DROUGHT PLAN 2022 APPENDIX

NORTHUMBRIAN WATER *living water*

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Northumbrian Water Limited has not excluded any information from this plan on the grounds that the information would be contrary to the interests of national security.

Under Section 37B(10)(b) of the Water Industry Act 1991, as amended by the Water Act 2003 (“the Act”), the Secretary of State can direct the company to exclude any information from the published Plan on the grounds that it appears to him that its publication would be contrary to the interests of national security.

DOCUMENT CONTROL SHEET

Report Title	Drought Plan 2022 Appendix
Authors	NWG Water Resources Team
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08/10/2021	2	Revised Draft	Amendments made to Draft Drought Plan in response to consultation
20/05/22	3	Final	Amendment to reflect EA comments

DOCUMENT SIGNOFF

Nature of Signoff	Person	Date	Role
Reviewed by	William Robinson	18/05/22	Water Resources & Performance Manager
Approved by	Keith Haslett	18/05/22	Water Director

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APPENDIX 1: DROUGHT VULNERABILITY ASSESSMENT

We are required to test the plan against different types of droughts (in terms of magnitude and duration) and identify when our supply is likely to be vulnerable.

In order to carry out this assessment we have completed the following:

- an assessment which uses the principles of the UKWIR 'Drought Vulnerability Framework' (17/WR/02/12).
- Stochastic drought modelling.

DROUGHT VULNERNABILITY FRAMEWORK

The UKWIR guidance provides an approach that water companies can use to improve the understanding of the vulnerability of their systems to drought and demonstrate this graphically by producing 'drought response surfaces' (DRS) for their Water Resource Zones (WRZs).

The guidance recommends several different calculation approaches based on the data availability and the level of modelling available for each WRZ, these approaches are detailed in the table below.

Nature of Drought Rainfall Data and Hydrological Modelling	Nature of WRZ and Deployable Output Assessment	Approach Number	Notes/Comments
Stochastically based rainfall data (normally includes hydrological models, but can include multi-site flow generation)	Conjunctive with *rapid* simulator	1a	Where direct flow generation has been used then rainfall deficit/flow analysis required
	Conjunctive but *no* rapid simulator	1b	Uses a sample of the full stochastic data set ('drought libraries')
Synthetically based rainfall data	All	2	Requires Extreme Value Analysis (EVA) to estimate risk/return period
Historic rainfall data with rainfall/runoff and/or groundwater models	SW storage dominated (with behavioural model)	3a	Requires EVA of rainfall, and yield/return period behaviour
	Groundwater or run of river only	3b	Requires EVA of rainfall and flow/level return period behaviour
Historic rainfall data with no hydrological models	SW storage dominated (with behavioural model)	4a	Rainfall EVA and rainfall deficit/inflow relationships needed
	Groundwater or run of river only	4b	Rainfall EVA and rainfall deficit/level/flow relationships needed

For the Kielder WRZ approach 4a was deemed to be the most appropriate due to not having, at the time, a full coverage of rainfall runoff models for the WRZ.

The calculation steps for Approach 4a as set out in the UKWIR guidance are detailed below.

1. Carry out EVA to determine the probability of each deficit/duration cell

2. Systematically generate synthetic events (intensity & duration) for a selection of deficit/duration cells using the historic record.

3. Run behavioural model for the selected level of demand

4. Calculate the number of days deficit for each synthetic event.

5. Scale impacts (see Section 6.1). Smooth 'days failure' figures in the matrix as appropriate. Compare the EVA plot of minimum levels or flows against the critical duration drought outputs to scale the DRS inputs

6. Plot DRS

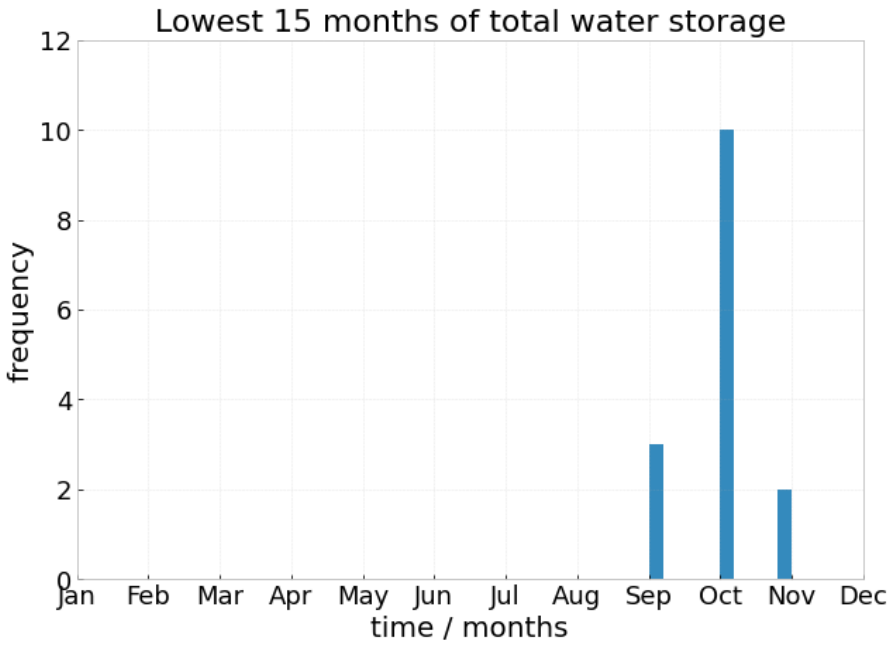
Prior to carrying out the calculations required to complete the drought vulnerability analysis there are two common decisions that need to be made:

- Decide upon which 'month ending' timings should be used to generate the DRS.
- Decide upon what level of demand the analysis should be run at.

SELECTION OF 'MONTH ENDING'

The guidance recommends that for a WRZ with a high level of storage that is driven by the annual average DO the month ending parameters are set 3 months apart, historically the lowest storage levels experienced have been in October.

Analysis of minimum storage levels within the Kielder WRZ was carried out by summing the monthly storage values for all reservoirs in an Aquator model run, using DO demands, and finding the month with the minimum storage value in each year from 1926-2014 (89 years). The minimum storage in each year was ranked, and the frequency of months containing the minimum storage in the 15 lowest years were plotted. Of these 15 years, 13 of the lowest storages occurred in October and, since this significantly dominated the sample of the most extreme years, only October was used in the analysis.



LEVEL OF DEMAND USED

To carry out this assessment several different levels of demand could be used such as.

- Total demand (DI)
- Total demand plus Target Headroom
- Total demand plus Target Headroom plus Outage
- Demand equivalent to DO

As deployable output is circa 123% of demand in the Kielder WRZ, and the system is constrained by licence/pumping capacities running the Aquator model at anything less than a demand equal to DO, would not place the system under enough stress to fully assess the risk to supplies during an extreme drought.

RAINFALL ANALYSIS

The daily catchment rainfalls, as used to construct the flow sequences for Aquator, for Burnhope, Cow Green, Derwent and Kielder were averaged to produce a single daily time series. This single timeseries of rainfall data was taken forward for the analysis.

The DVF manual requires rainfall frequency analysis for different drought durations to be based on the same end-months as the selected drought end-month for the water resources system. As only October was identified as a critical end-month for reservoir drawdown, rainfall analysis should be based on rainfall totals up to the end of October for every year of record.

Further analysis of the rainfall data was undertaken to assess if the October end month durations (6, 12, 18, 24 and 36 months) were representative of the population rainfall

distribution, a Kolmogorov-Smirnov (K-S) test was carried out for all month ends, for each duration. For the purposes of this investigation we extended the sampling regime to include month-end durations that were not significantly different from the central one of interest.

Rainfall series of various durations were then tested against several extreme value (EV) distributions. Overall, they fitted best with a three-parameter GEV distribution, the results of this analysis are in the table below.

Table of rainfall depths as percentage of LTAs

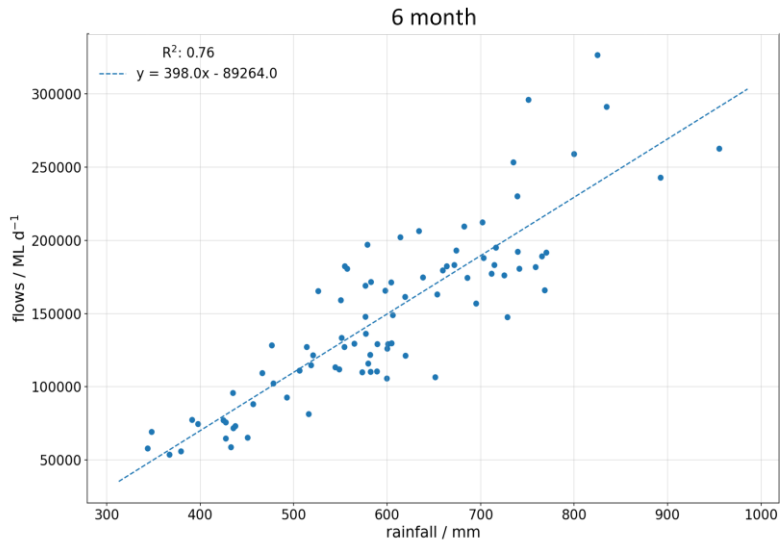
Return period	Duration				
	6month	12month	18month	24month	36month
2	74%	92%	100%	181%	116%
5	62%	80%	86%	92%	97%
20	52%	70%	75%	83%	88%
50	46%	64%	70%	79%	84%
100	43%	61%	67%	77%	81%
200	41%	58%	64%	75%	79%
500	38%	54%	61%	72%	77%
1000	34%	52%	59%	70%	75%

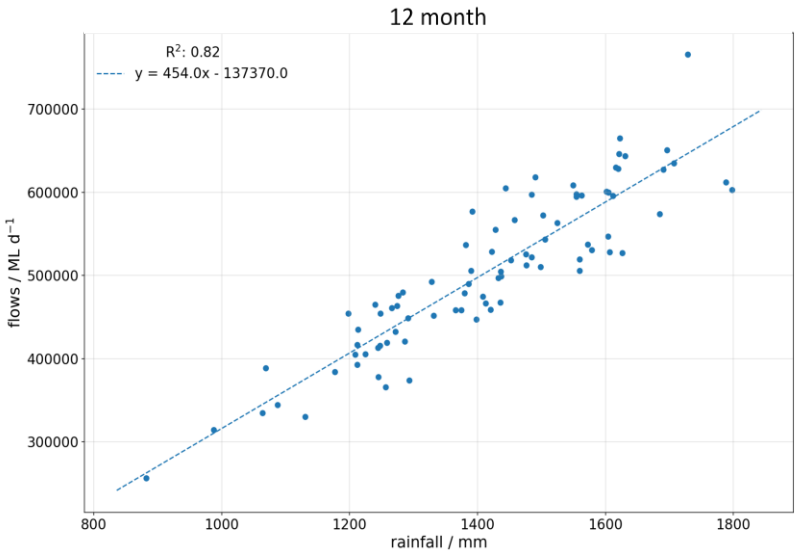
GENERATION OF SYNTHETIC EVENTS

Method 4a requires the creation of river flow sequences representing droughts of different durations and return periods. This is achieved by defining a relationship between rainfall over a given duration and the runoff volume accumulated over the same duration for the same events in the same catchments. This relationship is then used to generate runoff totals from the return period rainfall totals derived from the GEV analysis. Once the runoff volume has been estimated it must then be translated into a daily flow series for onward use in the water resources model.

