

Draft

Drought Plan 2020

Non Technical Summary

May 2019



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## A. Executive Summary

### i. Overview

At Welsh Water, our vision is; “To earn the trust of customers, every day”. That vision reflects our unique ownership structure: we have no shareholders and so can concentrate solely on delivering the best possible value for money to our customers. All the profits that we make are reinvested in the business to improve outcomes for our customers and the natural environment, or are used to benefit customers. We need to hold to this way of working every day, especially during stressful periods such as droughts which can be challenging for both ourselves and customers.

We are trusted to plan for drought and trusted to deliver these plans if and when drought periods occur – we must continue to earn that trust every day.

Welsh Water’s long term ambitions have been set out in our Water 2050 document and this places the maintenance of wholesome water supplies at its heart. One of our key strategies is what we have titled “Enough Water For All”. In essence, this is to ensure that we always have sufficient water in line with our customers’ expectations, even in times of drought.

Our Water Resources Management Plan and our Drought Plan are at the centre of this strategy. Producing and maintaining a Drought Plan is a statutory process required by Government who have set out the legal basis for this in The Water Industry Act 1991. We are directed by Welsh Government who also provide the guiding principles for our plan. We have worked closely with Natural Resources Wales who produce the Drought Planning Guidance for water companies in Wales.

Of most importance to our customers is the impact that a drought might have on them and in particular their expectation of how we might restrict water use through our powers to impose hose pipe bans (in legal terms, known as ‘Temporary Use Bans’) or more stringent measures that might limit non-domestic supplies called ‘Non-essential Use Bans’.

We have engaged with our customers to understand their expectations on how resilient they feel our supply systems should be to drought, how often it is acceptable to impose such restrictions and how these measures should be put in place. We have used this information to inform our plan.

As demonstrated through history, our supply area is not immune from drought. In 1976, around a million people in south east Wales were subject to rota-cuts in order to ration supplies. It is clear from our customer engagement that such measures are now generally considered unacceptable.

With such events in mind, Government has asked the water industry to better understand the likelihood and impact of such measures being needed again. Furthermore, Government has challenged the industry to increase levels of drought resilience. In response, we have taken a new approach to our understanding of drought risk for this Plan and have tested it against more severe droughts than observed in our historic records.

Although the drought of 2018 was fairly short in duration it was intense with very low rainfall. We therefore, had significant concerns that this could impact our customers and we put our current plan into practice. This experience, has given us greater insight into how we need to operate to manage our supplies in a drought and how additional network connectivity can provide increased system resilience. We installed a number of additional links within zones to maximise our water resources

and treatment capability to meet peaks in demands and in some cases between zones to enable water resources to be shared.

We have subsequently built this learning into our updated Drought Plan and will be making permanent improvements to our network connectivity through our forthcoming investment planning work.

## ii. Background

Welsh Water supplies on average around 800 million litres of water every day. Most of our water is supplied from our impounding reservoirs but we also obtain significant volumes from our lowland river sources. Groundwater accounts for less than five percent of our supplies at a Company level, but at a local level may be the whole supply.

This reliance on surface waters can make us vulnerable to relatively short periods of very low rainfall as experienced during 2018.

Although Wales has a relatively high rainfall compared to the rest of the UK the overall regional picture masks important geographical differences within our supply area: for example, at up to 3,000mm rainfall per year in Snowdonia, this can be more than four times the levels recorded in the border areas and Herefordshire, where 700mm per year is typical.

The diversity of our water supply systems reflects these regional variations, which can range from discrete small-scale local supplies, through to large scale multi-source integrated networks that are more typical of many other water company areas.

The amount of water that we take from the environment has fallen by around 12% since 2000 as demand for water has fallen due to lower customer use and because we have reduced leakage from our 27,400km network of pipes by around 40% in the same period. We are planning to

reduce the leakage from our systems by a further 15% over the next 6 years.

As the water undertaker for Wales we are faced with some unique challenges in developing our drought plan:

