



Drought Plan 2013

Yorkshire Water – July 2013

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1 Introduction

1.1 Overview of process

1.1.1 This Drought Plan is based on the extensive drought planning experience gained during 1995/96, 2003, 2010 and 2011, and formalises a process that has been successfully used in practice. It has been drawn up in accordance with the Environment Agency's *Water company drought plan guideline*, published in June 2011. The Plan is consistent with our published Water Resources Management Plan (2009) and with Environment Agency and Defra requirements.

1.2 Water resource planning

1.2.1 We have made significant investments to improve the security of supplies to all our customers whilst taking great care to protect the natural environment. This has been achieved through listening to our customers' needs and delivering a balanced Water Resources Management Plan. The current Levels of Service have been in place since April 2001 and ongoing planning will provide an increased level of security of supply to customers. This plan explains the principles of managing the resources network in Yorkshire in both normal and drought periods. A flexible and timely approach is adopted to identify and respond to the various stages of a drought.

1.2.2 Our Final Water Resources Management Plan (2009) presented three water resource zones until 2011/12:

- Grid Surface Water Zone (Grid SWZ)
- East Surface Water Zone (East SWZ)
- East Ground Water Zone (East SWZ)

1.2.3 The East GWZ was connected to the Grid SWZ through construction of a new pipeline completed in 2011/12. We now operate two water resource zones, the Grid SWZ and the East SWZ, as shown in Figure 1.1. These zones are consistent with our Water Resources Management Plan.

1.2.4 Significant investment in new pipelines and pumping stations was made during and immediately after the 1995-96 drought, which had impacted significantly in Yorkshire. Major raw and treated water transmission pipelines were laid and by the end of 1996 around 95 percent of the population of Yorkshire were linked through a robust integrated grid network. At the same time, developments in computer modelling were implemented which enabled the optimisation of water supplies together with centralised production planning, management and control.

1.2.5 Since 1996 the grid network has been extended and 99 percent of all customers are now connected.

1.2.6 Figure 1.2 shows the current grid system with the new infrastructure added since 1996. This provides customers with a robust supply system capable of maintaining Levels of Service during severe, localised droughts. It also enables the benefits of drought orders and permits to be spread throughout the Yorkshire region, together with benefits from conservation measures and targeted enhanced leakage control.