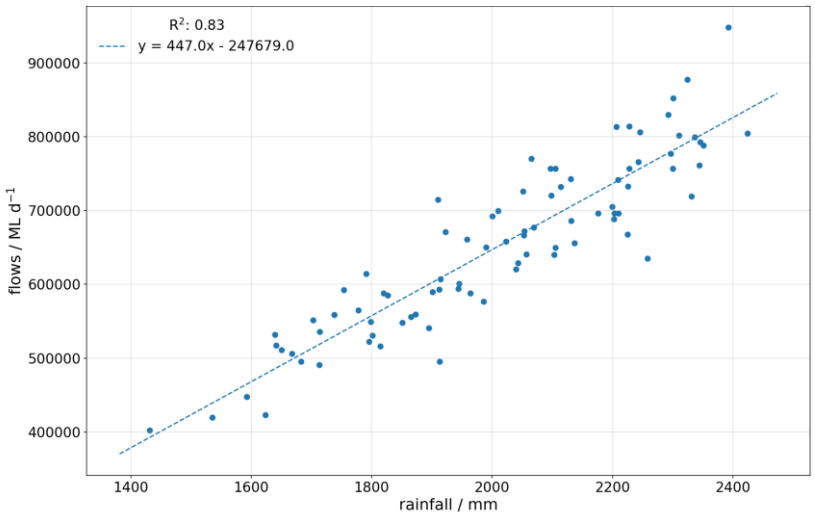
The key assumption in the approach is that the return period for the rainfall total and duration of interest translate directly over into the same return period for a given duration and volume of runoff.

The figures below show the catchment rainfall (mm) against recorded runoff (Ml/d) over the same period for durations from 6 months through to 36 months. The dashed line is the line of best fit using linear regression model, the equation of which is displayed in the legend.

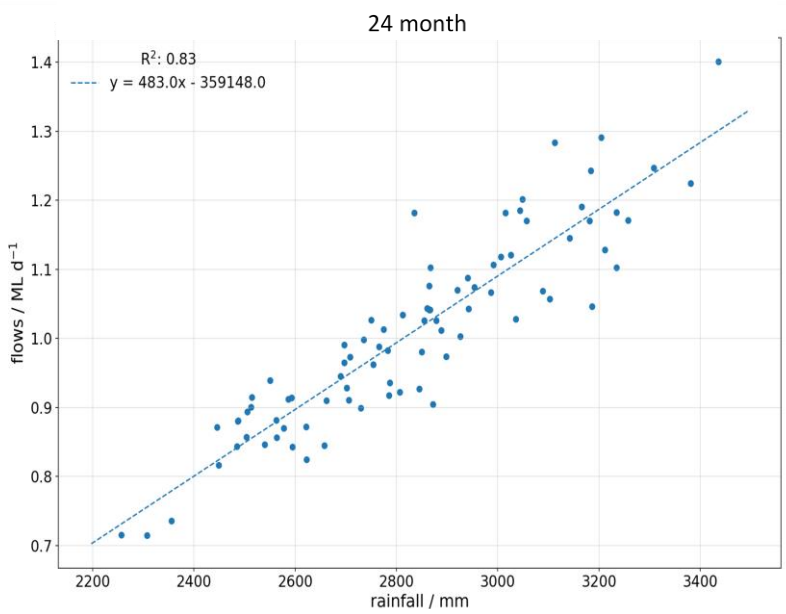

6 month
R²: 0.76
y = 398.0x - 89264.0
flows / ML d⁻¹
rainfall / mm
300000
250000
200000
150000
100000
50000
300
400
500
600
700
800
900
1000


12 month
R²: 0.82
y = 454.0x - 137370.0
flows / ML d⁻¹
rainfall / mm
700000
600000
500000
400000
300000
800
1000
1200
1400
1600
1800

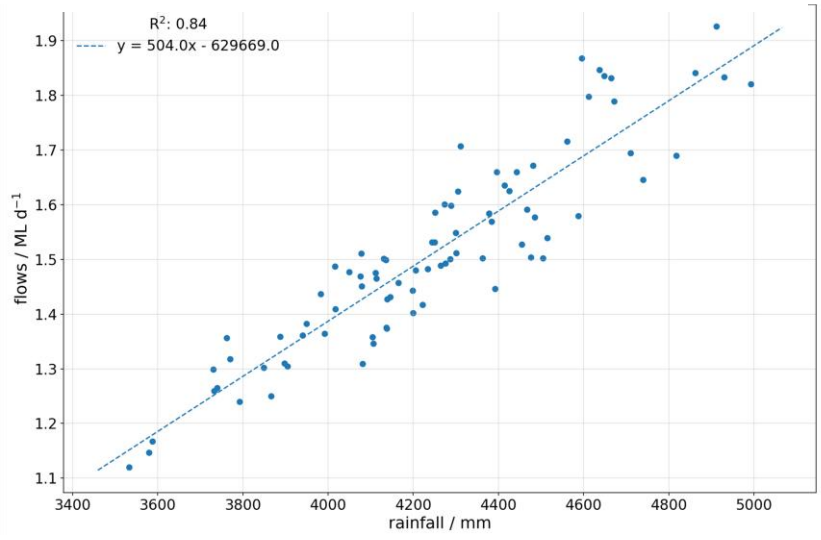
18 month



24 month

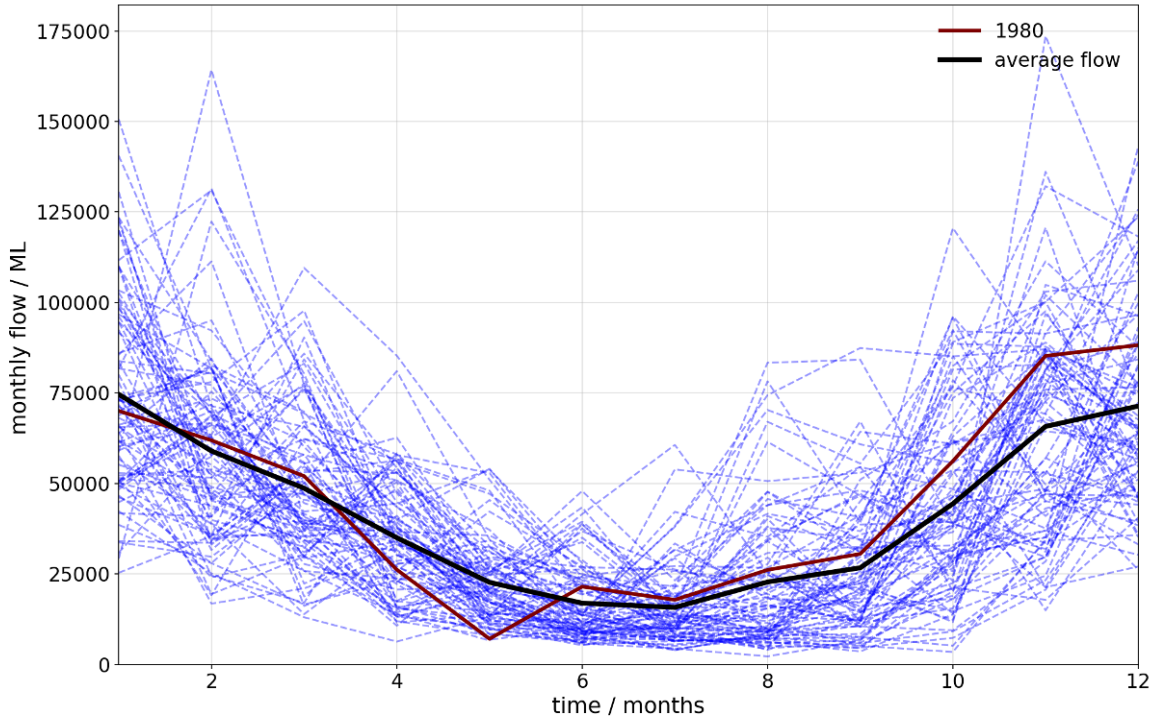


36 month



To estimate the flow for the various return periods for each duration, the drought rainfall factors were used to estimate the extreme rainfall totals for that drought.
The linear regression relationships established between the rainfall and flows were used to turn the extreme rainfalls needed for each drought into a consequential runoff volume. From this, the ratios were calculated between the 'normal' flow for that duration and the newly derived drought flows from the linear regressions.

The DVF manual instructed to find a 'normal' year of flow data which would be used to create the artificial drought series, a least squares estimate (LSE) method was used to find a year whose monthly flow closest matched the average monthly flow across all years.



The 'normal' year daily flow data were the basis of every year in the artificial drought time series. The ratios calculated from the rainfall/flow relationship (explained above) were multiplied by the 'normal' year for the months of the duration of interest and strung together with multiple 'normal' year flows acting as refill years in between droughts.

The general structure of the drought time series was as follows for a given duration:

- 2 warm-up years
- 1 in 100 return period drought (this was 1-3 years, depending on the duration. For 12+ month durations, the drought year, which ended in October, would overlap with the previous year. To account for this, the drought period spanned over 2 or more years)
- 1 cool down year
- 2 warm-up years
- 1 in 200 return period drought

And so forth, until the final return period and a cool down year.

AQUATOR MODELLING

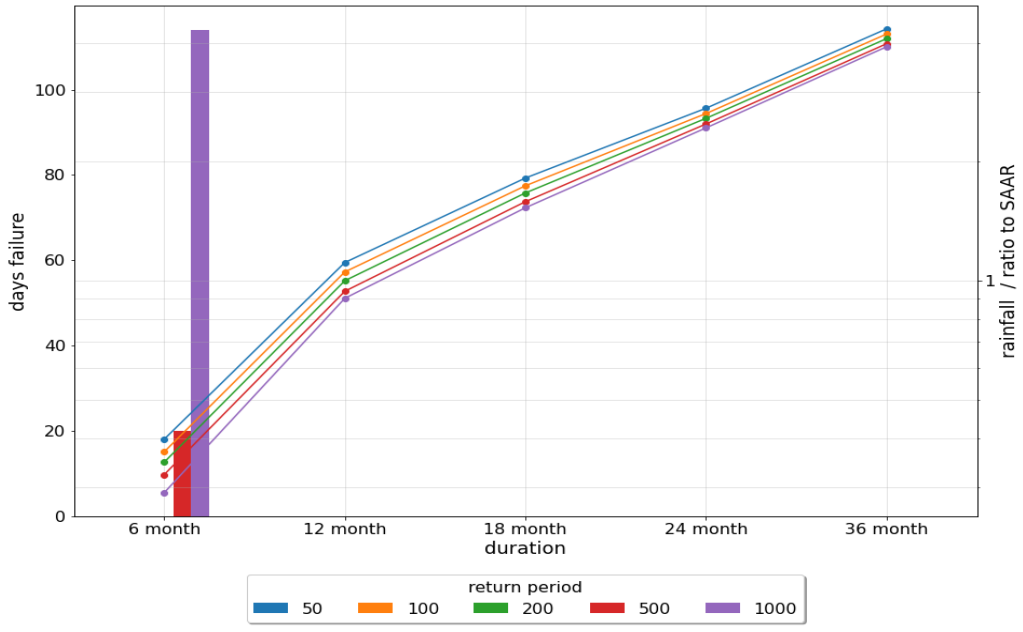
The drought time series for each catchment were input into Aquator Version 4.3 for the Northumbrian Water system and ran with demand set at DO levels (836Ml/d). Failure days occurred when the demand could not be met, or the emergency reservoir storage was used.

The table below summarises the number of failure days for each duration and given return period. Only the 1 in 500 and 1 in 1000 droughts for the 6 month duration had any failure days.

Rainfall return period	Duration (months)				
	6	12	18	24	36
50	0	0	0	0	0
100	0	0	0	0	0
200	0	0	0	0	0
500	**20**	0	0	0	0
1000	**114**	0	0	0	0

DROUGHT RESPONSE SURFACE

An alternate plot to the DRS recommended in the guidance is shown below, that we hope offers more clarity while showing the relevant information. The graph displays the number of failure days (left-hand axis) for the Kielder system as a bar chart and the rainfall (as a ratio of SAAR) on the right-hand axis as a line plot. Duration lengths are along the x-axis and the colours represent the different return periods.



Surface water stochastic modelling

Long-periods of 'stochastic hydrological' data (plausible synthetic scenarios based on historical hydrological patterns) were used to develop inputs to our Aquator XV water resources models. This allows us to better understand the drought resilience of our WRZs as well as being able to evaluate the frequency that Level 4 restrictions may be required.