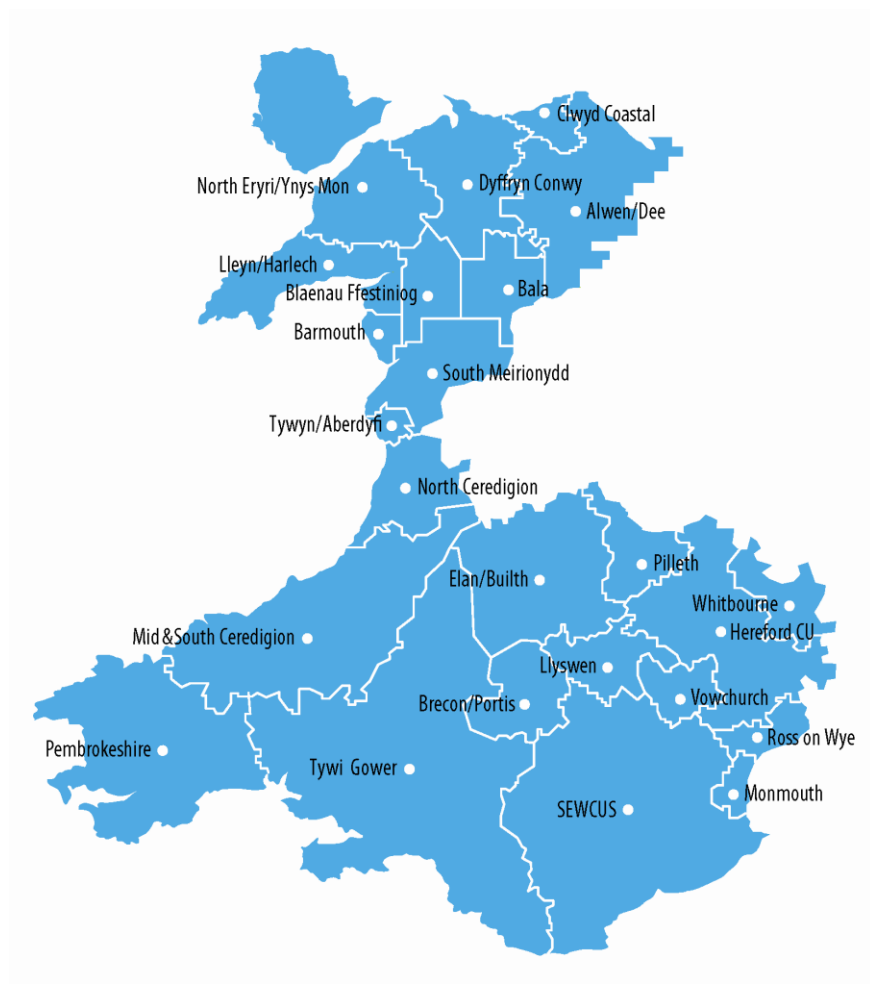
Because of the topography of Wales, Welsh Water has a high number of “water resource zones”. Our 24 water resource zones represent a fifth of the total for England and Wales (see figure below).

The landscape means that each of these zones is essentially self-contained with only limited opportunity to transfer water across zonal boundaries. This results in less flexibility to manage potential drought impacts and may require local measures to be put in place even if the overall position with regard to water availability in Wales is healthy.

The aquatic environment in Wales is of exceptionally high quality, with many sites of special scientific interest and a number of rivers designated at a European level as Special Areas of Conservation. Any drought measures therefore must balance our twin responsibilities of protecting the environment and maintaining public water supply.

These geographic and environmental constraints mean that, despite the relatively high rainfall in parts of Wales, drought can present a significant risk that we need to plan for adequately.

This document sets out how we will deal with drought conditions within both the urban and rural parts of our supply area, and how we will monitor the effect of any actions that we take on the natural environment.



*Welsh Water's Water Resource Zones*

### iii. The Drought Plan

#### a) Introduction

Our customers and stakeholders would like to understand our proposals, particularly how a drought might impact upon our water supplies and how we will communicate messages to them during periods of prolonged dry weather.

Therefore, we have written this Plan with customers, stakeholders and our regulators in mind. The latter require sufficient technical detail to understand the level of risk, if any, to our customers during drought and to be satisfied that our drought plans are rigorous and achievable.

Our Plan aims to do this through clearly setting out our response to drought in terms of;

- The way in which we monitor indicators so that we know a drought is happening.
- Defining the trigger levels at which we will take action and;
- Identifying the specific actions that we will take as trigger levels are met.

To support the drought planning process, a UK Water Industry Research (UKWIR) project was completed in 2013 to provide a voluntary Code of Practice and guidance to water companies. It provides advice on a potential staged approach to the implementation of demand restrictions such as Temporary Use Bans and Non-essential Use Bans with the aim of creating a more consistent approach between water companies across Wales and England. This general approach seeks to minimise the social and economic effects of water use restrictions, with restrictions placed initially on domestic customers before affecting commercial customers.

This Code of Practice was produced in collaboration with, and supported by representatives from regulators, consumer groups, trade bodies and customers. Welsh Water have signed up to this Code.

## b) Drought Indicators

Droughts are a prolonged period of little or no rainfall which, when combined with the usually hotter temperatures experienced, puts severe pressure upon our water resources and our ability to meet high customer demand for water.