Figure 1.1: Current Yorkshire Water supply zones

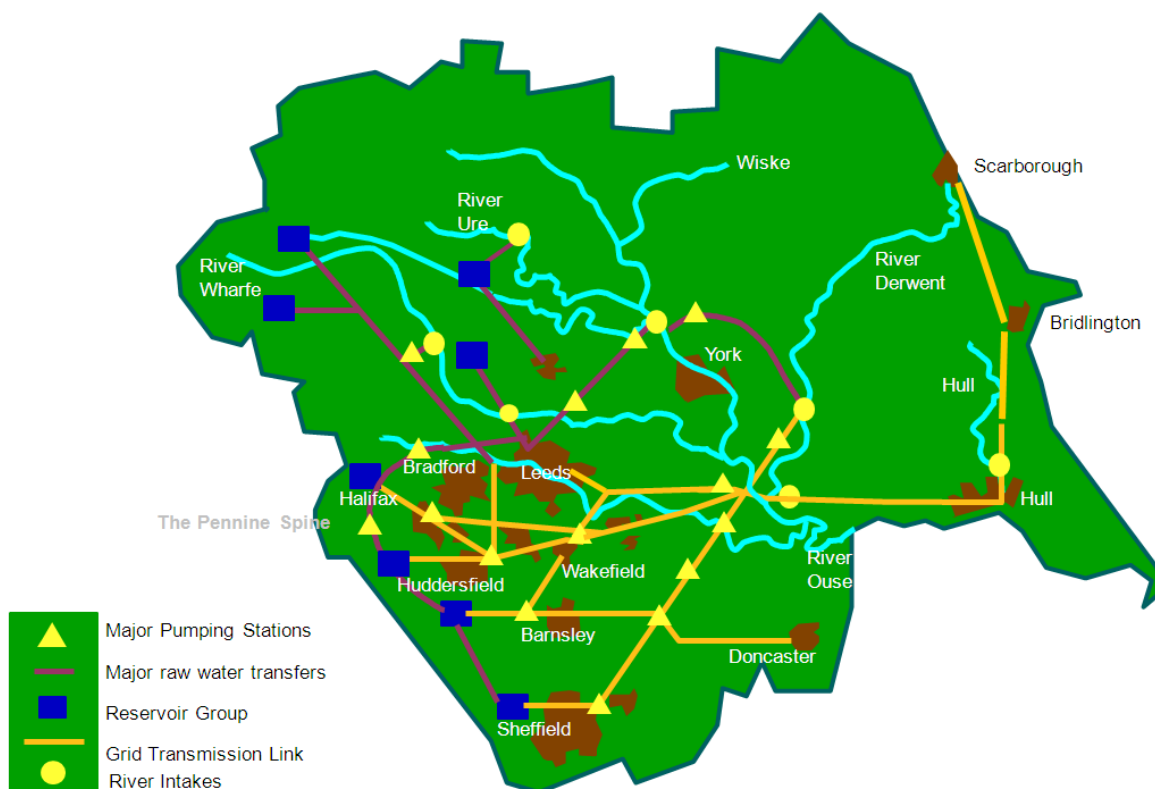


Figure 1.2: Yorkshire Water Grid system

1.3 Water resources management

- 1.3.1 The process of planning and managing water resources in Yorkshire is part of a fully integrated approach to operational planning from source to tap across the whole region. Our main objective is to ensure that good quality water is supplied at minimum cost to customers and the environment.
- 1.3.2 We have a weekly management process to determine key flow targets (reservoirs, rivers, boreholes, water treatment works and pipelines) for the week ahead. The process uses the WRAP (Water Resource Allocation Plan) computer model to determine the best use of available resources to meet demand and maintain security of supplies. Resources are selected to minimise costs, environmental impacts and carbon emissions.
- 1.3.3 The WRAP model takes account of expected demands, reservoir and groundwater operating rules, control curves and licensing constraints. Temporary constraints such as outages for maintenance work or water quality problems are also taken into account. The management of river resources is subject to licence conditions which restrict abstractions at times of low flow and permit increased abstractions during higher flows, typically in the autumn and winter.

1.4 Levels of service

- 1.4.1 We plan our resources to meet customer demands for water. The available yield of sources has been estimated on the basis of a Level of Service to customers. The Level of Service relates to the frequency of restrictions. We calculate our Level of Service using historic weather patterns and previous worst case scenarios to meet forecast demands.
- 1.4.2 The Level of Service currently adopted by Yorkshire Water is:

Introduction of temporary use bans:	1 in 25 years on average
Drought permits / orders Implementation:	1 in 80 years on average
Rota cuts / standpipes:	1 in >500* years

* This is an estimate of an exceptionally rare event

- 1.4.3 The frequency is an average over a long period of time and does not preclude a more frequent occurrence if there is a particular run of very dry years.
- 1.4.4 Our Level of Service has improved since 2001 through leakage reduction, grid extension and additional abstraction licences. Customers place a high value on the reliability of water supply. The same Level of Service is adopted for customers not supplied by the grid network. In the event of dry weather one of the first actions we take is to enhance water efficiency promotion. If we keep our customers aware of the situation they can help us to conserve resources and reduce the need for drought measures.
- 1.4.5 The management of our river resources is subject to licence conditions which restrict abstractions at times of low flow and permit increased abstractions during higher flows, typically in the autumn and winter. In the event of a severe drought additional abstractions may be sought through drought permits or drought orders.
- 1.4.6 The estimate of source yield is derived in our Water Resources Management Plan and is referred to as the deployable output of the available sources. Adjustments are made to this figure to allow for outages such as temporary plant failures or abstractions being prevented by pollution.

This results in an estimate of Water Available for Use (WAFU). Our strategy is to ensure that the WAFU is at all times sufficient to meet expected demand in a year with a prolonged dry period, subject to the Level of Service described above. During dry periods customer demand increases and we will utilise demand side drought actions before we utilise actions to increase supply. Depending on the severity of a drought, measures as listed in Appendix 6 may be used to temporarily increase the system deployable output as required.