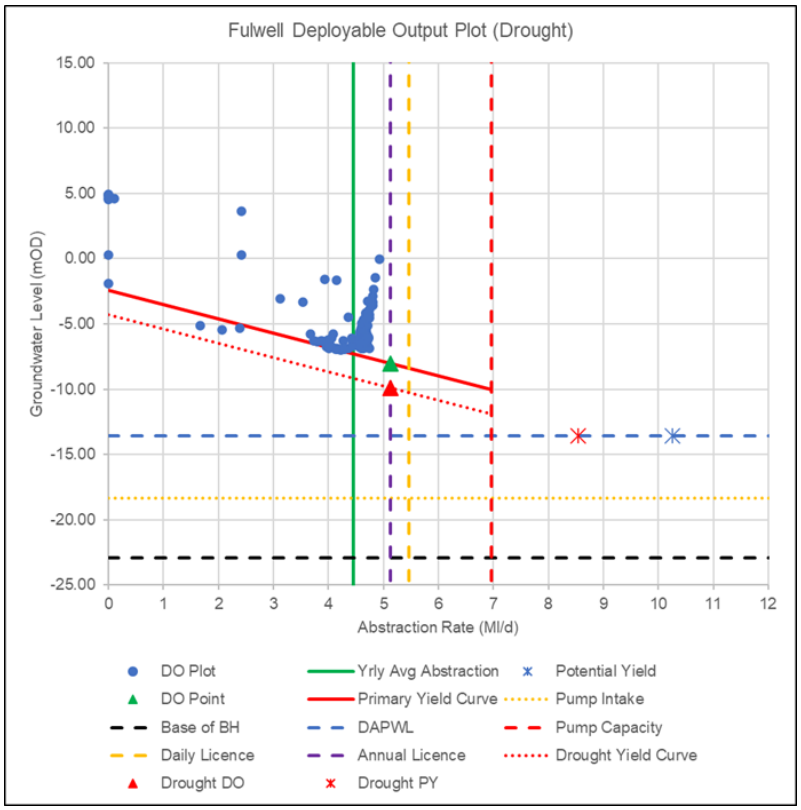
The stochastic timeseries were ran through Aquator XV using the permitted failure method, this is where a water resources model is run multiple times using a long hydrological record and incrementally increasing demand, to get a sense of the system response of the WRZ. The results of the Aquator XV runs were used to produce a profile of return period to DO, this allowed us to determine a representative DO (825.27Ml/d) for a 1:500-year return period based on Level 4 restrictions being a system failure. This DO level may not be associated directly with a specific model run, but rather be interpolated from the DO profile graphed.

The stochastic timeseries were then ran though Aquator XV with the demand fixed at the 1:500 year DO to stress test the system against a wide range of hydrological conditions.

Groundwater synthetic drought modelling

The calculated reduction in groundwater level has been modelled for 1:200 and 1:500 stochastic drought events. These values are used to lower the current DO curve for a specific borehole to calculate the 1:200 and 1:500 DOs.

An example borehole performance graph is shown below.



The graph shows the baseline response (based on 2019 data) of the borehole groundwater level to pumping (Solid red line) and the DO calculated from this (Green Triangle: 5.13Mld at GWL=-8mOD). Baseline response of borehole gwl to pumping is determined manually to include most data available. Whilst a few values fall below this line, including this data would alter the DAPWL DO value, but no other DO value.

The dashed red line shows the impact of a 1:200 year return period drought to the response baseline (drawdown of 1.88m from baseline calculated using Sunderland Groundwater Model) and the recalculated DO (red triangle: 5.13Mld at GWL=-9.88mOD). Purple (vertical) dashed line = Annual average licenced abstraction rate (Primary DO constraint). Blue (horizontal) dashed line = DAPWL. Red star = DO at DAPWL for 1:200 return period drought (Calculated based on intercept with DAPWL constraint with plotted borehole response of groundwater level to pumping for 1:200 year return period).

The results, reduction in groundwater level, of the stochastic modelling is shown below.

Borehole	1:200 Additional drawdown	1:500 Additional drawdown
BH 10	1.88	1.66
BH 11	- **	- **
BH 15	3.11	2.45
BH 14	3.02	2.28
BH 13	2.86	2.08
BH 12	2.25	1.70
BH 16	4.52	3.73
BH 17	15.48	11.35

** The modelled values obtained for Borehole 11 are considered to be invalid. The borehole is known to be recharged via fracture flow. The current Magnesian Limestone groundwater model cannot model recharge via fracture flow. An alternative methodology to derive a meaningful impact on groundwater level and DO of climate change and drought is to use the model values calculated for Borehole 14 which is analogous to the hydrogeological response of the Borehole 11 to abstractions. It is anticipated for the WRMP24, a new groundwater model for the Magnesian Limestone will be available.

It should be noted that the modelled impact of the 1:200 return period drought is greater than the impact for the 1:500 return period drought. This factor is also observed in the Fell Sandstone and Essex and Suffolk regional Chalk groundwater modelling. At present this is considered to be a consequence of the selection of the rainfall data used in the groundwater model. The rainfall pattern prior to the drought (the timing of the start of the drought period), and the duration of the drought, will both have a significant impact on the results of groundwater modelling. The results of stochastic modelling on the Fell Sandstone Groundwater Model will be used to evaluate this observation.

The deployable output values to be used in the drought plan are those calculated for the 1:500 event. Those boreholes constrained by DAPWL are also constrained by the Trigger Level assign to that specific borehole and therefore have lower DO values.

Borehole	DO	Constraint
BH 10	5.13	Licence
BH 11	4.01	Licence
BH 15	6.99	DAPWL/Control Level
BH 14	6.3	DAPWL/Control Level
BH 13	4.59	Licence
BH 12	4.04	Licence
BH 16	2.24	DAPWL/Control Level
BH 17	5.59	DAPWL/Control Level
Total	41.47	

Based on the DAPWL DO data above, it may be seen that the greatest impact of a drought on the Kielder WRZ Groundwater sources is on Borehole 15, Borehole 14, Borehole 16 and Borehole 17. Thus for operational purposes, during a drought, groundwater abstraction rates would be decreased down to the DO levels shown in the table above at these four vulnerable boreholes and increased up to the DO levels shown above at Borehole 10, Borehole 11, Borehole 13 and Borehole 12 in order to maintain the total Deployable Output for the Sunderland GWS of 41.47mld. Should this combined abstraction rate fall short of what is required (due to operational or water quality requirements) then the deficit would need to be made up using the Sunderland Surface water supplies. This is considered achievable by increasing water supply at Mosswood and/or Lumley.

Berwick and Fowberry WRZ

Drought simulations for the Berwick WRZ, which is supplied entirely from the Fell Sandstone groundwater aquifer, were performed using the United States Geological Survey's 'MODFLOW 6' software. A bespoke MODFLOW model was built on behalf of NWL by the British Geological Survey (BGS) based on the most recent geological interpretation of the area by NWL (2018) and Ford et al. (2019). The model was calibrated with groundwater-level data from EA observation wells and NWL abstraction wells for the period 01/01/1988 to 01/12/2018. It simulates transient groundwater flow on daily time steps but with monthly stress period inputs of recharge and abstraction rate. Recharge inputs were calculated from historic rainfall data using the BGS' ZOODRM software, an object-oriented distributed recharge model.

From WReN rainfall and potential evapotranspiration data it was calculated that, under 1 in 200 year return period drought conditions lasting 24 months, rainfall would fall to approximately 75% of its long term average. These data are from the nearest possible rain gauge, though it is outside the confines of the modelled area. ZOODRM was used to estimate a relationship – specific to the recharge zone of the Fell Sandstone aquifer – between such a reduction in rainfall and the concomitant reduction in recharge. This relationship is represented by a numerical factor (0.19), which was applied to the historic recharge inputs to the MODFLOW model for 24 months, beginning at the end of 2009. Retaining the original recharge inputs and representing the drought as a

reducing factor like this provides the opportunity to perturb the model with novel climate scenarios whilst staying relatively true to BGS' original calibration. The aim of this method is to introduce as little additional uncertainty as possible. By comparing the outputs from this amended recharge scenario with those of the baseline historic simulation, a time series of "additional drought drawdown" was produced for each NWL groundwater station. The maximum value of additional drawdown due to the 1 in 200 year drought was assessed against the abstraction constraints (sustainable rates; annual and daily licenced rates) and groundwater level constraints (pump intake; deepest advisable pumped water level; base of borehole) for each well, from which it was possible to identify if there would be a reduction in deployable output under drought conditions.

There were three distinct types of response to the drought. Boreholes 6 and 7 showed a relatively rapid and significant decrease in water level of up to 13.47m and 11.68m respectively, after which they began to recover. Boreholes 5(1) and 5(2) (which were modelled together due to their proximity) displayed the same trend of rapid response followed by recovery, but to a much less significant maximum addition drawdown of 0.86m. Boreholes 3 and 4 showed similarly small additional drawdowns but at the end of the simulation, seven years after the end of the drought, they had not yet begun to recover. At this point, the additional drawdown of their water levels had equilibrated at 1.91m and 0.73m respectively. The modelling results suggest that those wells with greater values of transmissivity are most resilient to changes in recharge due to drought conditions.

For most of the wells, their abstraction is voluntarily constrained by NWL at sustainable rates calculated by the BGS during development of the MODFLOW model. These rates are significantly below the EA-mandated licences and afford NWL with resilience against future changes in groundwater level. The only well which requires a reduction in deployable output during a 1 in 200 year drought event is borehole 3 as here the abstraction is constrained by the pump intake level, due to a very steep yield curve. The loss in DO would be 0.45m3/hr, or, 0.0108Ml/d, although this loss could be recouped by lowering the pump.

APPENDIX 2: DROUGHT TRIGGERS – WORKED EXAMPLES

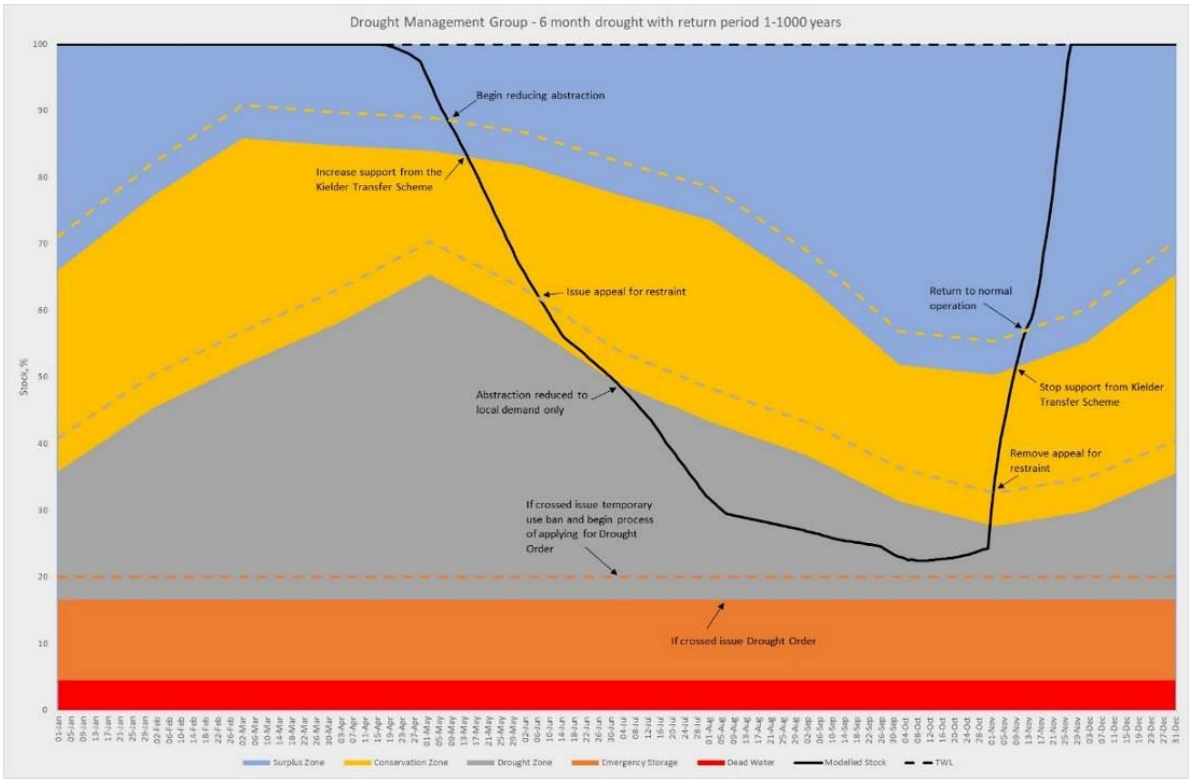
As part of the WRMP19 NW developed our planned level of service (LoS) that customers can expect to receive. LoS are expressed in terms of expectations about the frequency of restrictions on use of water during dry years and set out the standard of service that customers can expect to receive from their water company.