Droughts by their very nature are highly variable in terms of their timing, duration and severity but they all begin in the same way with a period of below average rainfall that continues for longer than expected. There are a number of indicators that show when a drought is developing and an important requirement of a drought plan is to identify those that we will monitor and use to trigger drought action. We use the following indicators across our water resource zones:

- Rainfall
- River flow
- Reservoir storage
- Groundwater levels
- Level of demand

Our regional water situation is monitored on a weekly basis and provides both rainfall and reservoir storage data. These are circulated widely both within Welsh Water and shared with external stakeholders, including Natural Resources Wales (NRW) and the Environment Agency (EA). Routine hydrometric monitoring is also carried out by NRW and the EA who share relevant data for rainfall and river flows with us. We also track

zonal and sub-zonal demand across our water supply network on a daily basis.

A comparison of these indicators under current conditions against historical norms provides a measure of the drought severity.

## c) When do we take action in a drought (Drought Triggers)

It is important to establish when action should be taken during droughts to protect public water supply. We have developed drought triggers to identify when we should consider implementing specific drought actions to reduce demand and, if necessary, obtain additional water resource. These triggers are used as decision making tools as part of the overall drought management process.

Drought indicators have been developed to identify when the water resource situation is moving into a drought. Drought trigger levels have been defined, aligned with drought guidance, to ensure that that drought actions are proportionate to the level of drought risk. These are:

- Stage 1 - Normal operation
- Stage 2 - Developing drought
- Stage 3 - Drought
- Stage 4 - Severe drought
- Stage 5 – Emergency Measures

## d) Managing Drought

The approach we take within Welsh Water to managing all incidents, whether they are short term events such as a burst water supply main, or longer term events such as the loss of an asset, is to try and ensure little

or no disruption to our customers' supplies whilst ensuring that our actions have minimal, if any, effects upon the environment.

Applying this approach during a drought event means we firstly take actions that are immediately available to us, such as reconfiguring our supply networks and increasing our leakage activity. We escalate communications activity when incidents or our actions impact upon our customers and in the case of drought, to ask for our customers support in using water wisely or to inform them of water use restrictions.

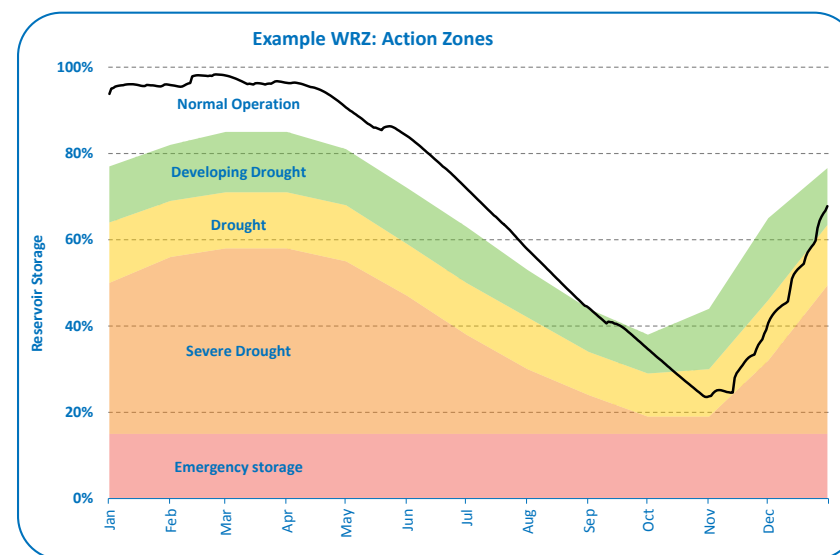
Our drought plan needs to be flexible in its approach as each drought is different in terms of its duration, severity and the areas it affects. It is not necessarily the case that all parts of our supply area would experience a drought at the same time, however we plan for a scenario where all our systems are under stress. We recognise that multiple events occurring simultaneously increase the magnitude and severity of an emergency situation. In an incident situation, our procedures require the separated but integrated operation of the following internal command centres; aligned to our emergency response manual.

Centre	Purpose
<b>Retail Centre</b>	for customer communications
<b>SMART 'HUB'</b>	for operations communications and real-time operations data
<b>Silver Command Centre</b>	for local tactical and operational management and response
<b>Gold Command Centre</b>	for strategic response and management
<b>Crisis Management Team</b>	for executive management and external agency support

These structures provided effective coordination and management of all internal and external activities in managing the events of 2018 and so we will take this approach in future drought events.

#### e) Reservoir drought triggers and actions.

The stocks available in our impounding reservoirs are critical in assessing our water resource position at any point in time. We track the levels in each of our reservoirs, against a series of pre-defined 'drought control lines', as shown by the black line in the next figure. These help us to understand our level of risk and the actions that we should be taking in relation to drought.



Example WRZ Drought Action Zone Plot

### Normal Operation

Over the late Autumn/Winter period our reservoirs will typically fill and overtop due to rainfall. It is important that we make best use of our cheapest and environmentally preferred water sources during this period which are predominantly our impounding reservoirs. We use our lowland, river sources under these conditions but they are operated below their peak capacity.