1.4.7 Levels of Service within the East SWZ are more difficult to simulate and for the purpose of the Drought Plan they are related to events where resource deployable output is insufficient to maintain demand within drought periods. For the East SWZ the Levels of Service are based on an analysis of historic river flows and the ability to meet demand where output is constrained by abstraction licences. The Level of Service provided in both water resource zones meets our minimum standard of temporary use bans i.e. not more frequently than 1 year in 25.

1.5 Pre-draft and draft consultation

1.5.1 In accordance with the Environment Agency guideline, statutory and non-statutory consultees were invited to comment prior to production of our draft Drought Plan.

1.5.2 Our statutory consultees are listed below:

- Environment Agency
- Ofwat
- Defra

1.5.3 There are no licensed or appointed water suppliers who supply water in our area via our supply system.

1.5.4 Our non-statutory consultees are those who have an interest in our Drought Plan or are likely to be affected by actions within our plan, including our neighbouring water companies. They are listed below:

- Consumer Council for Water
- Natural England
- Anglian Water
- Northumbrian Water
- Severn Trent Water
- United Utilities

1.5.5 The pre-draft consultation was in the form of a letter sent to all consultees outlining the process and timelines for the publication of the draft Drought Plan.

1.5.6 All the pre-draft consultees are notified of the publication of our Drought Plan. We also notify a wider consultation group as listed in Appendix 9. Consultees are invited to send representations on the plan to Defra.

1.5.7 In considering demand side options we have consulted with our domestic and business customers and stakeholders on the wider uses that water companies can ban during a drought. More details on this can be found in section 3.4.

- 1.5.8 We received a copy of all representations on our draft Drought Plan from Defra. Our response to representations was published as a statement of response on our website within 15 weeks from the date we publish our draft plan. Our statement of response addressed the issues raised in representations and where necessary we have made amendments to our Drought Plan.

2 Drought triggers and scenarios

2.1 Groundwater and surface water triggers, data sources and arrangement

- 2.1.1 Reservoir stocks are monitored continuously and compared against control lines. These control lines have been calculated using historic reservoir inflow sequences from 1920 and are designed to minimise the risk of reservoir stocks falling below the marginal storage level. The control lines represent the value of reservoir storage that is required to guarantee a continuous rate of supply (equivalent to yield) such that the reservoir storage never falls below a critical storage line given the minimum historic inflows. The Drought Control Line (DCL) is designed such that stocks will never fall below marginal storage. The Normal Control Line (NCL) is designed such that stocks will never fall below the DCL. The controls lines are updated on a regular basis, and have recently been updated to include inflows until the end of 2011.
- 2.1.2 Reservoir control lines have been recalculated based on minimum inflows from 1920-2011. The experience of the 2011 low rainfall and inflows in the south of the region resulted in very low reservoir levels in the south. A considerable amount of support was provided to compensation reservoirs by supply reservoirs, and this has led to a change in the way the control lines are calculated.
- 2.1.3 For the DCLs, net inflows assuming support from the upstream supply reservoirs of half the normal compensation are assumed. For the NCLs, net inflows assuming full support to maintain the normal compensation release are assumed. These changes have led to a decrease in yield for many reservoirs in the region, and/or an increase in the level of control lines, although this yield decrease has not been fully reflected in the deployable output due to the conjunctive use operation of the system.
- 2.1.4 The need for drought management action is determined by the DCL for groups of reservoirs in five areas of the company's supply region (East, North West, Central, South West and South). The North West, Central, South and South West groups all contain the region's surface water supply reservoirs. The East Group consists of the Hull Borehole group (which is modelled as a reservoir), and reservoirs which store water abstracted from the River Hull. We will apply for a drought order or permit for each of the five reservoir groups, as required. An order or permit will include all reservoir operations, associated releases and maintained flows in a particular reservoir group.
- 2.1.5 When reservoir stocks are predicted by the Water Resources Planning Report (WRPR) to be within typically 6 weeks of crossing the DCL (see Figure 2.2) for a given resource group, we may introduce temporary use bans. The length of time may vary depending on prevailing weather conditions and known resource availability. Prior to the introduction of temporary use bans we will have instigated publicity campaigns and other activities to reduce demand on resources. We will have started scoping outline drought permit or drought order plans and will be discussing these with the Environment Agency. Our policy is that temporary use bans would not be imposed during winter months. This would also include times when winter refill drought orders or permits were in place.
- 2.1.6 Figure 2.1 shows the control lines of the five reservoir groups and measured reservoir group stocks for 2010 and 2011. In 2011 the regional reservoir stocks crossed the Environment Agency early warning trigger line at the end of March, and the first Environment Agency liaison meeting was held in mid-April. We produced forecasts of reservoir stocks at least every 2

