1.03	0.78	1.03	0.78	1.29	7.87	15.37	21.68	79.91
1933	Dec	0	1.03	0.78	1.03	0.78	0.98	-1.46	6.29	20.21	86.19
1934	Jan	0	1.03	0.78	1.03	0.78	1.34	9.72	17.47	29.94	102.98
1934	Feb	0	1.03	0.78	1.03	0.78	1.12	2.48	9.48	32.42	102.98
1934	Mar	0	1.03	0.78	1.03	0.78	1.22	5.96	13.71	38.37	102.98
1934	Apr	0	1.03	0.78	1.03	0.78	1.53	14.96	22.46	53.33	102.98
1934	May	0	1.03	0.78	1.03	0.78	0.95	-2.34	5.41	51.00	102.98
1934	Jun	0	1.03	0.78	1.03	0.78	0.57	-13.80	-6.30	37.19	96.68
1934	Jul	0	1.03	0.78	1.03	0.78	0.44	-18.23	-10.48	18.96	86.19
1934	Aug	0	1.03	0.78	1.03	0.78	0.93	-3.04	4.71	15.92	90.91
1934	Sep	0	1.03	0.78	1.03	0.78	0.74	-8.81	-1.31	7.11	89.60
1934	Oct	0	1.03	0.78	1.03	0.78	1.24	6.65	14.40	13.76	102.98

APPENDIX D – EXAMPLE ADVERTS FOR WATER EFFICIENCY AND VOLUNTARY RESTRICTIONS

Example advert for increased water efficiency promotion

Don't waste water this summer

Dee Valley WATER

Drought Status

Drought

Please only use the water you need and don't waste it
Protect our water supplies this summer

We are approaching drought conditions, please help us to protect our water supplies and the environment

Order your **free** water saving devices

Go to SaveWaterSaveMoney.co.uk or contact our customer call centre 01978 846946

Shower timer

Shower regulator

Save a flush

Your efforts really can make a difference

Example advert for Voluntary Restrictions

Voluntary Water Use Restrictions

Dee Valley WATER

Drought Status
Severe Drought

Please follow our voluntary water use restrictions and protect our water supplies this summer

We are approaching severe drought conditions, please help us to protect our water supplies and the environment by avoiding the use of **hosepipes** and **sprinklers**.

Use a water can for your garden

Please don't use hosepipes and sprinklers to clean your car or water your garden.

Use a bucket and sponge to clean your car

Although these restrictions are voluntary, your efforts really can make a difference

APPENDIX E – TEMPORARY USE BAN NOTICE EXAMPLE

TEMPORARY BAN ON WATER USED
IN THE DEE VALLEY WATER AREA

Dee Valley Water gives notice that, pursuant to sections 76 and 76A–C of the Water Industry Act 1991, the following uses of water supplied by Dee Valley Water are restricted.

This notice, and further details concerning the prohibitions, current drought and water efficiency advice may be found on our website: www.deevalleywater.co.uk

Water use restrictions will start on [DATE] at [TIME] and continue until further notice. The restriction applies to the following [LOCATIONS]. Thank you for your support at this important time.

Prohibited Uses

The use of a hosepipe, including using sprinklers, dripper hoses, automatic irrigation systems and similar devices, is prohibited for the following:

1. Watering a garden using a hosepipe
2. Cleaning a private motor-vehicle using a hosepipe
3. Watering plants on domestic or other non-commercial premises using a hosepipe
4. Cleaning a private leisure boat using a hosepipe
5. Filling or maintaining a domestic swimming or paddling pool
6. Drawing water, using a hosepipe, for domestic recreational use
7. Filling or maintaining a domestic pond using a hosepipe
8. Filling or maintaining an ornamental fountain
9. Cleaning walls, or windows, of domestic premises using a hosepipe
10. Cleaning paths or patios using a hosepipe
11. Cleaning other artificial outdoor surfaces using a hosepipe

Note that customers can still undertake the above activities if they use mains water from a bucket or watering can; or use water that is not sourced from the mains such as grey water, rainwater from a water butt through a hosepipe, or private borehole.

The following definitions apply:

- "Using a hosepipe" includes the drawing of water supplied by the Company from a container through a hosepipe; and filling a container by means of a hosepipe with water supplied by the Company;
- “Garden” includes a park, gardens open to the public, a domestic garden, a lawn, a grass verge, an allotment used for non-commercial purposes and any other green space;
- “Hosepipe” includes anything designed, adapted or used to serve the same purpose as a hosepipe. The prohibitions apply whether or not any device is attached to the hosepipe, such as a sprinkler for example; and
- “Using a hosepipe for domestic recreational use” includes operating water slides and other recreational equipment.