As storage levels fall we start taking action to maximise the amount of water resource by increasing the use of the lowland river sources which in turn preserve our upland storage in case of drought.

### Developing Drought

As we encounter a drought our reservoir storage will fall below that normally expected for the time of year. This is because less water than normal will be captured by reservoirs under dry conditions whilst the water demand leaving the reservoir stays the same or increases. We monitor this position and, as we move towards the 'Developing Drought' action zones of our reservoirs, the focus of operation switches to not only preserving and balancing water resource but to actions that will manage demand.

In general, we aim to maximise the water resource across each zone and this can require significant adjustments to our treatment works output and the reconfiguration of our trunk mains networks. Great care and planning is needed to ensure that the transition to new configurations is, from our customers' perspective, seamless.

As drought continues we will increase our demand management effort through enhanced and targeted leakage control and/or pressure management. We will also be increasing our messaging to inform

customers of the current water situation and the need to protect water supplies and the environment.

As the management of our systems becomes more complex, we establish our 'Silver' and 'Gold' command centres to manage this change process. We will also make our regulators aware of the situation and form appropriate lines of communication with Government, industry groups and our regulators. The 'Gold' and 'Silver' command centres manage the development and delivery of action plans with the objective of maximising the water resource available to meet customer need whilst taking a measured response to managing customer demand.

### Drought

If dry weather conditions persist, we are encountering a drought and must respond accordingly, including by preparing for potential severe drought conditions.

If storage levels continue to decline then we will take further action to preserve storage until levels recover back to normal. We will be maximising our leakage effort and we will have introduced all supply side measures that do not need to take more water from the environment. We will have taken action through new schemes or possibly bulk water tankering to resolve any local pinch points.

At this stage we will seek to implement a Temporary Use Ban ("Hosepipe Ban"), which will restrict certain uses of water. This is inevitably a difficult decision as this will impact directly on some customers, but once made we will work with Welsh Government and Natural Resources Wales to effectively communicate the need to increase demand management in this way.

Within this 'Drought' action zone we may also submit applications to our environmental regulators (Natural Resources Wales and the Environment



Agency) to allow us to gain more water in addition to that currently permitted. It will be clear to the general public at this stage that water supplies are under stress and this will doubtless attract media interest.

### Severe Drought

There would need to be very dry weather patterns for an exceptionally long period for reservoir storage levels to fall in to the 'Severe Drought' action zone.

Our actions will be proportionate to such severe weather and we would seek further help from our customers, both domestic and non-domestic through implementation of a 'Non Essential Use Ban' to restrict certain public and commercial uses of water.

Assuming our Drought Permit/Drought Order applications have been successful, we would implement these schemes immediately and begin monitoring in line with our pre-prepared Environmental Monitoring Plans and Environmental Assessments. In preparing this Drought Plan, we have re-examined the environmental impact of potential Drought Permit/Drought Orders, so that we now have a better understanding of the need for monitoring and environmental mitigation measures to be put into place

### Emergency Storage

Our planning for drought includes a reserve supply of water known as 'Emergency Storage'. This volume is designed to meet around 30 days of customer demand, as well any environmental requirements.

If we reach the stage where this is the only storage we have remaining in our reservoirs, we are in an exceptional drought event and we may need local 'extreme' measures such as water rationing to preserve supplies for as long as possible.

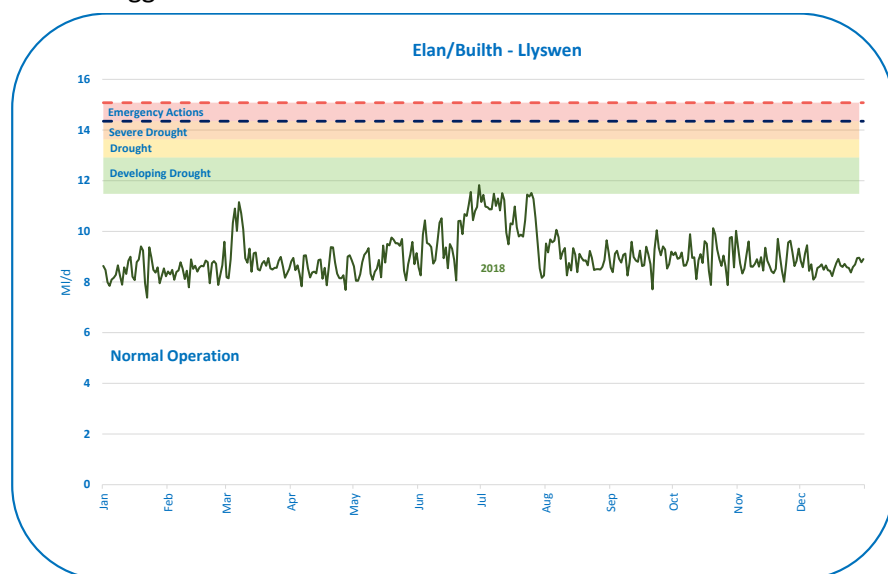
The table below summarises the measures that we will take in line with our Drought Action Zones.