weeks, and these forecasts showed that we could expect temporary use bans in the autumn of 2011 in the south if we had a repeat of the driest years on record. The control lines have been updated since 2010/2011, but the lines which were in operation at the time are shown, as these reflect the lines in use and the decisions made at the time.

2.1.7 We would adopt the following process in the selection, prioritisation and implementation of drought orders and permits in consultation with the Environment Agency:

- Assessment of drought monitoring
- Assessment of risk (WRPR / drought scenarios)
- Ranking of risks
- Drought order / drought permit design – assessment of yield benefit
- Drought order risk & benefit analysis (yield/environmental/ economic)
- Drought order prioritisation – programme development.

2.1.8 The standard we have adopted is that temporary use bans would normally only be imposed between the months of April and October inclusive. However, this policy will be reviewed in the event of droughts spanning two calendar years or more.

2.1.9 A temporary use ban will be imposed to reduce the demand and preserve stocks in preparation for drought order / permit applications, typically six weeks in advance of the planned implementation date for orders / permits. The six week trigger is consistent with the Water Resources Management Plan assessment of deployable output. Any increase in trigger length will reduce level of service.

2.1.10 Examples of likely sequences of drought measures are shown in section 2.14. The decision to impose restrictions will rest with Yorkshire Water.

2.1.11 The Drought Plan assumes that when reservoir stocks fall below the DCL for a given reservoir group, drought orders or permits will be implemented affecting demand zones, abstraction licences and compensation releases in the relevant area.

2.1.12 The exact timing of consultation and implementation of drought measures will be subject to the particular circumstances prevailing at the time, but in general will be broadly in line with the timing determined by the reservoir control lines.

2.1.13 The results of computer simulations for a number of different scenarios, showing reservoir storage and drought actions are shown in Appendix 2 in the same format as that provided in the weekly Water Situation Report.