	Level of service	What this means	Stated return period
Level 1	Appeal for restraint	Ask our customers to use water wisely. For example, watering plants at night and not watering the lawn because grass is resilient to drought.	1 in 20 years (5% probability in any one year)
Level 2	Temporary Use Ban	Applies mainly to the domestic use of water and stops the use of a hosepipe or sprinkler for any garden watering or cleaning.	1 in 150 years (0.66% probability in any one year)
Level 3	Drought Order Ban	Expands what has been applicable to the domestic customer under the Temporary Use Ban, to non-domestic or commercial customers.	1 in 200 years (0.5% probability in any one year)
Level 4	Standpipe and Rotacuts	A temporary reduction or nil supply of water at the customer tap and use of stand pipes to fill containers.	1 in 500 years (0.4% probability in any one year)

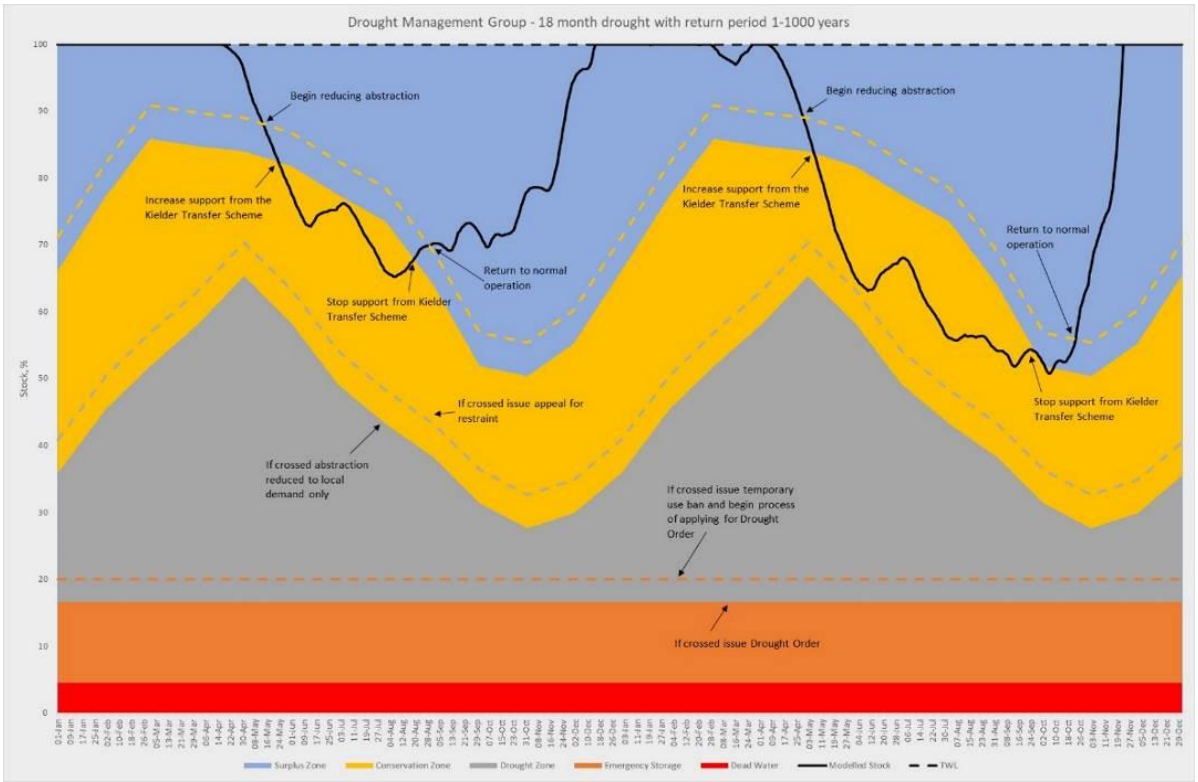
Kielder WRZ

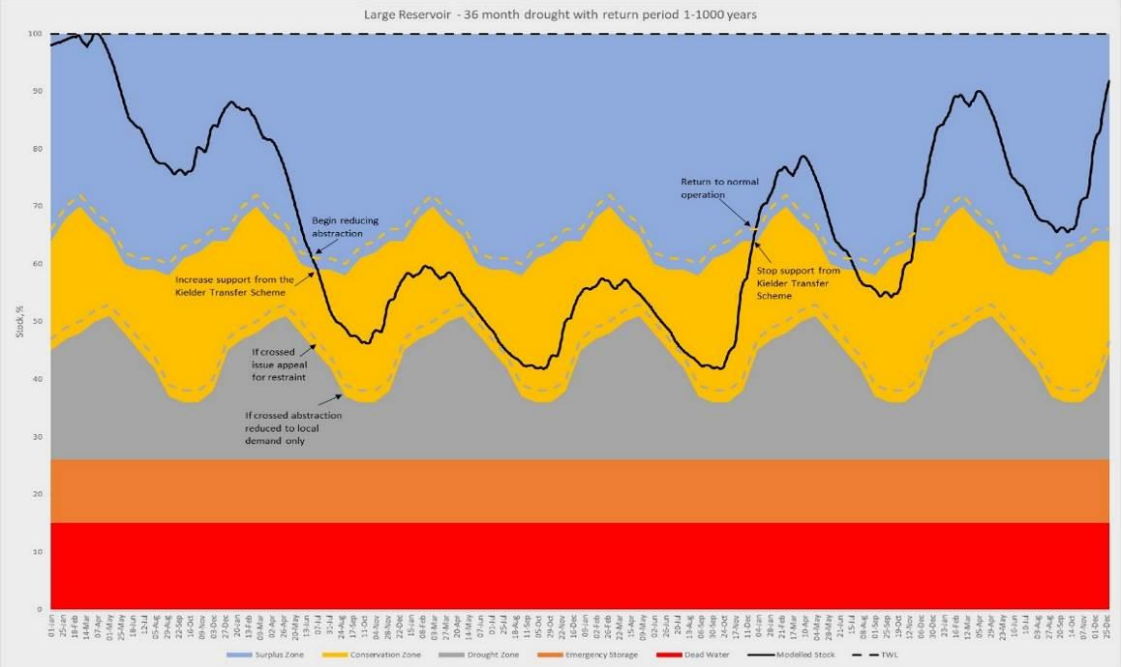
Surface water - reservoirs

The following worked examples are all taken from the Aquator runs used in the DVF analysis, all ran with demand equal to DO. Using DO in the model runs ensures that we are confident that along with meeting demand we can also meet target headroom and outage allowance.



As can be seen in the graph above the winter refill period is sufficient to fully refill the reservoir group due their relatively small storage capacity and large winter rainfall depths. This is evident in the plots of longer duration droughts, an 18 month drought is shown below, with the reservoirs refilling even in the drier winter.

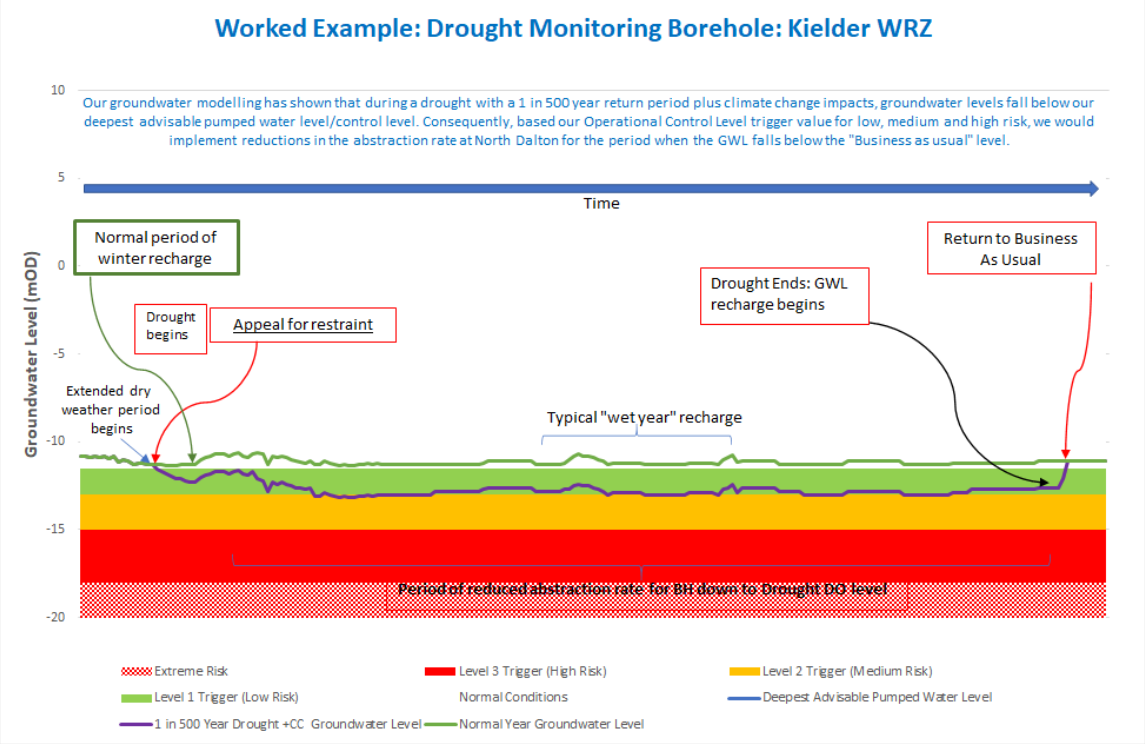




To illustrate the impact of a multi-year drought on a larger reservoir we have included the graph above. It demonstrates that even in an extreme drought (36 month, 1-1000 year return period) the capacity of the reservoir relative to the demand is such that we do not need to implement any restrictions beyond an appeal for restraint.