Drought Action Zone	Supply Side Actions	Demand Side Actions	Communications Key Messages
<b>Normal</b>	Weekly monitoring of rainfall, reservoir and river levels.  Optimise sources to minimise the costs of operations whilst remaining within licence, operation and quality constraints	Daily and weekly monitoring of demand levels and review of supply/demand situation.	<b>Use the water that you need but please don't waste it.</b>  General Water Efficiency Campaigns via: <ul style="list-style-type: none"> <li>• Company website water efficiency page</li> <li>• Social media</li> <li>• Press Releases</li> <li>• Organised events</li> <li>• Education Centres</li> </ul>
<b>Developing Drought</b>	Targeted leakage management. Convene 'Gold incident' command centre.  Implementation of dry weather operations to optimise water supply.  Liaison in line with Management and Communication Plan	Continuous monitoring of demand levels and review of supply/demand situation.  Implement demand side options: <ul style="list-style-type: none"> <li>• Media Campaigns with Water Efficiency Device Offering</li> <li>• Enhanced Leakage Management</li> </ul>	<b>Weather has been drier than normal therefore reservoir levels aren't where we would expect them to be for time of year.</b> <b>Introducing temporary use restrictions is a last resort. We would like to avoid this so are asking customers to work with us to help conserve water resources.</b>  Continuation of Normal Activities plus: <ul style="list-style-type: none"> <li>• Website – dedicated web page ready to go live as soon as required</li> <li>• Welsh Water spokesperson film clips</li> <li>• Targeted social media</li> <li>• Press releases - to be issued to relevant media.</li> <li>• Paid for adverts - to appear in relevant media</li> <li>• Letters to customers</li> <li>• Roadshow / local exhibition</li> <li>• Face to face meeting with stakeholders</li> </ul>
<b>Drought</b>          <b>Drought</b>	Continue to optimise current dry weather operational activities to preserve resource.  Review feasibility of bringing mothballed sources back in supply.	Continuation of preceding actions. Effectiveness of demand side measures estimated.  Preplanning for the implementation of Temporary Use Bans.    If applicable:	<b>Weather has been drier than normal therefore reservoir levels aren't where we would expect them to be for time of year.</b> <b>Introducing temporary use restrictions is a last resort. We would like to avoid this so are asking customers to work with us to help conserve water resources.</b> <b>We may have to introduce a temporary hosepipe ban as a last resort to help conserve water supplies.</b>

	<p>If applicable: Preparation of supply side application for Drought Permit/Drought Order from Natural Resources Wales/ Environment Agency and or Welsh Government/Defra.  Commence baseline environmental monitoring</p>	<p>Implement demand side options:</p> <ul style="list-style-type: none"> <li>• Temporary Use Bans (saving of up to 5% of demand anticipated).</li> </ul>	<p>Continuation of Developing Drought Activities with enhanced messaging plus:</p> <ul style="list-style-type: none"> <li>• Media interview with senior managers</li> <li>• Water efficiency lessons</li> <li>• Billing call centre recorded messages</li> </ul>
<b>Severe Drought</b>	<p>Continuation of preceding actions. Bring mothballed sources back in supply where feasible.</p> <p>If applicable: Implement supply side options.</p>	<p>Continuation of preceding actions. Implement demand side options:</p> <ul style="list-style-type: none"> <li>• Temporary Use Bans (saving of up to 5% of demand anticipated).</li> </ul> <p>Preplanning for the implementation of Non Essential Use Bans. Preplanning for the implementation of Emergency Drought Order.</p> <p>If applicable: Implement demand side options:</p> <ul style="list-style-type: none"> <li>• Non Essential Use Bans (saving of up to 10% of demand anticipated).</li> <li>• Emergency Drought Order (saving of up to 17.5% of demand anticipated)</li> </ul>	<p><b>Weather has been drier than normal therefore reservoir levels are exceptionally low for the time of year.</b></p> <p><b>Temporary use restrictions are in place. We thank customers for observing these to protect water supplies.</b></p> <p><b>We may have to introduce non-essential use restrictions as a last resort to help conserve water supplies.</b></p> <p><b>We may have to implement alternative water supply options under drought permit/order.</b></p> <p>Continuation of Drought Activities with enhanced messaging, details below:</p> <ul style="list-style-type: none"> <li>• Website – dedicated web page ready to go live as soon as required</li> <li>• Welsh Water spokesperson film clips</li> <li>• Targeted social media</li> <li>• Press releases - to be issued to relevant media.</li> <li>• Paid for adverts - to appear in relevant media</li> <li>• Letters to customers</li> <li>• Roadshow / local exhibition</li> <li>• Media interview with senior managers</li> <li>• Water efficiency lessons</li> <li>• Billing call centre recorded messages</li> <li>• Face to face meeting with stakeholders</li> </ul>