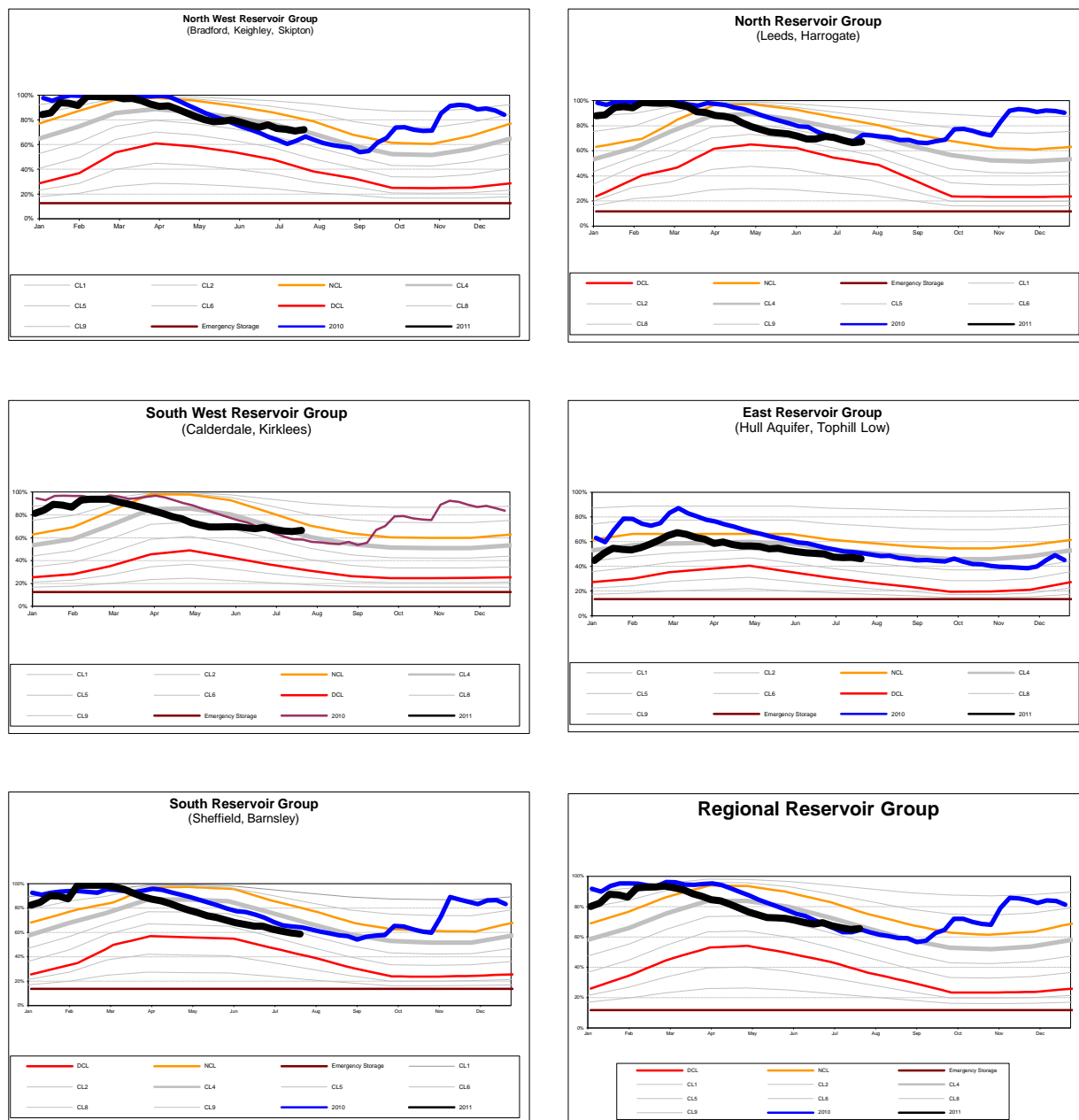


Figure 2.1: Drought monitoring in the weekly Water Situation Report

2.2 Drought scenarios

2.2.1 We have run a number of drought scenarios using examples of the timing and extent of drought measures under different storage conditions. The simulations have been “forced” with successively lower starting conditions receiving a repeat of various known low inflow years (e.g. 1929, 1995) in order to trigger more extensive drought actions including the implementation of long term drought options. The reservoir stocks for the major reservoir groups for these scenarios are shown in Appendix 2. These scenarios have been run using the control lines in use now, and developed using inflows from 1920-2011.

2.3 1995-96 inflows

2.3.1 Appendix 2 (Figure A2.1) shows the predicted reservoir storage under a repeat of 1995-96 inflows. The simulation shows that although temporary use bans, a conservation campaign and additional leakage control would be required, the only drought orders or permits which would be implemented were in the south west reservoir group in January 1996. In reality in 1995/96 we had drought orders throughout the region. The improved service, compared to the actual situation in 1995/96, is due to significant investment in leakage control, new water sources and a robust grid network.

2.4 1929 inflows

2.4.1 Appendix 2 (Figure A2.2) shows the predicted reservoir storage under a repeat of 1929 inflows. The DCL is not crossed in any reservoir group.

2.5 Second year of serious two year drought

2.5.1 Appendix 2 (Figure A2.3) shows the predicted reservoir storage in the second year of a serious two year drought. This is based on the 1929 inflows, with reservoir stocks at 65 percent at the start of the year to represent a more extreme case. The DCL is crossed in all but the East group in the second year.

2.6 Third year of extreme three year drought

2.6.1 In the unlikely event that a drought were to extend into a third consecutive year, storage in each of the reservoir groups could be severely depleted, falling below and remaining below the DCL for several months (as demonstrated in Appendix 2 - Figure 2.4). This is a scenario only; a 3-year drought has never been experienced in the Yorkshire Water region since reliable records began, and there is a very low probability of such an event occurring.

2.6.2 A recent project commissioned by Yorkshire Water estimated the return period of a two year drought to be 40-70 years in the south of the region- the return period is greater in the north. Return periods for a three year drought are estimated to be greater than 400 years. The frequency of such long duration droughts may increase to as little as 1 in 100 years under extreme (10th percentile) climate change scenarios. (WRc, *Duration Modelling- impact of multi-year drought events on resources and assets*, 2012).