These prohibited water uses are covered by the Water Industry Act 1991 section 76 as amended by the Flood and Water Management Act 2010. Further definitions may be found in the Water Use (Temporary Bans) Order 2010, which is available at www.legislation.gov.uk/uksi/2010/2231/contents/made

Statutory Exceptions

Customers who meet the requirements below can continue to use water without having to make representation to Dee Valley Water to receive permission. In using water, it is requested that customers use water wisely and adopt water efficient practices:

- Using a hosepipe for health or safety reasons, where this includes (a) removing or minimising any risk to human or animal health or safety; and (b) preventing or controlling the spread of causative agents of disease;
- Watering plants that are (1) grown or kept for sale or commercial use, or (2) that are part of a National Plant Collection or temporary garden or flower display;
- Cleaning any area of a private leisure boat which, except for doors or windows, is enclosed by a roof and walls;
- Filling or maintaining a pool where necessary in the course of its construction;
- Filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment;
- Filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease;
- Filling or maintaining a pool used in the course of a programme of veterinary treatment;
- Filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity;
- Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity; and
- Filling or maintaining an ornamental fountain which is in or near a fish-pond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy.

NB Watering areas of grass, which are used for sport or recreation, is covered by a Statuary Exception for health & safety only in relation to the active strip/playing area, not the entire ground.

Discretionary Universal Exceptions

Customers who meet the criteria below for a Discretionary Universal Exception can continue to use water without having to make representation to Dee Valley Water to receive permission to use water for the following restricted uses. It is requested that customers that meet the requirements for a Discretionary Universal Exception use water wisely and adopt water efficient practices.

The criteria for a Discretionary Universal Exception include:

Specific details of exceptions will be decided at the time of publication and will depend on the nature severity of the drought.

Discretionary Concessional Exceptions
Customers can make representation to Dee Valley Water to receive a Discretionary Concessional Exception to use water for the following restricted uses. If permission for a Discretionary Concessional Exception is given, it is requested that customers use water wisely and adopt water efficient practices.

The water uses for which a Discretionary Concessional Exception can be applied for by writing Dee Valley Water include:

Specific details of exceptions will be decided at the time of publication and will depend on the nature severity of the incident.

Representations
Representations concerning any of these prohibitions may be made in writing by [DATE] to Managing Director at Packsaddle, Wrexham Road, Rhostyllen, Wrexham, LL14 4EH.

If, as a result of any representation Dee Valley Water decides to vary any terms of the prohibition, a further notice will be published. Subject to this, the prohibitions will have effect from the stated date and will remain in force until further notice.

Any person who contravenes any of these prohibitions may be guilty of an offence, and liable, on summary conviction, to a fine not exceeding £1,000.

Information to be included with the Temporary Ban Notice

- A quote from company spokesman to thank customers in advance for their support;
- Description of the sources of water supplied by the water company and how the prevailing conditions are affecting supply;
- Description of the state of water resource/severity of the situation with reference to long term averages;
- A graphic showing key data of relevance;
- Expanded definition of certain terms
- Detailed explanation of restrictions exceptions
- Tips on how to save water
- Description of the Company's efforts for tacking leakage
- Other relevant information

APPENDIX F – REVOCATION OF RESTRICTIONS EXAMPLE

REMOVAL OF WATER USE RESTRICTIONS
IN THE DEE VALLEY WATER AREA

[INSERT RELEVANT REFERENCE TO LEGISLATION ACCORDING TO THE WATER USE RESTRICTIONS THAT HAVE BEEN IN PLACE (TUBs/Ordinary Drought Orders)]

Since [DATE] a number of temporary restrictions on the use of water (with some exceptions) have been in force in the Dee Valley Water area.

We are pleased to announce that that from [time and date] all of these restrictions are lifted.

We are very grateful to our customers for their cooperation in conserving supplies during the water shortage. We ask customers to continue to show restraint and to use water responsibly to help secure future supplies.