## f) Demand Triggers

In a number of Water Resource Zones, our primary concern is about the capacity of our infrastructure to meet increased demand from customers, rather than the availability of the raw water. Our Water Resources Management Plan and annual performance reviews look at the capability of our systems to meet peaks in demand. It is therefore unlikely that we will encounter such difficulties but to be prudent, we set water demand related triggers.



*Elan / Builth – Llyswen Drought Action Zones*

The figure above shows an example for our combined Elan/Builth and Llyswen zones. The graph plots our peak supply capability against historic and predicted maximum demand. If demands approach our peak capability for unprecedented reasons this indicates that we need to take actions to address this through demand management measures.

## g) Our Communication Plan

Welsh Water's Drought Communications Plan (DCP) has been developed to ensure the effective flow of information to customers and stakeholders during the various stages of a drought. The strategy is designed to ramp up in response to the escalating stages of drought and crucially trigger behavioural changes from customers to help conserve water supplies. While we have not had a hosepipe ban for a number of years, and have successfully reduced our leakage rates, as a company we fully appreciate how impacted we can be by events such as the hot summer experienced in 2018. Our DCP will ensure we are in a position to respond immediately in the event of similar conditions occurring in future.

The key to the effective management of any drought situation will be engagement with customers and stakeholders. Their cooperation - and crucially behavioural changes - during such times is essential to help protect water resources for everyone. To achieve this we will need to ensure our communications are effective – particularly to generate understanding of the situation and actions we require customers to take.

We cannot however expect customers to play their part without also being explicit about all of the activities our company will undertake to keep them in supply, so this forms an important part of our messaging.

Our communications strategy also has flexibility to adapt to varying drought situations by using appropriate communication techniques and messaging. Multiple communication channels are utilised to ensure the most effective is used for the targeted audiences.

This also includes ensuring communication is fully bilingual to cater for our customers' language of choice. The company has also incorporated learning from the 2018 summer into the plan. We are confident that our

not-for profit operating model will have a positive impact on our call for customer support in managing drought in our supply area.

## h) Understanding our Drought Risk

The view from Government is that our water supply systems should be resilient to at least a 1:200 drought event before 'extreme' measures, such as water rationing, are taken to manage demand.

In order to understand the level of drought resilience we can provide to our customers, we have undertaken drought vulnerability assessments for all of our Water Resource Zones, in accordance with the Drought Vulnerability Framework (DVF) guidance that was jointly published by Natural Resources Wales and the Environment Agency in 2017.

This drought analysis work is relatively complex but the results are extremely useful and can be conveyed in reasonably simple terms. This is essentially an evaluation process that seeks to identify the level of drought risk that is faced by an individual zone across a range of drought scenarios of varying durations and severities. The DVF is a risk based approach with the initial phase of the assessment to screen out zones of low risk.

The table below provides a high level summary of the estimated risk for each Water Resource Zone of needing to implement customer water use restrictions. The return periods are not exact but are based on the results of our drought risk analysis; we have tried to interpret these into a 'simple' figure to present a high level view.

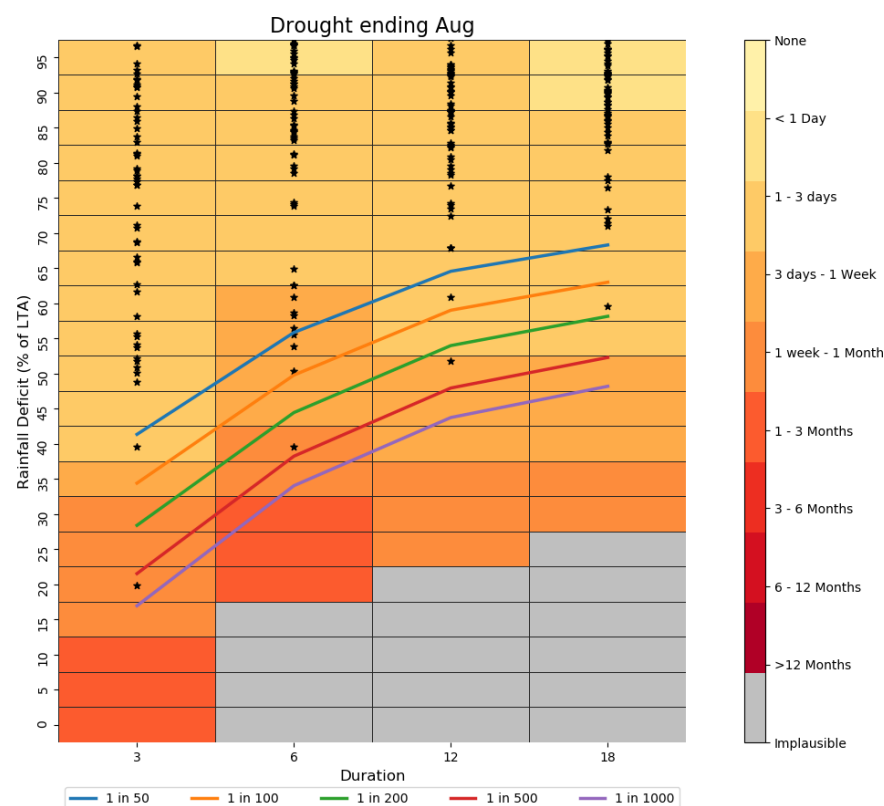
Of particular importance to Government is our system's performance to the most extreme droughts and new targets have been set to ensure that water supplies are resilient to droughts that might be expected one in every 200 years or 0.5% likelihood. For zones where there is a risk of not