2.6.3 A range of alternative supply-side options to maintain essential water supplies in the event of a third consecutive year of a drought have been developed (see Section 3).

Grid SWZ Drought Scenarios with potential high level decisions and actions				
Not based on any specific historical drought				
Resource Zone	Scenario and Trigger	Action 1	Action 2	Action 3
Grid SWZ Serious drought in autumn of year 1	Prolonged dry summer with total reservoir stocks falling (typically below CL5)	Re-zone supplies to maximise grid, install temporary pumping and cross border transfers	Calls for restraint and conservation campaign, enhance leakage control	Consider winter refill drought orders after consultation with Environment Agency
Grid SWZ Serious drought in spring of year 2	Dry winter following dry year with total reservoir stocks (typically below CL5)	Enhance calls for restraint and conservation campaign, continue increased leakage control	Prepare for temporary use bans. Prepare outline drought permit / drought order options for both increasing supply and restricting use.	Consult the Environment Agency on potential monitoring requirements for long term drought options
Grid SWZ Severe drought in summer of year 2	Reservoir storage within 6 weeks of DCL	Impose temporary use bans	Enhance calls for restraint and conservation campaign, continue increased leakage control	Apply for drought permit / drought orders for both increasing supply and restricting use Consider long term drought options
Grid SWZ Severe drought in autumn of year 2	Reservoir storage below DCL	Temporary use bans, drought orders and permits for both increasing supply and restricting use in place	Enhance calls for restraint and conservation campaign, continue increased leakage control	Construct long term drought options if required Prepare emergency drought orders
Grid SWZ Severe drought in spring of year 3	Reservoir storage still below DCL	Temporary use bans, drought orders and permits in place for both increasing supply and restricting use in place	Enhance calls for restraint and conservation campaign, continue increased leakage control	Long term drought options in use

Table 2.1: Yorkshire Water drought scenarios

- 2.6.4 Appendix 2 (Figure A2.4) shows the predicted reservoir storage in the third year of an extreme three year drought. This is based on the 1929 inflows, with reservoir stocks at the level they were towards the end of 1996 before the winter recovery took place. This again represents a more extreme case than that experienced in either 1995-96 or 1929. The figure shows modelled reservoir stocks for the “ordinary” drought options of reduced compensation releases and decreased HOFs, and for the use of the Tees transfer and River Ouse to Elvington pipeline. Both of these are options for an extreme long term drought. The decision to implement either of these would be continually reviewed and in this scenario would have been made during the second year of the drought- with the River Ouse to Elvington pipeline being in use sometime during year three.
- 2.6.5 Stocks are also shown assuming that third year drought options are implemented from the spring of year three, and from July in year three. This allows us to be certain that delays in construction of the third year drought options (in this example the Tees transfer and the River Ouse to Elvington pipeline) will still improve our position with respect to reservoir stocks.

- 2.6.6 Further examples of various drought scenarios with high level Yorkshire Water responses or actions are shown in Table 2.1. These examples are based on experience of one and two year droughts in the Yorkshire region and an unprecedented third year of drought that has been included to demonstrate action we could take if a three year drought did occur.
- 2.6.7 We have not stipulated specific triggers for individual third year actions as the decision to implement a third year option would depend on conditions at the time. The third year drought options have long lead times, and it is likely that any trigger specified would be crossed early in the second year of a drought, and more often than not, would not be required.
- 2.6.8 The timescales for implementing the majority of our long term drought options are longer than those for options that we would consider implementing in a one or two year drought. This is due to the need to construct additional infrastructure, for example, abstraction pumping stations, pipelines or water treatment work expansion.
- 2.6.9 In view of these timescales, decisions on moving forward with implementation of one or more “long-term” supply-side options would be taken after implementation of all the appropriate one or two year drought options set out in this Drought Plan. If the situation did not recover we would progress the planning and feasibility work to support decisions on implementing long term drought options. This work would be accelerated as the drought continued and subject to continual review.
- 2.6.10 The trigger to consider the requirement for long term drought options would be in a second year of drought when reservoir stocks were six weeks from the drought control line.
- 2.6.11 The decision as to which drought options would be implemented would be made by the Crisis Management Team (see Section 5) and would be continually reviewed. The decision would be based on conditions at the time taking into account the following;
- 2.6.12 The magnitude of the supply deficit to be addressed, taking into account the severity of rainfall forecasts.
- 2.6.13 The areal extent of a drought to determine which options will have an impact where additional resources are most needed.
- 2.6.14 The availability of the resource, for example, river sources may not be available if the river flows are impacted by the drought.
- 2.6.15 Construction timescales taking account of measures to accelerate delivery, such as fast-track procurement approaches, seven day per week working, multiple construction teams and use of modular construction techniques.
- 2.6.16 The likely environmental impact of individual options. Where possible we will select the least damaging options based on prevailing environmental conditions and the Strategic Environmental Assessment (see Section 4) provided they can provide the required volume in the affected areas.
- 2.6.17 Any other risks relating to option implementation (e.g. drinking water quality and engineering risks).
- 2.6.18 The costs of implementing and operating long term options will be considered in the selection of options and we will select the lowest cost options that meet the above criteria.
- 2.6.19 During the decision process we would consult the Environment Agency, Drinking Water Inspectorate and Natural England to review the risks and benefits of the long term options.