[Detailed explanation here if desired]

Any queries in connection with this announcement should be addressed to:

Chief Executive Officer
Dee Valley Water
Packsaddle
Wrexham Road
Rhostyllen
Wrexham
Ll14 4EH

Or by email to: [EMAIL ADDRESS]

[DATE]

Information on the following should be included with the Revocation Notice

- A quote from company spokesman to thank customers for their support and to praise them for being water efficient;
- A short history of the water resource situation (historically low rainfall and river levels for example)
- The make-up of the company's supplies: groundwater, river etc and how the unprecedented conditions affected resources;
- Explanation of how the conditions triggered the water restrictions as stipulated in the company's Drought Plan; a statutory process;
- Statement whether or not other companies also implemented and are lifting restrictions if appropriate;
- Description of the change in circumstances which led to the restrictions to be lifted, perhaps using a local example known to the customers (e.g. reservoir, borehole, groundwater, river level);
- Description of the water company's current and future actions to improve supplies (leakage removal, mains replacement, metering, promotion of water efficiency);
- A statement to raise awareness of free water efficiency devices that customers can obtain, and to ask customers to report any leaks they may discover; and
- Name and contact details for further information.

APPENDIX G – RESTRICTED ACTIVITIES FOR TUBS AND DROUGHT ORDERS AND THEIR EXPECTED EXCEPTIONS

Temporary Use Bans

TUB Category	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)
Watering a garden using a hosepipe	Using a hosepipe to water a garden for health or safety reasons. NB In this category, the definition of "a garden" includes "an area of grass used for sport or recreation". Therefore it should be noted that watering areas of grass, which are used for sport or recreation, is covered by a Statutory Exception for health & safety only in relation to the active strip/playing area, not the entire ground.	To Blue Badge holders on the grounds of disability Use of an approved drip or trickle irrigation system fitted with a pressure reducing valve (PRV) and timer	To customers on the company's Vulnerable Customer and Water Sure Lists and who have mobility issues but are not in possession of a Blue Badge
Cleaning a private motor-vehicle using a hosepipe	A "private motor-vehicle" does not include (1) a public service vehicle, as defined in section 1 of the Public Passenger Vehicles Act 1981(c), and (2) a goods vehicle, as defined in section 192 of the Road Traffic Act 1988(d)	To Blue Badge holders on the grounds of disability Use of a hosepipe in the course of a business to clean private motor vehicles where this is done as a service to customers	To customers on the company's Vulnerable Customer and Water Sure Lists who have mobility issues but are not in possession of a Blue Badge
Watering plants on domestic or other non-commercial premises using a hosepipe	Does not include watering plants that are (1) grown or kept for sale or commercial use, or (2) that are part of a National Plant Collection or temporary garden or flower display.	To Blue Badge holders on the grounds of disability Use of an approved drip or trickle irrigation system fitted with a PRV and timer	To customers on the company's Vulnerable Customer and Water Sure Lists who have mobility issues but are not in possession of a Blue Badge
Cleaning a private leisure boat using a hosepipe	(1) cleaning any area of a private leisure boat which, except for doors or windows, is enclosed by a roof and walls. (2) Using a hosepipe to clean a private leisure boat for health or safety reasons	Commercial cleaning Vessels of primary residence Cases where fouling is causing increased fuel consumption Engines designed to be cleaned with a hosepipe.	To prevent or control the spread of non-native and/or invasive species
Filling or maintaining a domestic swimming or paddling pool	(1) filling or maintaining a pool where necessary in the course of its construction (2) filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap (3) filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment (4) filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease (5) filling or maintaining a pool used in the course of a programme of veterinary treatment (6) filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity	None	None

TUB Category	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)
Drawing water, using a hosepipe, for domestic recreational use	None	None	None
Filling or maintaining a domestic pond using a hosepipe	Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity	Blue Badge holders on the grounds of disability	None
Filling or maintaining an ornamental fountain	Filling or maintaining an ornamental fountain which is in or near a fish-pond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy	None	To operate water features with religious significance
Cleaning walls, or windows, of domestic premises using a hosepipe	Using a hosepipe to clean the walls or windows of domestic premises for health or safety reasons	To Blue Badge holders on the grounds of disability Commercial cleaning	None
Cleaning paths or patios using a hosepipe	Using a hosepipe to clean paths or patios for health or safety reasons	To Blue Badge holders on the grounds of disability Commercial cleaning	To customers on the company's Vulnerable Customer and Water Sure Lists who have mobility issues but are not in possession of a Blue Badge
Cleaning other artificial outdoor surfaces using a hosepipe	Using a hosepipe to clean an artificial outdoor surface for health or safety reasons	To Blue Badge holders on the grounds of disability Commercial cleaning	To customers on the company's Vulnerable Customer and Water Sure Lists who have mobility issues but are not in possession of a Blue Badge