achieving this we have undertaken further work to understand the types of drought that are cause for concern and the likelihood that our systems may fail to meet this target.

We have defined a failure in our models as the point at which we can no longer meet the demands of our customers without the imposition of extreme demand management measures. This is the point on our reservoir drought control charts at which only 'Emergency Storage' is available to us, a position that we would never want to reach as this is an unacceptable risk to our customers. The extent of failure is how long we would remain in this position of relying on 'Emergency Storage'.

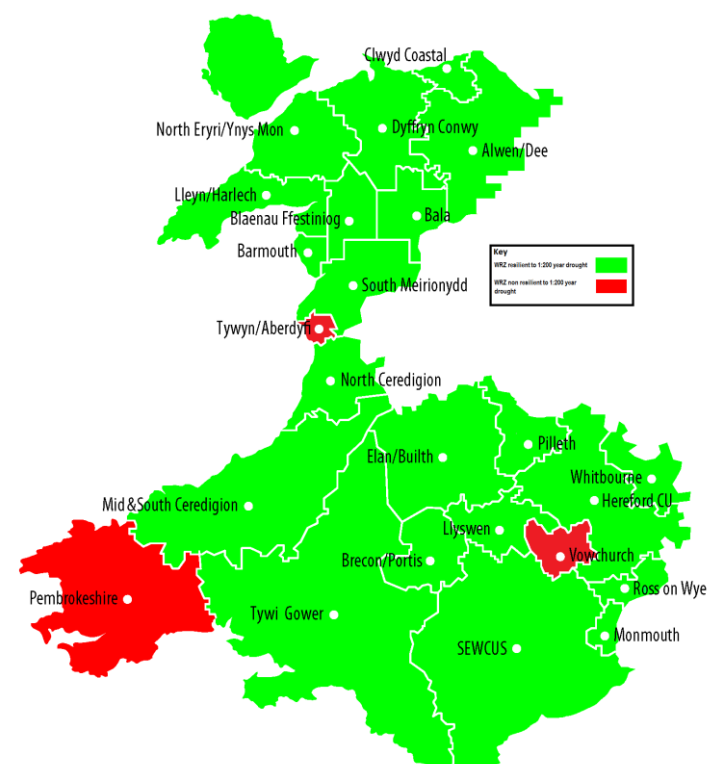
The water industry has developed a standard way to show this information called a Drought Response Surface (DRS) chart. This collates the output of the assessment and helps in communicating the findings. A DRS chart (below) is a visual presentation of the sensitivity of a zone to a range of droughts. Each drought is expressed in terms of rainfall deficit as a measure of drought severity (defined as the percentage of Long Term Average Rainfall, as shown on the y-axis, and the duration of the drought assessed in 6 monthly intervals on the x-axis of the chart).

The risk of water supply 'failure' and drought frequency are plotted on these axis for comparison. The chart then can be used to understand, for example, the likelihood of zonal water supply failure for a 1:100 year return period type of drought.



*Example drought response surface*

Overall, the results of our drought risk analysis demonstrates that our resilience to drought is high in all but three zones (see map overleaf). Once we complete our investments planned for the next 3 years, this will improve to high across the Welsh Water region. This means that there should be a very low chance of us needing to implement customer water supply rationing.



*Results of 1:200 year drought response surface testing*

The advanced statistical approaches we have used for this testing are very new to the industry and further analysis of the data we have undertaken outside of this Plan indicates that we should be mindful of the uncertainties inherent within this approach. We have, therefore, provided a range of drought risks in the summary table below.