- 2.6.20 We will ensure full compliance with the requirements of The Water Supply (Water Quality) Regulations 2000 (as amended 2007 and 2010), Regulation 15 when considering introducing any new sources to be used ultimately for drinking water. Specifically we will meet the arrangements stated in DWI Information Letter 06/2012, around providing; adequate information to the DWI / appropriate sampling and monitoring / reporting requirements / and following our Drinking Water Safety Planning risk assessment methodology and submission of Reg. 28 documentation as necessary.
- 2.6.21 By this stage we would already be meeting regularly with the Environment Agency. In the spring of a second year of drought we would start discussions on the instigation of environmental monitoring requirements associated with the relevant long term options, in line with the Environmental Monitoring Plan. These discussions would start prior to taking the decision to implement long term drought options to endeavour to provide a summer drought environmental baseline before a third summer of drought.

2.7 Water resources management and monitoring

- 2.7.1 Conjunctive use schemes work on the principle of using available river resources in the winter and spring to preserve reservoir or groundwater storage until the summer, when releases from reservoir and groundwater storage can offset the lower availability of river resources.
- 2.7.2 The combined yield of resources used conjunctively (i.e. by maximising river abstraction during high winter river flows) is greater than the sum of the yields from the resources operated independently from each other. We have operated conjunctive use for many years, particularly in relation to the use of reservoirs and river sources.
- 2.7.3 A number of routine reports and management processes are embedded into our routine operational production planning processes. These processes are used in the management of droughts, although the frequency of reporting and decision-taking may be increased.
- 2.7.4 The following sections describe the routine monitoring, reporting and water resources management processes which are in place.

2.8 Weekly water situation reports

- 2.8.1 These form part of the normal business of data gathering and presentation. The reports include the following information:
- Rainfall
 - River flows
 - Groundwater levels
 - Reservoir stocks
 - Demands
 - Water treatment works outputs
 - Flows in key grid pipelines

- 2.8.2 Should a drought become severe, the frequency of reporting will be increased. The initial trigger for increased reporting will be when reservoir stocks cross the Environment Agency early warning trigger line (shown in Figure 2.2). The frequency of reporting on critical hydrological features (such as rainfall and reservoir stocks) will increase to twice per week when permission is sought for drought permits/orders. The frequency will be increased to daily when permission is sought for further (emergency) drought measures.
- 2.8.3 A Water Situation Report is produced weekly and is available electronically to Yorkshire Water colleagues including the Kelda Management Team (KMT). The report is e-mailed each week to our Environment Agency regional water resources contacts.
- 2.8.4 The report contains a drought monitoring section. This includes reservoir stocks within the key resource groups that are used to determine drought management action (see Section 5). An example of this is shown in Figure 2.1.
- 2.8.5 Our Drought Plan incorporates reservoir control lines for each of the key reservoir groups in Yorkshire. These control lines are included in our weekly Water Situation Report, and made available to the Environment Agency each week. The Environment Agency early warning trigger line is included to identify falling reservoir stocks and initiate discussions with the Environment Agency on the water supply situation.
- 2.8.6 When reservoir stocks fall below the Environment Agency early warning trigger line our Strategic Asset Manager will contact the Environment Agency's Regional Drought Co-ordinator at Rivers House, Leeds.