Drought Orders

Drought Order Purpose of Use	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)
Purpose 1: watering outdoor plants on commercial premises	The purpose specified does not include watering plants that are: (a) grown or kept for sale or commercial use; or (b) part of a National Plant Collection or temporary garden or flower display	None	None
Purpose 2: filling or maintaining a non-domestic swimming or paddling pool	The purpose does not include: (a) filling or maintaining a pool that is open to the public; (b) filling or maintaining a pool where necessary in the course of its construction; (c) filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap; (d) filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment; (e) filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease; (f) filling or maintaining a pool that is used in the course of a programme of veterinary treatment; (g) filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity; (h) filling or maintaining a pool that is for use by pupils of a school for school swimming lessons. Note that a pool is not open to the public if it may only be used by paying members of an affiliated club or organisation.	None	Swimming pools serving industrial training if considered justified Pools with religious significance;
Purpose 3: filling or maintaining a pond	The purpose does not include: (a) filling or maintaining a pond in which fish or other aquatic animals are being reared or kept in captivity (b) filling or maintaining a pond using a hand-held container which is filled with water drawn directly from a tap	To Blue Badge holders on the grounds of disability	None
Purpose 4: operating a mechanical vehicle-washer	Operating a mechanical vehicle-washer for health or safety reasons	None	None
Purpose 5: cleaning any vehicle, boat, aircraft or railway rolling stock	Cleaning any vehicle, boat, aircraft or railway rolling stock for health or safety reasons	None	Small businesses whose sole operations are cleaning of vehicles using hosepipes To prevent or control the spread of non-native and/or invasive species
Purpose 6: cleaning non-domestic premises	Cleaning of any exterior part of a non-domestic building or a non-domestic wall for health or safety reasons	None	Small businesses whose sole operations are cleaning of non-domestic buildings using hosepipes;

Drought Order Purpose of Use	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)
Purpose 7: cleaning a window of a non-domestic building	Cleaning a window of a non-domestic building using a hosepipe for health or safety reasons	None	Small businesses whose sole operations are cleaning of non-domestic buildings using hosepipes
Purpose 8: cleaning industrial plant	Cleaning industrial plant using a hosepipe for health or safety reasons	None	None
Purpose 9: suppressing dust	Suppressing dust using a hosepipe other for health or safety reasons	None	None
Purpose 10: operating cisterns (in unoccupied buildings)	None	None	None

APPENDIX H – TEMPORARY WATER USE EXCEPTION FORM

Temporary Water Use Exception Form

Contact details
Name:
Address:
Postcode:
Telephone Number:
Email Address:
Account Number:

Exception details		
Is the exemption on the grounds of health and safety? (please tick the appropriate box)	**Yes**	**No**
Details:		
Is the exemption on the grounds of mobility issues? (please tick the appropriate box)	**Yes**	**No**
Details:		
If not health and safety or mobility issues, what is the exception on the grounds of?		
Details:		

For company use only		
Representation approved	**Yes**	**No**
Comments:		
Approved by:		

Please complete this form and return to:

Dee Valley Water plc
Packsaddle
Wrexham Road
Rhostyllen
Wrexham
LL144EH

Or email to:

contact@deevalley group.com

APPENDIX I – DROUGHT ORDER NOTICE EXAMPLE

NOTICE OF APPLICATION FOR DROUGHT ORDER
PROHIBITION OR LIMITATION ON THE USE OF WATER
IN THE DEE VALLEY WATER AREA

Take notice that due to the threat of a serious deficiency in supplies of water within the affected area, caused by an exceptional shortage of rainfall, Dee Valley Water of Packsaddle, Wrexham Road, Rhostyllen, Wrexham. LL14 4EH, is applying to the Secretary of State for Environment, Food and Rural Affairs or Welsh Government for a Drought Order under sections 73 and 74(2)(b) of the Water Resources Act 1991.

The affected area includes all of the following areas insofar as they receive a supply of water from the Company: [LIST PLACES OR MAP HERE].