WRZ	Temporary Use Ban	Non Essential use Ban	Extreme Measures
North Eryri Ynys Mon	Around 1:200	Around 1:200 to 1:500	>1:500
Clwyd Coastal	<1:200	Around 1:200 to 1:500	Around 1:500
Alwen Dee	Around 1:200	Around 1:500	>1:500
Bala	>1:500	>1:500	>1:500
Tywyn Aberdyfi (without planned WRMP19 scheme)	<1:20	<1:40	<1:50
Tywyn Aberdyfi (with planned WRMP19 scheme)	Around 1:200	Around 1:200 to 1:500	Around 1:500
Blaenau Ffestiniog	Around 1:200	Around 1:200 to 1:500	>1:500
Barmouth (As now connected to Llyn Harlech)**	<1:200	Around 1:200	Around 1:200 to 1:500
Llyn Harlech (As now connected to Barmouth)**	<1:200	Around 1:200	Around 1:200 to 1:500
Dyffryn Conwy	<1:200	Around 1:200 to 1:500	>1:500
South Meirionnydd	Around 1:200	Around 1:200 to 1:500	>1:500
Ross on Wye	N/A*	N/A*	>1:500
Elan Builth	N/A*	N/A*	>1:500
Hereford	N/A*	N/A*	>1:500
Llyswen	N/A*	N/A*	>1:500
Monmouth	N/A*	N/A*	>1:500
Pilleth	N/A*	N/A*	>1:200
Brecon Portis	N/A	N/A*	>1:500
Vowchurch (without planned WRMP19 scheme)	N/A*	N/A*	<1:100
Vowchurch (with planned WRMP19 scheme)	N/A*	N/A*	Around 1:500
Whitbourne	N/A*	N/A*	>1:200
SEWCUS	Around 1:200	Around 1:200 to 1:500	Around 1:500
Tywi CUS	Around 1:200	Around 1:200 to 1:500	Around 1:500
Mid & South Ceredigion	Around 1:200	Around 1:200 to 1:500	Around 1:500
North Ceredigion	Around 1:200	Around 1:200 to 1:500	Around 1:500
Pembrokeshire (without planned WRMP19 scheme)	<1:100	<1:100	<1:100
Pembrokeshire (with planned WRMP19 scheme)	Around 1:200	Around 1:200 to 1:500	Around 1:500

\*The WRZ has sufficient water resource and the trigger for action is on levels of demand. We are only likely to impose TUBs and NEUBs in line with actions in the wider region, principally the SEWCUS zone.

\*\*This high level of resilience is based on the temporary schemes from the 2018 drought being made permanent and the two zones are joined together.

Summary results of the Drought Vulnerability Assessment for all 24 WRZs

## i) End of drought

As the water resources situation at the end of a drought returns to the normal level, we will continue to undertake similar risk assessments as those made during the drought period but with greater attention to the longer term impact. We will look both at the prospect of the weather turning dry once again and the likelihood that our reservoirs will re-fill over the winter/spring period and not lead to further issues the following year. At this stage we will look at the need to apply for additional drought permits aimed at securing water supply for the following year.

For these reasons, the initial recovery out of the Drought Action Zone would not typically be the point at which all measures would be lifted. A more likely point for declaring the end of a drought would be in the approach to the Normal Action Zone, where reservoirs are well stocked for the time of year and, in demand trigger zones, abstraction quantities fall below the developing drought trigger level.

As with the onset of drought, it is important that we take a flexible approach to the lifting of restrictions imposed on our customers or in taking additional water from the environment outside of our permitted volumes. We may also choose to lift restrictions on an area basis in a proportional manner. These decisions will be led by the Gold incident team and further discussed with government through the Wales Drought Liaison group and the National Drought Liaison Group. The factors that will be taken into account in making this decision will be:

- The results of risk forecasts for individual Water Resources Zones
- The time of year and anticipated savings from demand side measures
- Forecast weather conditions
- Natural Resources Wales and the Environment Agency, environmental drought status

Throughout the post-drought stage as conditions recover, post-drought environmental monitoring will be undertaken as part of the suite of actions to ensure we have the fullest possible understanding of the impact that any supply side drought actions have had. This post-drought environmental monitoring also informs our decision making so that appropriate measures can be taken to support the recovery of the environment after a period of drought.

Once we are confident that conditions have recovered and we are able to 'stand down' our incident response teams, we will hold a number of internal meetings involving all the members of our Gold and Silver centres to review the drought event.

The extent of the review will be dependent upon the level of drought encountered. We will review the effectiveness of the drought management actions we took to understand any impacts on customers and the environment.

For more severe droughts where we have put Temporary Use Bans in place, we will prepare a 'lessons learnt' report.

Once we have completed our internal review we will meet with Government and regulators to review how effective they felt our drought management was, how well we worked together across organisations and whether improvements could be made, particularly in terms of communication and support to other sectors.