Groundwater

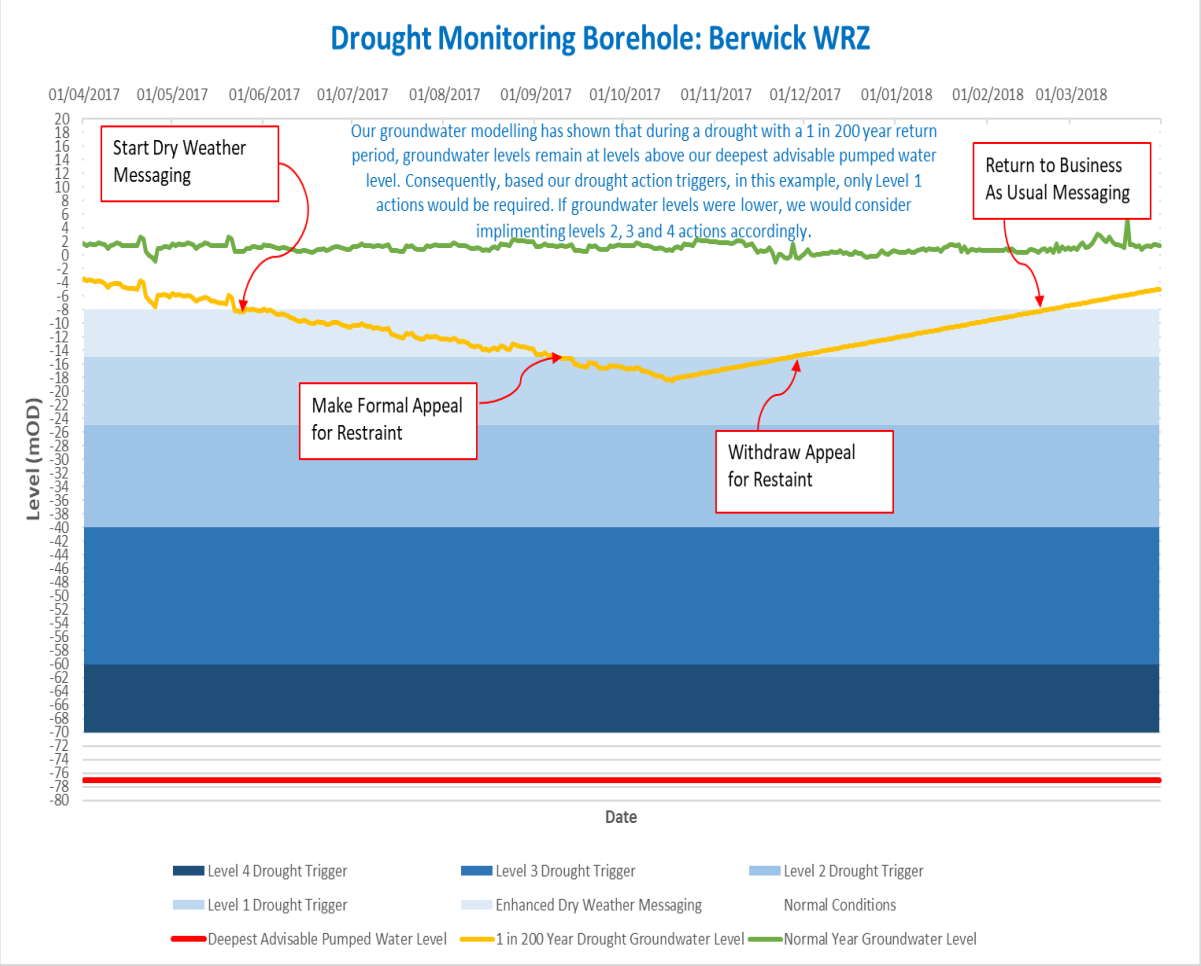
An example of monitoring groundwater level trends and the decision making/actions associated with the various stages of a drought based on the calculated Groundwater Trigger Levels is shown below.



Berwick & Fowberry WRZ

"Normal" groundwater levels in the plot are based on a typical annual seasonal variation in groundwater levels. The 1 in 200 year drought values are derived from the Fell Sandstone Groundwater Model where a 1:200 year rainfall drought event has been calculated as giving rise to an 81% drop in recharge to groundwaters. However, due to the storage capacity of aquifers, groundwater during a drought can be drawn from storage and thus the impact on groundwater levels is mitigated compared to surface water droughts. The Fell Sandstone model, when run for the borehole showing the greatest fall in groundwater level due to a 1:200 drought event shows an approximate 15m fall in local groundwater levels whilst maintaining abstraction at calculated sustainable abstraction rates. This 15m lowering of the water table has been artificially applied to the" normal" groundwater level to produce an example hydrograph of groundwater levels during a 1:200 year drought event.

Enhanced dry weather trigger level = -8mOD. Based on historical lowest observed dry-weather pumped groundwater level in Feb 2017 of approximately -6mOD. 2m headroom between lowest observed gwl and drought trigger is equivalent to approximately 0.33x observed seasonal variation in groundwater level of around 6m. Equivalent to approximately 50% of reduction in calculated gwl due to 1:200 year return period drought (7m) below Dry weather trigger.



EXPERIENCE OF 2018, 2019 AND 2020

The most recent prolonged dry period was in 2018/19 when rainfall varied from 43% of the Long Term Average (LTA) in May to 134% of the LTA in March.

Total stock levels were generally below average for most of the year. The levels started at just above average but as a consequence of the dry spring and summer quickly dropped. Given it size the lower than usual level in Derwent reservoir was a major factor in the overall low stock level. Our usual operations of careful management of reservoir levels enabled a gradual improvement throughout autumn and most of winter. However, a dry December and January saw levels drop again but following a wet March we ended up above average and only slightly below the position at the start of the period.

The level in Derwent dropped through rule curves which meant that our Treatment Works and the river Derwent were supported to varying extents by The Kielder Transfer Scheme from July to year end.

There was never a risk of any restrictions to water supply due to the lower than average reservoir levels because of the capability to support the system from Kielder.

Last year, 2020, combined reservoir storage was above average at the end of March, however due to the extremely dry weather in April and May, along with an increase in demand reservoir stocks were drawn down quickly.

Factors which influenced high demand included –

- **Hand washing and home hygiene:** A key Covid-19 measure is enhanced hand washing and home hygiene which in itself, resulted in an increased demand for water.
- **Home working:** Home working had a significant effect demand in the area.
- **Garden Water Use:** With so many people at home and some being furloughed, people took the opportunity to spend more time in the garden and to both pressure-wash their drives and patios, and to grow more flowers and vegetables.
- **Weather:**. With so many people staying local and postponing holidays, we believe garden water use was much higher than would have normally been the case with increased use of kids “slip and slides”, which require a continuous garden hose supply of water, and paddling pools. Some of the latter require a significant amount of water to fill which in most cases may be single use given how dirty the water quickly gets.

Reservoir stocks and WTW flows were carefully managed throughout the summer, this close management along with the weather turning wetter in June meant that reservoir stocks began to recover. Although demand remained above normal further wet weather in October and over the 2020/21 winter has meant that all reservoirs recovered to a healthy position.

Additionally, during this year we also had high levels of planned outage at our treatment works and even with the higher level of demand in our supply area, we maintained resilient supplies to all of our customers.

APPENDIX 3: DETAILED ENVIRONMENTAL ASSESSMENTS

We do not have any drought permit options and so have not needed to prepare any environmental reports.

APPENDIX 4:
RELEVANT LEGISLATION AND GUIDANCE

In producing this draft Drought Plan, reference was made to the following guidance and legislation:

- Water Company Drought Plan Guideline 2020, Environment Agency
- The Drought Plan (England) Direction 2020
- Drought Plan Guideline Extra Information: Environmental Assessment for Water Company Drought Plans, May 2016, Environment Agency
- Drought Plan Guideline Extra Information: Supplementary Information, April 2016, Environment Agency
- Drought Plan Guideline Extra Information: Drought Permit and Order Application Ready, November 2016, Environment Agency
- Water Company Drought Plan Guideline 2011, Environment Agency
- Water Industry Act 1991
- Water Act 2003 where s.63 inserts new sections 39B & 39C into the Water Industry Act 1991 and s.62 inserts new sections 37B-D into Water Industry Act 1991
- Drought Plan Direction 2005
- Drought Plan Regulations 2005
- Drought Direction 1991
- Flood and Water Management Act 2010 where s.36 amends the Water Industry Act 1991 by substituting a new s.76
- Water Use (Temporary Bans) Order 2010
- Environmental Assessment of Plans and Programmes Regulations 2004
- Conservation of Habitats and Species Regulations 2010
- Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act 2000, Section 28G.

APPENDIX 5:
EXCEPTIONAL SHORTAGE OF RAIN (ESoR) ASSESSMENT

The Environment Agency issued its latest draft guidance entitled Hydrological guidance for the assessment of an Exceptional Shortage of Rain (ESoR) on 18 March 2021.

The sections in the guidance that relate to drought permit and drought order applications is reproduced below.

Overview

An ESoR needs to be demonstrated as part of any future drought permit or drought order application. In the case of a drought permit or emergency drought order, the Environment Agency or Secretary of State, respectively, must be satisfied that a serious deficiency of supplies of water in any area exists or is threatened due to an exceptional shortage of rain. For a drought order, the Secretary of State must be satisfied that, due to an exceptional shortage of rain, a serious deficiency of supplies exists or is threatened, or such a deficiency in flow or level of any inland waterway to pose a serious threat to any flora or fauna which are dependent on those waters, exists or is threatened.

The EA's guidance states that it is not appropriate to set a prescriptive approach to assessing an ESoR case. Each drought and each situation is unique. This technical guidance provides additional detail on best practice for ESoR assessments and should be read in conjunction with the Environment Agency's supplementary guidance on drought permits and drought orders.

Practicalities

In the case of a water company drought permit application, the water company will undertake the ESoR assessment. A checklist for water companies has been included in this document (see Appendix A) and should be provided to water companies to help with their assessment. The ESoR assessment should include suitable graphical evidence, for example charts, maps and tables, as appropriate, to support the ESoR case.

The Environment Agency expects water companies to follow the methodologies outlined in its supplementary guidance on drought permits and drought orders.

As a minimum, the Environment Agency expect every assessment to include a rainfall ranking and SPI assessment for the full period of analysis available and if appropriate, supported by additional methods agreed by Environment Agency hydrologists.

Appendix A – Exceptional Shortage of Rain (ESoR) checklist for water companies.

Audience: Environment Agency

Purpose

This document is designed for water companies completing an Exceptional Shortage of Rainfall (ESoR) assessment as part of a drought permit application. You (the water company) must follow the checklist below when completing your ESoR assessment. You may wish to use the sub-headings below to structure your ESoR report. This document is not designed to be used as a template for your report.

Checklist

- Consult with the Environment Agency hydrology technical specialists, Area Drought Coordinator and water company lead (OCS) at as early stage as possible to agree the approach.

1. Introduction

- Provide an overview of the application and the area of interest.
- Provide details of the supply situation and the hydrological context.

2. Rainfall data

- You must use areal rainfall data for the catchment area of interest.
- In most circumstances, you should use the Environment Agency's HadUK / DRT dataset for Hydrological Areas which is provided to water companies on a monthly basis. If the Hydrological Areas are not appropriate then rainfall data can be extracted for a bespoke catchment area from the HadUK/DRT dataset by Environment Agency hydrologists. Fully explain which dataset has been used and why.
- If you have calculated areal rainfall yourself (you are strongly advised to avoid this):
  - You will need to demonstrate that your data is of better quality and / or more hydrologically relevant than the HadUK / DRT dataset.
  - Set out the limitations of the dataset.

- Your areal rainfall should be calculated in accordance with British Standard BS7843-4:201296. The rain gauges used must be quality controlled, have minimal missing data and be operated in accordance with British Standard.

3. Period of analysis

- Determine the start and end point of the period of analysis before starting the assessment. This is the period of the rainfall deficit which is used to support the ESoR case. You should agree the period of analysis with the relevant Environment Agency hydrologist, the Area Drought Coordinator and water company lead.
- The application should be submitted as soon as possible after the end of the period over which you believe the ESoR has occurred.
- Start of the period of analysis:
  - Provide clear evidence (e.g. charts / graphs) of the point at which the resource situation is no longer normal for the time of year. This should include both the onset of the rainfall deficit and the effects on the water supply situation.
  - Justify how the variables used here are reflective of the water supply situation in the catchment area of interest.
- End of the period of analysis:
  - Provide clear evidence (e.g. charts / graphs / reference to Drought Plan) that the rainfall deficit has triggered the need for a drought permit.
  - Use the latest rainfall data at the point of the application.

4. Geographical extent of analysis

- Provide justification for the catchment area used in the analysis. In most circumstances, this will be one or several of the Environment Agency's Hydrological Areas.
- Provide evidence of how the rainfall deficit is relevant to the catchment area of the public supply source or the wider integrated water resource zone / sub unit of this zone.
- Catchments less than 10 km² or those without a rain gauge located within them should not be used.

5. Technical rainfall analysis methods

- Refer to the Environment Agency's supplementary guidance on drought permits and drought orders. This is available internally on the Content

Cloud and externally it will be shared with water companies on SharePoint or by request from the Water-Company-Plan mailbox.