The Drought Order is necessary to manage the demand for water in order to meet the deficiency of supplies of water in the area. The uses of water that can be prohibited or limited under the Drought Order are those prescribed by the Secretary of State in the Drought Direction 2011. These activities are in addition to the activities covered by Temporary Use Ban that are currently in place for domestic customers.

The proposed Drought Order will allow Dee Valley Water to prohibit or limit the use of water within the area referred to for any of the following purposes:

Purpose 1: Watering outdoor plants on commercial premises;
Purpose 2: Filling or maintaining a non-domestic swimming or paddling pool;
Purpose 3: Filling or maintaining a pond;
Purpose 4: Operating a mechanical vehicle-washer;
Purpose 5: Cleaning any vehicle, boat, aircraft or railway rolling stock;
Purpose 6: Cleaning non-domestic premises;
Purpose 7: Cleaning a window of a non-domestic building;
Purpose 8: Cleaning industrial plant;
Purpose 9: Suppressing dust; and
Purpose 10: Operating a cistern in any building that is unoccupied and closed.

Statutory Exceptions
Customers who wish to use water for the actions below can continue to use water without having to make representation to Dee Valley Water to receive permission. In using water, it is requested that customers use water wisely and adopt water efficient practices.

- Purpose 1 does not include watering plants that are: grown or kept for sale or commercial use; or part of a National Plant Collection or temporary garden or flower display
- Purpose 2 does not include:
    - filling or maintaining a pool that is open to the public;
    - filling or maintaining a pool where necessary in the course of its construction;

    - filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap;
    - filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment;
    - filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease;
    - filling or maintaining a pool that is used in the course of a programme of veterinary treatment;
    - filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity;
    - filling or maintaining a pool that is for use by pupils of a school for school swimming lessons.
- Purpose 2 a pool is not open to the public if it may only be used by paying members of an affiliated club or organisation.
- Purpose 3 does not include: filling or maintaining a pond in which fish or other aquatic animals are being reared or kept in captivity; or filling or maintaining a pond using a hand-held container which is filled with water drawn directly from a tap.
- Purpose 3 does not include filling or maintaining a domestic pond using a hosepipe.
- Purpose 5 permits the cleaning any vehicle, boat, aircraft or railway rolling stock for health or safety reasons
- Purpose 6 permits the cleaning of any exterior part of a non-domestic building or a non-domestic wall for health or safety reasons
- Purpose 7 permits the cleaning a window of a non-domestic building using a hosepipe for health or safety reasons
- Purpose 8 permits the cleaning industrial plant using a hosepipe for health or safety reasons
- Purpose 10 permits the suppression of dust using a hosepipe for health or safety reasons

Discretionary Universal Exceptions
Customers who meet the criteria below for a Discretionary Universal Exception can continue to use water without having to make representation to Dee Valley Water to receive permission to use water for the following restricted uses. It is requested that customers that meet the requirements for a Discretionary Universal Exception use water wisely and adopt water efficient practices.

The criteria for a Discretionary Universal Exception include:

Specific details of exceptions will be decided at the time of publication and will depend on the nature severity of the incident.

Discretionary Concessional Exceptions
Customers can make representation to Dee Valley Water to receive a Discretionary Concessional Exception to use water for the following restricted uses. If permission for a Discretionary Concessional Exception is given, it is requested that customers use water wisely and adopt water efficient practices.

The water uses for which a Discretionary Concessional Exception can be applied for by writing to Dee Valley Water include:

Specific details of exceptions will be decided at the time of publication and will depend on the nature severity of the incident.

View the applications

Anyone may inspect a copy of the application, including a copy of the draft Drought Order and plan showing the affected area, free of charge, at the offices of Dee Valley Water, Packsaddle, Wrexham Road, Rhostyllen, Wrexham, Ll14 4EH between the hours of 9.0am to 5.00pm, Monday to Friday, within 7 days of the date of publication of this notice. A copy of the draft Drought Order and plan showing the affected area is also available for inspection at the offices of the undermentioned solicitors between the hours of [HOURS], Monday to Friday, within 7 days of the date of publication of this notice.

Objections may be made in writing to the Secretary of State for Environment, Food and Rural Affairs, c/o [NAME OF CONTACT], [DEPARTMENT AND ADDRESS (or by e-mail to [EMAIL ADDRESS]), giving an address to which correspondence relating to the objection may be sent. Objections should be made within 7 days of the date of publication of this notice.