- Use the same rainfall dataset (usually HadUK / DRT) for each analysis method (as set out in the sections above) and the same historic period of record (from 1891).
- Use your assessment period of analysis for each method as your main evidence. If you use any shorter periods as supporting evidence (for example, the winter refill period), justify how these are relevant to the water resource situation.
- Detail any limitations and uncertainties associated with the methodology, and the possible impacts on the results.

6. Other meteorological and hydrometric measures

- This analysis should not detract from your evidence that the reason for a serious deficiency is an ESoR.
- Refer to the Environment Agency's supplementary guidance on drought permits and drought orders. This is available internally on the Content Cloud and externally it will be shared with water companies on SharePoint or by request from the Water-Company-Plan mailbox. The internal Environment Agency guidance document contains more details on best practice.
- Use your assessment period of analysis for each method as your main evidence. If you use any shorter periods as supporting evidence (for example, the winter refill period), justify how these are relevant to the water resource situation.
- Detail any limitations and uncertainties associated with the methodology, and the possible impacts on the results.

7. Overview / Other

- You should consider the relationship to the threat of a serious deficiency of supply in the catchment area of interest.
- You should consider the relationship to the water company system.
- You may wish to include a forward look based upon a meteorological forecast

8. Summary and conclusions

- Provide a summary of the evidence for an ESoR drawing on your evidence from your technical analysis.

APPENDIX 6:
SUMMARY DROUGHT OPTIONS FORMS

Demand Side Drought Actions

Demand Side Drought Action Name	Level 1 Appeal for Restraint
Trigger(s) Or preceding actions	Level 1 drought trigger as per worked examples (See Appendix 3) Would follow enhanced dry weather messaging
Demand Saving or DO of Option (Mld)(1)	~0 to 7% annual average ~0 to 14% peak
Location	By Water Resource Zone
Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: - 1 week to implement campaign Most effective during hot weather (late Spring and summer)
Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None required – at water company discretion. Liaison with WReN, neighbouring water companies and EA
Risks associated with option	Customers already sufficiently water-wise resulting in lower saving.

Demand Side Drought Action Name	Level 2 Temporary Use Ban
Trigger(s) Or preceding actions	Level 2 drought trigger as per worked examples (See Appendix 3)
Demand Saving or DO of Option (Mld)	~0 to 5% annual average ~0 to 10% peak
Location	By Demand Management Area (Essex and / or Suffolk)
Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: - 2 weeks to place adverts in newspaper and plan media communication; followed by 3 weeks for representation after publishing on ESW's website
Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	None but liaison with WReN, neighbouring water companies, EA, CCW and Defra would take place.
Risks associated with option	Customers already sufficiently water-wise resulting in lower saving.

Demand Side Drought Action Name	Level 3 Non-Essential Use Ban Drought Order
Trigger(s) Or preceding actions	Level 3 drought trigger as per worked examples (See Appendix 3)
Demand Saving or DO of Option (Mld)	~0 to 2% annual average ~0 to 4% peak
Location	By Water Resource Zone
Implementation Timetable Preparation time, time of year effective, duration	From DMG approving drought action: 2 months to finalise drought order application and determination, communication with public, time to place adverts in newspaper and send prohibition notices. Maximum duration 3 months before extension required.
Permissions required and Constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Emergency Drought Order Secretary of State Liaison with EA, CCW and Defra required.
Risks associated with option	Negative impact on affected businesses.

APPENDIX 7:
ENVIRONMENTAL PERMITS AND DROUGHT ORDERS

We do not have any drought permit or drought order supply side drought actions.

APPENDIX 8:
TEMPORARY USE BAN REGIONAL ALIGNMENT

We will adopt the following TUB enforcement policy which other water companies, particularly in the Water Resources South East (WRSE) and Water Resource East (WRE) regions have agreed to use,.

The following enforcement policy is a universal document for water companies to use when implementing a TUB.

TEMPORARY USE BAN ENFORCEMENT POLICY

1. Introduction

Northumbrian Water is the statutory water and sewerage undertaker for an area covering approximately [add a broad descriptive geographical].

A map showing the region for which Northumbrian Water is appointed to act as the statutory water undertaker is shown shaded in blue and attached to this document as Appendix 1. This area is referred to within this document as “the Northumbrian Water Region”.

On [date] Northumbrian Water imposed, throughout the Northumbrian Water Region, a prohibition on the use of water for a number of specified categories of use, in accordance with section 76 of the Water Industry Act 1991. This is referred to as the Temporary Use Ban or TUB. The TUB was imposed because of the serious deficiency of water available for distribution and its terms are as follows:

The TUB took effect from midnight on [date] following publication of the notice on the Northumbrian Water website and in the [insert newspaper name], The Times and the Daily Mail newspapers on [date]. The terms of the TUB are attached to this document as Appendix 2.

Under the terms of section 76(5) of the Water Industry Act 1991, if any person fails to comply with the terms of the TUB that person shall be guilty of an offence and liable on conviction in the Magistrates’ Court to a fine of up to £1000.

This enforcement policy sets out the standards and guidance that will be applied by Northumbrian Water when undertaking its enforcement role within the provisions of the Water Industry Act 1991.

Where infringements and contraventions are found, Northumbrian Water will respond in a manner commensurate with the need to safeguard the availability of water available for distribution. Wherever possible, Northumbrian Water will offer advice to those who may have contravened the prohibition in a bid to remedy infringements in a timely and cost effective manner. However, in particular cases, offenders may face prosecution.

The purpose of this enforcement policy is to seek to ensure that when enforcement action is required, it is pursued in a consistent, balanced and fair manner.

2. Overall Aim

It is intended that this policy will seek to ensure compliance with the TUB within the Northumbrian Water Region, in an attempt to conserve water, in a fair, open and consistent manner having regard, where appropriate, to the circumstances of each individual case and the extent to which the terms of the TUB have been contravened.

3. Guiding Principles

Whilst undertaking its regulatory and enforcement role in connection with the TUB, Northumbrian Water will have regard to the following Guiding Principles:

- Any decision regarding enforcement action will be impartial and objective, and will not be affected by race, politics, gender, sexual orientation or the religious beliefs of any alleged offender, victim or witness.
- Northumbrian Water will use as its starting position when considering enforcement of the TUB the belief that the vast majority of persons wish to comply with the terms of the TUB and should be assisted in doing so by Northumbrian Water following the Investigational Phase process set out in Appendix 3 below ("the Investigational Phase"), if reasonably practicable.
- There will be a consistent approach to enforcement whilst recognising individual circumstances.
- Prosecution for an offence under the Water Industry Act 1991 will be considered in all cases, but particularly where a serious, severe, persistent and/or blatant breach of the relevant legislation has taken place or where alternative methods of resolution have failed.

4. Standards

Northumbrian Water will try to meet the highest standards of service whilst undertaking its regulatory and enforcement function in connection with the TUB. The following specific level of service standards will be applied in connection with the TUB: -

- Matters relating to enforcement of the TUB will be dealt with promptly with written enquiries and complaints receiving a response or acknowledgement within ten working days.
- Employees of Northumbrian Water employed to monitor compliance with the TUB will announce themselves on arrival at any premises and promptly show credentials/identification unless they are already known to the person or persons on such premises.
- Employees of Northumbrian Water employed to monitor compliance with the TUB will provide their name and a Northumbrian Water contact telephone number to those persons with whom they are in written contact concerning enforcement of the TUB.
- Complaints relating to persons failing to comply with the TUB will be dealt with promptly, though we will always request the name and address of the complainant. Any such identification will be treated in confidence, but may

need to be disclosed (with prior consent) should formal legal proceedings be taken against the person or persons to which the complaint relates. Anonymous complaints however, will still be investigated.

- Northumbrian Water will be professional, courteous and helpful in its enforcement of the TUB and wherever possible will seek to work with persons towards compliance using the Investigational Phase.
- In accordance with the Investigational Phase at the onset of considering enforcement action Northumbrian Water will provide the person(s) believed to be contravening the TUB in writing with full details of the manner in which it is alleged the TUB has been breached and the steps that are required to be undertaken and by when to avoid enforcement action being taken.

5. Consistent Enforcement

Consistent enforcement action is desirable, but absolute uniformity would be unfair by failing to recognise individual circumstances that may modify action to be taken where it is permissible. Consistency of approach whilst allowing a degree of discretion will be encouraged by:

- Appropriate training and supervision of those employed by Northumbrian Water to monitor and enforce compliance with the TUB. Amongst other things, they will be made fully conversant with the terms of this Enforcement Policy and its Appendices.
- Ensuring there is compliance with the standards set out in this policy by Northumbrian Water.
- Recognition that it may not be in the interests of justice to prosecute a person found to be breaching the terms of the TUB in those cases where there is only sufficient evidence to prove a minor infringement.
  The final decision whether or not to prosecute will be taken by Northumbrian Water's Executive Management Team, who will be aware that each case is unique and must be treated on its own merits.

6. Assessing Appropriate Action (in cases of infringement)

The Investigational Phase that will be undertaken by Northumbrian Water sets out the detailed steps that will be taken by Northumbrian Water **before** enforcement action is taken against a person found to be contravening the TUB. Northumbrian Water will seek to ensure that the process identified in the Investigational Phase attached below as Appendix 3 as it applies to each individual case will be followed to allow a person sufficient time to demonstrate compliance with the terms of the TUB before enforcement action will be taken.

Prosecution will normally be considered where one or more of the following criteria are satisfied:-

- There is a need to protect the public interest and the interests of the environment, health, safety and such other interests.
- Informal approaches have failed.
- The persons concerned have ignored requests for compliance with the TUB.

- There has been a repeated serious and/or blatant contravention which is a clear overt challenge to the TUB and has potential to undermine customer confidence in the fairness of the restriction.

Northumbrian Water accepts that the decision to institute criminal proceedings against a person or persons who fail to comply with the terms of the TUB is a serious one that should only be taken after full consideration of all the facts.

Northumbrian Water is not bound by, but chooses to accept the provisions of the Code for Crown Prosecutors, January 2013 As such, Northumbrian Water will only institute criminal proceedings when it is satisfied that the two stages of the Full Code Test: (i) the evidential stage; and (ii) the public interest stage, have been met.

The evidential stage is passed when there is sufficient evidence to provide a realistic prospect of conviction against each defendant on each charge. A realistic prospect of conviction means that a bench of magistrates, properly directed in accordance with the law, is more likely than not to convict the defendant of the charge alleged.

The public interest stage is applied by balancing public interest factors for and against prosecution. A prosecution will usually take place unless there are public interest factors tending against prosecution which clearly outweigh those tending in favour. Public interest factors that can affect the decision to prosecute usually depend on the seriousness of the offence or the circumstances of the offender. Some factors may increase the need to prosecute but others may suggest that another course of action would be better.

Both the evidential and public interest stages will be considered fairly and objectively by Northumbrian Water.

[Date]

Appendix 1 Map of Northumbrian Water Region

Insert a map showing the geographical area for which Northumbrian Water is appointed as the statutory water ("the Northumbrian Water Region")

Appendix 2: Terms of the Temporary Use Ban

Temporary Use Ban:
Section 76 Water Industry Act 1991
Potable* water supplied throughout the area of [Company name] Utilities Limited must NOT be used for the following purposes:

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 (except when using hand held containers filled directly from a tap);
6. drawing water, using a hosepipe, for domestic recreational use;

7. filling or maintaining a domestic pond (excluding fish ponds) 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.

Definition of a garden
A “garden” includes all of the following: a park; gardens open to the public; a lawn; a grass verge; an area of grass used for sport or recreation; an allotment garden, as defined in section 22 of the Allotments Act 1922; any area of an allotment used for non-commercial purposes; and any other green space.

Exemptions
The following will be exempted from the restrictions:

i) using a hosepipe in a garden or for cleaning walls or windows of domestic premises, paths or patios, a private leisure boat or an artificial outdoor surface, where such use is necessary for health and safety reasons.

ii) people with severe mobility problems who hold a current Blue Badge as issued by their local authority will not be prohibited from using a hosepipe to water a garden attached to a domestic dwelling, plants on domestic premises, or allotments where the Blue Badge holder is the tenant.

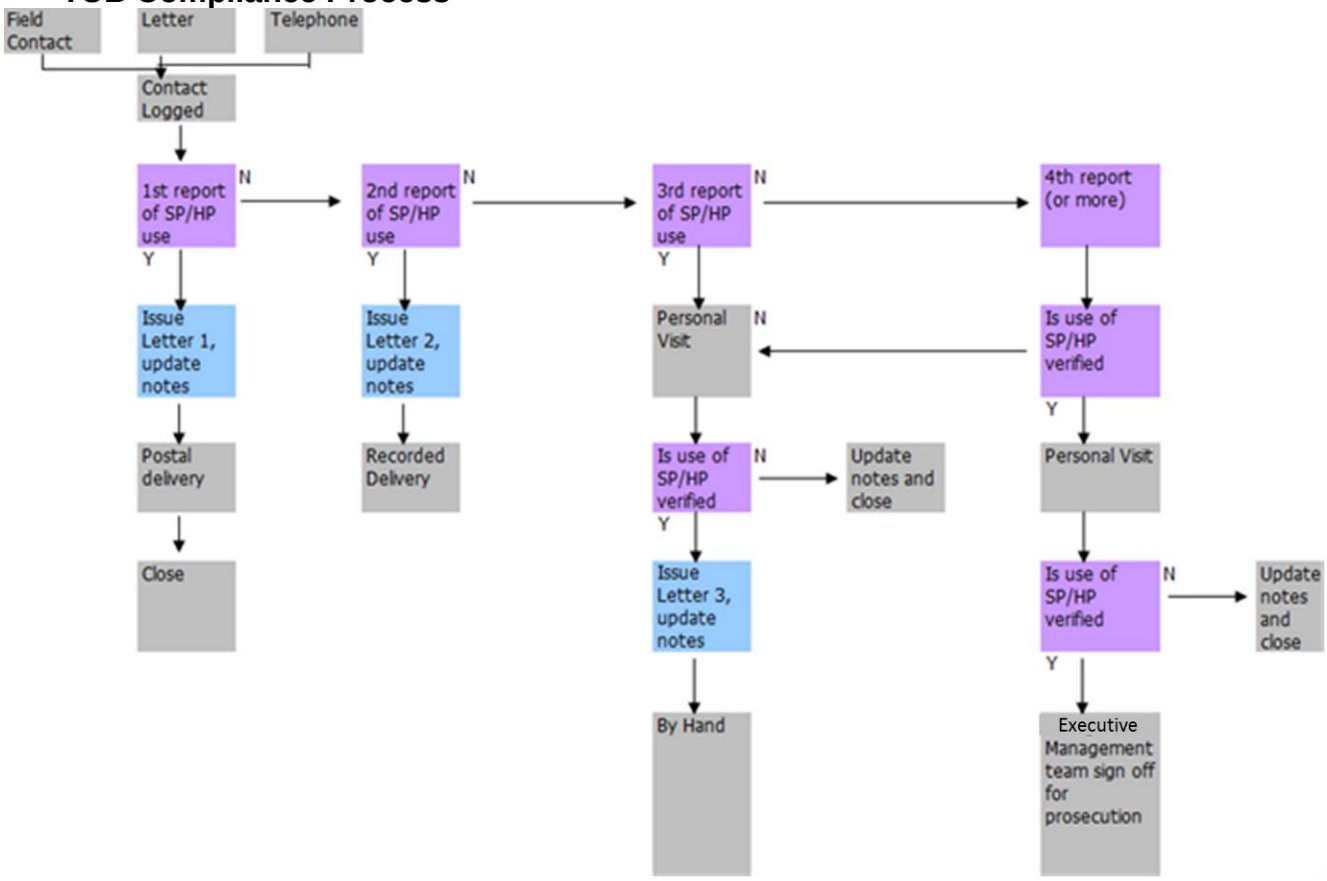
iii) using a hosepipe to clean a private motor vehicle, walls and windows of domestic premises, or paths, patios and other outdoor surfaces where this is done as a service to customers during a business.

iv) using a hosepipe to water an area of grass or artificial outdoor surfaces used for sport or recreation, where this is required in connection with a national or international sports event. A list of qualifying events will be published on [Company name]’s website and updated as and when required.

v) drip or trickle irrigation watering systems, fitted with a pressure reducing valve and a timer, that are not handheld, that place water drip by drip directly onto the soil surface or beneath the soil surface, without any surface run off or dispersion of water through the air using a jet or mist.

Appendix 3: TUB Non-compliance Investigational Phase (Flowchart)

TUB Compliance Process



APPENDIX 9:
TEMPORARY USE BANS DEFINITIONS

Definition of "using a hosepipe"

For the purposes of a TUB, we have used the definition of "using a hosepipe" as that given in the Water Use (Temporary Bans) Order 2010 as follows:

a) Drawing relevant water through a hosepipe;
b) Drawing relevant water through a hosepipe from a container and applying it for the purpose; and
c) Filling or partly filling a container with relevant water by means of a hosepipe and applying it for the purpose.

A reference to a hosepipe includes anything designed, adapted or used for the same purpose as a hosepipe. "Relevant water" refers to mains water i.e. supplied by the water undertaker; it does not include water supplied before the water restriction was implemented.

The legislation does not state any exemptions to the definition of a hosepipe.

We considered whether micro-irrigation systems should be exempted from a temporary use ban but concluded that they should not be exempted. Whilst we recognise micro-irrigation systems use water more efficiently than a hosepipe or sprinkler, a 1 in 20 year ban is more about conserving water than using water more efficiently. If micro-irrigation was exempted from a hosepipe ban, more systems would be sold during the ban thereby decreasing some of the volume of water conserved from the imposition of the hosepipe ban.

The above definition of a hosepipe applies to all of the 11 categories detailed below:

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

Although all of these uses of hosepipes are banned, it is important to note that during any TUB, gardens may still be watered:

- by hand using a bucket or watering can;

- with grey-water (ex bath/ washbasin water) through a hosepipe; and / or
- using rainwater from a water-butt through a hosepipe (assuming sufficient rainfall).

Further explanation of uses to be banned

Watering a garden using a hosepipe

The definition of "a garden" has been widened and clarified under the Water Use (Temporary Bans) Order 2010. We intend to ban the use of watering using a hosepipe for all categories allowed to be banned, with no exceptions.

The areas where watering a garden using a hosepipe will be banned under Phase 1 are:

a) a domestic garden
b) a park
c) gardens open to the public
d) a lawn
e) a grass verge
f) an area of grass used for sport or recreation
g) an allotment garden
h) any area of an allotment used for non-commercial purposes
i) any other green space

Exemptions: Under legislation a "garden" does not include the following, meaning hosepipe use is allowed to continue in these areas under a Phase 1 temporary use ban.

a) agricultural land
b) other land used in the course of a business for the purposes of growing, for sale or commercial use, any crops, fruit, vegetables or other plants.
c) land used for the purpose of a National Plant Collection.
d) a temporary garden or flower display
e) plants (including plant organs, seeds, crops and trees) which are in an outdoor pot or in the ground, under cover. NB for domestic purposes watering of these by a hosepipe is still banned under our Phase 1 but it comes under a different category in the legislation.

(Legislation excludes the banning of "watering a garden using a hosepipe" when the use is for "health or safety reasons". However use of this exclusion is likely to be rare and the company would scrutinize the genuineness of such a claim).

Cleaning a private motor-vehicle using a hosepipe

Washing of any private motor vehicle, using a hosepipe is banned. This includes commercial car wash businesses that use hosepipes or pressure washers to wash customer's cars. Private cars can still be washed by householders and commercial businesses by hand using water from a bucket.

Exemptions: Legislation excludes:

a) a public service vehicle, as defined in section 1 of the Public Passenger Vehicles Act 1981; and
b) a goods vehicle as defined in section 192 of the Road Traffic Act 1988.

NB. Taxis and minicabs are public service vehicles and are therefore excluded from the ban.

Commercial carwashes, that do not use a hosepipe or similar apparatus, are also exempt from this ban.

Watering plants on domestic or other non-commercial premises using a hosepipe

This category covers the banning of watering by a hosepipe of plants which are in an outdoor pot or in the ground, under cover (predominantly plants growing in a greenhouse border).

“Domestic or other non-commercial premises” means

a) Any land, building or other structure used or enjoyed in connection with the use of any of the following which is used principally as a dwelling:

    - A building or part of a building
    - A caravan
    - A boat
    - Any land or premises which is not used principally for the purpose of a business

Exemptions: Legislation defines some exemptions:-

- Plants in outdoor pots and in the ground, undercover in public authority premises
- Plants in outdoor pots and in the ground, undercover in commercial premises
- Plants grown or kept for sale or commercial use
- Plants that are part of a National Collection or temporary garden or flower display.

Whilst Local Authorities are not restricted in their watering of plants, using a hosepipe, in outdoor pots or in the ground, under cover by the Phase 1 ban, we would expect them to also cease watering this category when a ban is imposed. This is likely to be seen to be fairer by the public and helps to fulfil a Local Authority’s duty under the Water Act 2003 to conserve water.

Cleaning a private leisure boat using a hosepipe

Using a hosepipe to clean a private leisure boat is banned. A private leisure boat is defined as “a vessel or other thing, other than a seaplane, which is designed, constructed or adapted to move through, in, on or over water”. Boats in private ownership only are included, whether trailer launched or not. The ban includes all small water craft also e.g. canoes, kayaks, jet skis etc.

Exemptions: Legislation exempts the following:

- Vessels used in the course of a business
- Vessels made available or accessible to the public
- Cleaning of any area of a private leisure boat which, except for doors and windows, is enclosed by a roof and walls
- Using a hosepipe to clean a private leisure boat for health or safety reasons.

Filling or maintaining a domestic swimming or paddling pool

A domestic swimming or paddling pool is defined as swimming or paddling pool, other than a pool that is being used for the purpose of a business, which is:

a) in a building or part of a building used principally as a dwelling; or
b) on any land or in any building that is used or enjoyed in connection with (a).

Exemptions: Legislation excludes filling or maintaining a pool:

a) where necessary in the course of its construction
b) using a hand-held container filled with water drawn directly from a tap
c) that is designed, constructed or adapted for use in the course of a programme of medical treatment
d) used for the purpose of decontaminating animals from infections or disease
e) used in the course of a programme of veterinary treatment
f) in which fish or other aquatic animals are being reared or kept in captivity.

Drawing water, using a hosepipe, for domestic recreational use

This category covers the banning of the use of a hosepipe to operate water slides or other domestic recreational equipment. This is interpreted to mean both slides designed to be used with water and any temporary or ad hoc water slides or sprinklers. Recreational use covers the use by adults or children.

Exemptions: There are no legislative exemptions.

Filling or maintaining a domestic pond using a hosepipe

This restriction is fairly limited in the number of ponds likely to be effected. A wider ban on filling ponds comes in under the Phase 2 restrictions and requires the company obtaining a Drought Order under the Drought Direction 2011. A “domestic pond” is defined as a pond, including a swimming pond, on land that is used in connection with a building, or part of a building, used principally as a dwelling; and is not being used for the purpose of a business. A pond can be natural or man-made and can be internal or external, and includes ornamental ponds.

Exemptions: Legislation excludes filling or maintaining a pond in which fish or other aquatic animals are being reared or kept in captivity.

Filling or maintaining an ornamental fountain

This category covers any water fountain or water cascade that serves a purpose that is primarily decorative. This includes sculptures that have a water component. Filling by any means is banned including permanent plumbing.

This ban applies equally to fountains, cascades and sculptures using water that are privately owned or publicly owned. It also applies to features that use recycled water.

Exemptions; Legislation exempts the filling or maintaining of an ornamental fountain which is on 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.