[NAME AND ADDRESS OF SOLICITORS]
Solicitors acting for Dee Valley Water

APPENDIX J – DEMAND SIDE DROUGHT OPTION FORMS

Option Name: Increased water efficiency promotion	
Trigger(s) (or preceding actions)	On reaching trigger 3 we would increase our water efficiency promotion to our customers. Concurrent actions would be additional leakage control through a variety of activities including increased leakage detection and repair.
Demand Saving Ml/d unless stated otherwise	Demand savings associated with increased water efficiency promotion are difficult to quantify on their own. However combined with voluntary use restriction we estimate savings of 0.57% and 0.67% of the dry year annual average household demand for the Wrexham and Chester Resource Zones respectively. This equates to approximately 0.24 and 0.16 Ml/d. The above savings will subject on the time of year which they are implemented. Winter savings are likely to be lower than those achieved in summer.
Demand Saving Percentage reduction on peak week demand	See above.
Location Area affected or whole supply zone	Increased water efficiency promotion would be targeted at specific geographical areas depending on the nature of the drought and the localities where we project we can achieve the best savings.
Implementation timetable Preparation time, time of year effective, duration	Preparation time: The preparation time is entirely dependent on the form of media that is being used to promote water efficiency. Updating our website can be carried out within days, local radio and newspaper adverts may take two weeks whilst messages on bills will be reliant on the issuing cycle. Time of year: The type of publicity will be dependent on the time of year. In winter focus will be placed upon lagging pipes and water saving in the home whilst in summer publicity would concentrate on outdoor water use such as garden watering. Duration: The duration of increased water efficiency promotion will be dependent on the rate of decline in the Dee Storage System and the potential need for the promotion of more severe measures such as voluntary restriction, Temporary Use Bans and drought orders. If the need arises to promote the more severe measures they will take priority over water efficiency promotion to avoid confusion through mixed messages.
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None
Risks associated with option	Estimated savings cannot be relied upon as they will depend on the circumstances of the drought.

Option Name: Additional leakage control	
Trigger(s) (or preceding actions)	On reaching trigger 3 we would carry out additional leakage control through a variety of activities including increased leakage detection and repair. Concurrent actions would be increased water efficiency promotion to our customers.
Demand Saving Ml/d unless stated otherwise	Redeployment of resources to provide increased leakage detection and repair activities could reduce leakage by 1.5Ml/d below the economic level of 10.17Ml/d set out in our WRMP13. However there are caveats to this estimate as it would require redeployment of resources, working overtime and this level of savings could not be achieved instantly rather over a period of weeks/months. In addition drought conditions have been shown to increase leakage due to increased movement in the soil as the soil moisture deficit increases. There may be difficulties in sustaining this level of reduction if the drought became long term as resources are not available for redeployment on a permanent basis.
Demand Saving Percentage reduction on peak week demand	See above.
Location Area affected or whole supply zone	Those areas where greatest savings could be achieved.
Implementation timetable Preparation time, time of year effective, duration	Preparation time: Days. Time of year: All. Duration: 1-2months.
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None
Risks associated with option	Estimated savings cannot be relied upon due to the potential for a drought to increase the break out of leaks. Redeployment of resources could not be sustained for more than a few weeks without detrimental effects on other aspects of the business.

Option Name: Voluntary water use restriction	
Trigger(s) (or preceding actions)	We would consider implementing voluntary water use restrictions at trigger 4 if the drought was to occur during the summer months (April-September). Outside the summer months a decision to implement voluntary use bans would be based dependent on whether any worthwhile savings could be achieved. The proposed three week consultation period for the implementation of Temporary Use Bans will be used for the implementation of the voluntary use bans. Preceding actions are increased water efficiency promotion and additional leakage control
Demand Saving Ml/d unless stated otherwise	As per increased water efficiency promotion.
Demand Saving Percentage reduction on peak week demand	As per increased water efficiency promotion.
Location Area affected or whole supply zone	As per increased water efficiency promotion.
Implementation timetable Preparation time, time of year effective, duration	As per increased water efficiency promotion.
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	As per increased water efficiency promotion.
Risks associated with option	As per increased water efficiency promotion.