Cleaning walls, or windows, of domestic premises using a hosepipe

This category refers to the cleaning of walls or windows on domestic premises using a hosepipe. The restriction also applies to businesses cleaning domestic walls or windows using such apparatus as water-fed poles.

A domestic premise is defined as:

a. A building used principally as a dwelling or dwellings
b. A garage, shed, outbuilding or other building or structure used or enjoyed in connection with a building used principally as a dwelling; or
c. A wall or other means of enclosure within the cartilage of a building used principally as a dwelling.

Exemptions: Legislation exempts cleaning activities for health and safety reasons. However these are likely to be rare with health or safety reasons likely to be restricted to:

- Removing or minimising any risk to human or animal health or safety; and
- Preventing or controlling the spread of causative agents of disease.

Cleaning paths or patios using a hosepipe

This ban on use applies regardless of who is carrying out the cleaning and regardless of whether they are on domestic or commercial premises. The ban applies whatever the paths or patios are made of.

Exemptions: Legislation only exempts cleaning using a hosepipe for health or safety reasons. Again these exemptions are likely to be rare and similar to the exemptions for H & S given in (**9**).

Cleaning other artificial outdoor surfaces using a hosepipe

This category bans the use of a hosepipe for outdoor cleaning of artificial surfaces regardless of who is doing the cleaning and regardless of whether the premises are domestic or commercial. Artificial outdoor surfaces are defined as:

a) Any area outdoors which is paved or laid with hard or artificial material;

b) Timber decking;
c) A quay (including a jetty, pontoon, wharf or slipway).
d) A trailer designed, constructed or adapted to launch boats or other vessels or craft into water, other than a private motor vehicle
e) The roof of any domestic premises.

Exemptions: Legislation only exempts cleaning using a hosepipe for health or safety reasons. Again these exemptions are likely to be rare and similar to the exemptions for H & S given in (**9**).

APPENDIX 10:
NON-ESSENTIAL USE BAN DEFINITIONS

Commercial Premises

- For the purpose of a Drought Order, commercial premises are defined as:- "any land, building, other structure or premise not being domestic or other non-commercial premises within the meaning of the Temporary Water Use Ban".

Watering outdoor plants on commercial premises using a hosepipe

- This banning of activity covers:
  - Plants which are in a pot or other container that is outdoors or undercover
  - Plants which are in the ground under cover.
  -
- **Exemptions**: Legislation exempts the watering of plants using a hosepipe that are:-
  - Grown or kept for sale or commercial use; or
  - Part of a National Collection or temporary garden or flower display.

Filling or maintaining a non-domestic swimming or paddling pool

- For the purpose of the Drought Order, the Drought Direction 2011 defines non domestic swimming or paddling pools as "a swimming or paddling pool as defined and covered by the Water Industry Act S76(2)(e). The intention is that filling of domestic pools will already have been banned under the Temporary Water Use Ban.

- **Exemptions**: Legislation exempts the following from filling or maintaining pools:
  a. That is open to the public
  b. Where necessary in the course of its construction
  c. That is designed, constructed or adapted for use in the course of a programme of medical treatment
  d. That is used for the purpose of decontaminating animals from infections or disease
  e. Used in the course of a programme of veterinary treatment
  f. In which fish or other aquatic animals are being reared or kept in captivity
  g. That is for use by pupils of a school for school swimming lessons

  For the purpose of exemptions "Open to the public" is defined as:

  A pool is **not** open to the public if it may only be used if the user is a paying member of an affiliated club or organisation i.e. these are not exempt.

Filling or maintaining a pond

- This extends the areas of pond filling or maintaining being banned beyond those already covered by the Temporary Water Use Ban. Non domestic ponds are now also covered by the ban on the use of hosepipes and both domestic and non-domestic ponds are banned from having water added by a fixed pipe. Ponds include manmade and natural ponds of any size.

- **Exemptions:** Legislation exempts the filling of any ponds, domestic or non-domestic, by hosepipe or fixed pipe, which contains fish or other aquatic animals that are being reared or kept in captivity. It also excludes the filling of any ponds using a hand-held container which is filled with water directly drawn from a tap.

Operating a mechanical vehicle-washer

- This is fully defined as “operating a mechanical vehicle-washer, whether automatic or not”.

- **Exemptions:** There are no exemptions in legislation. While we are not considering any outright exemptions, we would intend to delay implementing this ban, for as long as we consider sensible, for mechanical washers that recycle water and use less than 23 litres of water per vehicle wash.

Cleaning any vehicle, boat, aircraft or railway rolling stock using a hosepipe

- A boat is interpreted, in this case, as a vessel or other thing that:
  - Is designed, constructed or adapted to move through, in, on or over water; and
  - Is not a private leisure boat within the meaning applied under the Temporary Water Use Ban.
- A vehicle is defined as any of the following which is not a private motor vehicle within the meaning of the Temporary Water Use Ban:
  - A vehicle, designed, constructed or adapted for use on roads; or
  - A trailer or other thing designed, constructed or adapted for attachment to a vehicle falling within a) above.
  - Railway rolling stock is interpreted to include passenger train cars, freight train cars, locomotives and tube trains.
  - Aircraft are interpreted to include privately and commercially owned airplanes, helicopters, gliders and hot air balloons.

- **Exemptions:** The only exemption in legislation is on the grounds of health or safety reasons.

Cleaning non-domestic premises using a hosepipe

- The activity to be banned is defined as:
  - Any exterior part of a non-domestic building other than a window
  - A non-domestic wall

- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Cleaning a window of a non-domestic building using a hosepipe

- This restriction is equivalent in all ways to that covered under the Temporary Water Use Ban for domestic properties. The ban extends to the use of water fed poles where mains water is the source used to create the de-ionised water.

- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Cleaning industrial plant using a hosepipe

- In this restriction "plant" is defined to mean "*The equipment, including machinery, tools, instruments and fixtures necessary for an industrial operation"*
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Suppressing dust using a hosepipe

- The Drought Direction 2011 defines "using a hosepipe" as:
  - Drawing relevant water through a hosepipe from a container and applying it for the purpose; and
  - Filling or partly filling a container with relevant water by means of a hosepipe and applying it for the purpose.
- This also includes anything designed, adapted or used for the same purpose as a hosepipe.
- **Exemptions:** The only exemption in legislation is on the grounds of health or safety.

Operating a cistern in any building that is unoccupied and closed

A cistern is defined as meaning an automatically-operated flushing cistern which services a WC pan or urinal.

Occupation of a building by security staff is interpreted to comprise a building that is “unoccupied”.

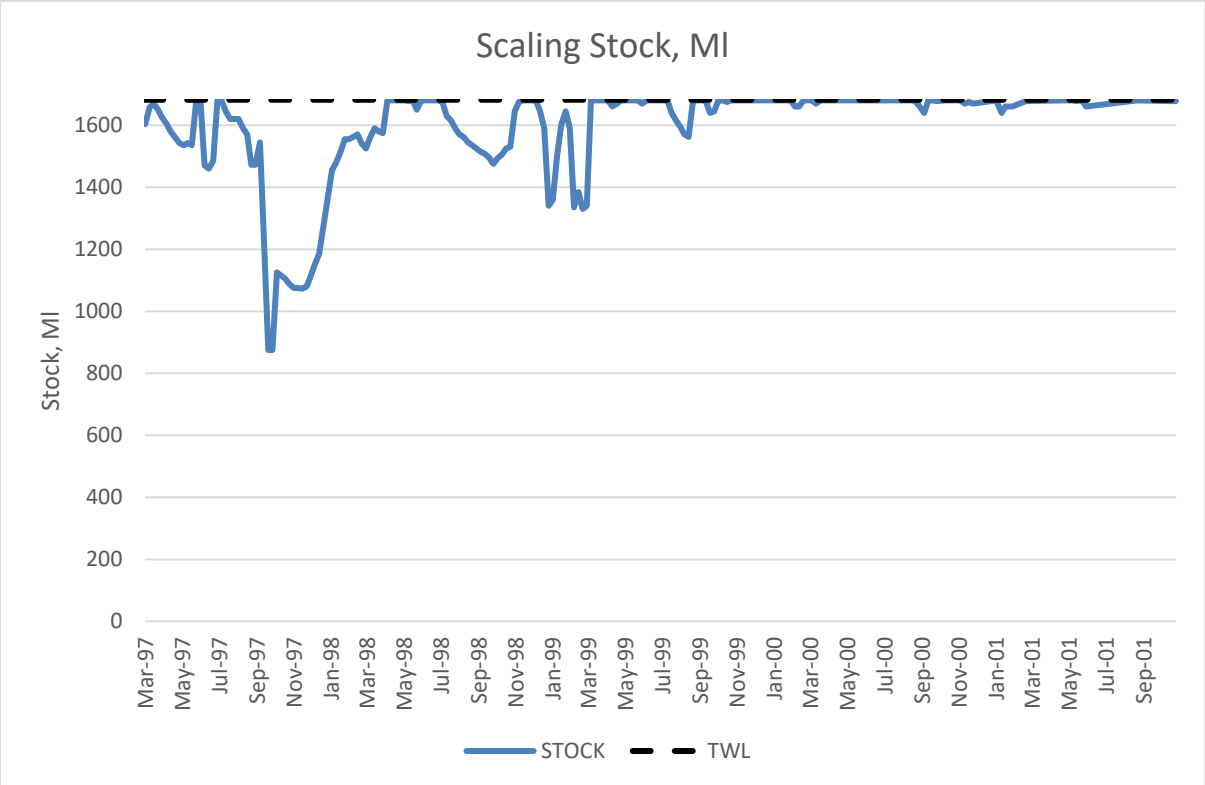
APPENDIX 11:
COMPENSATION ONLY RESERVOIRS

A Compensation Only Reservoir (COR) is a reservoir that is owned and operated by a water company but that has no links whatsoever (direct or indirect) to that company's public water supply network. So for example, the COR would not be listed as a source of supply in the company water resources management plan or as an option to provide public water supply in its drought plan. The main or sole function of the COR is to provide a discharge of water (known as a compensation flow) to the downstream watercourse.

We have one such reservoir, Scaling Dam, at the extreme south east of our region. Built in 1953 with a capacity of 1690 Megalitres (Ml) it originally supplied Scaling Water Treatment Works. The treatment works were abandoned in 1999 and the reservoir is now used only for leisure purposes.

Under the Cleveland Water Order 1950 we must make a continuous compensation release of not less than 0.682 Ml.

The graph below shows the storage in the reservoir prior to and after the abandonment of the treatment works.



The key legislation for drought incident management in relation to CORs is set out in the Water Resources Act 1991 (WRA 1991, Part 2, Chapter 3) which states:-

If the Secretary of State is satisfied that, by reason of an exceptional shortage of rain, there exists or is threatened—

(a) a serious deficiency of supplies of water in any area, or
(b) such a deficiency in the flow or level of water in any inland waters as to pose a serious threat to any of the flora or fauna which are dependent on those waters,
then,**]**, subject to the following provisions of this Chapter, he may by order (in this Chapter referred to as an "ordinary drought order") make such provision authorised by this Chapter as appears to him to be expedient with a view to meeting the deficiency. In the case of a drought the assumption is that the necessity for action would be in line with b) above and the requirement would be to alter the compensation flow.

Currently the reservoir generally operates at or close to its Top Water Level (TWL) and the only adjustments we make are to increase the downstream flows above compensation in an attempt to avoid the reservoir overflowing.

From the graph above it can be seen that in Sept 1997 the level dropped to 875 Ml.

Based on an example where the level starts just below the TWL with a storage volume of 1600 Ml and it can be dropped to the 1997 low level of 875Ml then the compensation flow could be maintained for some 1063 days or just under 3 years with no water entering the reservoir, which is highly unlikely scenario.

Similarly if the compensation release was to be doubled then it could be maintained for some 18 months. These duration of these extreme examples could be extended by allowing the reservoir to fall below the 1997 value.

We therefore conclude that there is very little likelihood of the requirement for a Drought Order with regards to Scaling Dam.