Option Name: Temporary use bans	
Trigger(s) (or preceding actions)	We would implement Temporary Use Bans at trigger 5 (as per the Dee Drought Directives) if the drought was to occur during the summer months (April-September). Outside the summer months a decision to implement Temporary Use Bans would be dependent on whether any worthwhile savings could be achieved and would be discussed at a meeting with the Dee Consultative Committee.
Demand Saving Ml/d unless stated otherwise	Demand savings associated with Temporary Use Bans are estimated to be 2.16% and 2.61% of the dry year annual average household demand for the Wrexham and Chester Resource Zones respectively. This equates to approximately 0.92 and 0.63 Ml/d. The above savings will subject on the time of year which they are implemented. Winter savings are likely to be lower than those achieved in summer.
Demand Saving Percentage reduction on peak week demand	See above.
Location Area affected or whole supply zone	Whole company or water resource zone.
Implementation timetable Preparation time, time of year effective, duration	Preparation time: 3 weeks approximately Time of year: Subject to discussions with the Dee Consultative Committee; unlikely to implement a Temporary Use Bans outside the summer months (April-September). Duration: The duration of a Temporary Use Bans will be decided by the Dee Consultative Committee.
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	The decision to introduce a Temporary Use Bans rests with ourselves subject to satisfying the criteria in Section 76 of the Water Industry Act 1991 (serious deficiency of water available for distribution).
Risks associated with option	Estimated savings cannot be relied upon as they will depend on the circumstances of the drought.

Option Name: Ordinary Drought Order to prohibit or limit the use of water	
Trigger(s) (or preceding actions)	We would implement an ordinary drought within six weeks of crossing trigger 5. The decision to apply for and implement a Drought Order would be dependent on the time of year whether any worthwhile savings could be achieved and would be agreed at a meeting with the Dee Consultative Committee. An ordinary drought order would only be implemented after a Temporary Use Bans had been implemented.
Demand Saving Ml/d unless stated otherwise	Demand savings associated with ordinary drought orders are estimated to be 1.51% and 1.14% of the non-household demand for the Wrexham and Chester Resource Zones respectively. This equates to approximately 0.64 and 0.28 Ml/d. The above savings will subject on the time of year which they are implemented. Winter savings are likely to be lower than those achieved in summer.
Demand Saving Percentage reduction on peak week demand	See above.
Location Area affected or whole supply zone	Whole company or water resource zone.
Implementation timetable Preparation time, time of year effective, duration	Preparation time: 6 weeks approximately Time of year: Subject to discussions with the Dee Consultative Committee Duration: The duration of an ordinary drought order will be decided by the Dee Consultative Committee.
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	The decision to apply for an ordinary drought order to prohibit or limit the use of water rests with ourselves. To decision to grant the order rests with either the Welsh Government or the Secretary of State/
Risks associated with option	Estimated savings cannot be relied upon as they will depend on the circumstances of the drought.

Option Name: Augmentation of the River Dee with water from Pen-y-Cae Reservoir		
Option Implementation Assessment	**Trigger(s)** (or preceding actions)	On trigger 3 we would augment the River Dee with water from Pen-y-Cae Reservoir via Trefechan Brook with 0.4Ml/d. On trigger 4 we would augment the River Dee with a further 0.4Ml.d (0.8Ml/d total) from Pen-y-Cae Reservoir.
	Deployable output of action Ml/d unless stated otherwise	See above.
	Location Area affected or whole supply zone	N/A
	Implementation timetable Preparation time, time of year effective, duration	Preparation time: Days Time of year: Any Duration: The duration of the augmentation will be dependent on the storage in the Dee Storage System.
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	A decision to augment the River Dee will be taken by the Dee Consultative Committee
	Risks associated with option	No risks are associated with this option
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 SEA and HRA screening appraisals did not identify any environmental impacts as a result of this option.
	Baseline information used	Historic rainfall and runoff data to confirm that abstraction below the minimum operating volume or outside our abstraction licence would not occur if a historic drought was to be repeated.
	Summary of additional baseline monitoring requirements	If the need arose to abstract water below the minimum operating volume of Pen-y-Cae Reservoir additional monitoring would be undertaken; this would include, but not be limited to: • Dissolved oxygen levels • Alkalinity • Turbidity • pH levels
	Mitigation measures	If necessary, aeration systems would be installed in the reservoirs to increase oxygen levels and minimise fish distress. Any netting and transfer of fish would be arranged during the drought as soon as environmental conditions were below an acceptable standard.
	Impact on other activities e.g. fisheries, industry etc	A local fishing club is based at Pen-y-Cae Reservoir, they are unlikely to be impacted by this option as we do not plan to abstract below the minimum operating volume or outside our abstraction licence