2.9 Weekly water production planning

- 2.9.1 A weekly management process determines key flow target settings (reservoirs, rivers, boreholes, water treatment works and pipelines) for the week ahead. The process takes information from the Water Situation Report and then, using the Water Resource Allocation Plan (WRAP) computer model, determines the best use of available resources to meet demand and maintain security of supplies. It takes account of expected demands, reservoir and groundwater operating rules, control curves and licensing constraints. In addition, temporary constraints such as outages for maintenance work or water quality problems are taken into account.
- 2.9.2 The output from WRAP is made available electronically across the company. Field staff implement the required flow output settings. Any unforeseen events are handled by the Duty Manager in the Regional Operations and Communications Centre (ROCC).
- 2.9.3 Since 2006 we have also carried out daily production planning using a real time water resource planning model, RtWRAP. The RtWRAP model is run daily, and key grid targets are automatically sent to the relevant assets and the flow rates at these assets are controlled. We still have the weekly production planning meetings and management process, but adjustments can be made on a daily basis to reflect any changes in asset availability.

2.10 Monthly water resources planning report

- 2.10.1 Operation of our highly integrated network of resources is planned and tested (3 to 18 months planning horizons are typical) using computer modelling software. These models can rapidly

simulate the operation of the whole network against different rainfall, demand and operating conditions.

- 2.10.2 These reports identify future reservoir stocks for selected drought inflow sequences and predicted demands. The potential need for drought measures can be tested by comparing the stocks prognosis against control lines for each reservoir group. Remedial actions are identified to reduce and/or balance out demand on resource groups at risk.
- 2.10.3 Operational measures are planned to reduce the longer-term risk of imposing restrictions on customers or seeking drought permits/orders for increased abstraction or modifications to river flow conditions. Progress of the measures is monitored monthly.
- 2.10.4 In the event of drought measures becoming a reality, the frequency of planning reports would be increased.

2.11 Forecasting

- 2.11.1 Drought scenario planning is carried out using the Water Resource Allocation Plan Simulation (WRAPsim) and WRAP models. The models simulate the conjunctive use of our sources over a 92 year period at a weekly time-step for given levels of demand. It contains over 1200 components including all river and reservoir sources, boreholes, water treatment works, pipelines and demand centres. WRAPsim output provides the modeller with an accurate assessment of the future behaviour of each source, its ability to meet demand and the frequency of restrictions that would need to be imposed.
- 2.11.2 The WRAPsim model can also be used to predict future water supply situations based on past weather patterns. This allows the modeller to predict when drought restrictions may be required and provides important support to drought planning. Typical output from WRAPsim for key resource groupings and scenario modelling are shown in Appendix 2.

2.12 Communication between Yorkshire Water and the Environment Agency

- 2.12.1 The Environment Agency receives our weekly Water Situation Report and is kept informed through regular discussions with relevant staff. The Environment Agency early warning trigger line (see Figure 2.2) is an early warning trigger which will instigate initial communication between Yorkshire Water and the Environment Agency's Regional Drought Co-ordinator. We will establish liaison meetings with the Environment Agency to keep them apprised of the water supply situation and the management measures that we have instigated.
- 2.12.2 Liaisons will reduce when reservoir stocks have risen above the trigger line for a period of two weeks. The frequency of the liaison meetings will be established after the first contact with the Environment Agency Regional Drought Co-ordinator.
- 2.12.3 The Environment Agency will provide information on their assessment of the severity of the drought. This is based on a number of statistics including rainfall and river flows and the Drought Severity Index (DSI) methodology. This information would be for each of the catchments in our supply region together with the Severn Trent catchments (Derwent, Idle and Torne).

2.12.4 We will agree with the Environment Agency when there has been an exceptional shortage of rain and identify triggers to initiate drought actions. Environment Agency drought classifications are described in Table 2.2.

Drought Stage	
Normal	Drought planning actions in a normal water resource situation, including routine monitoring
Potential drought	Drought actions required to prepare for drought once prolonged drier conditions are evident. Careful monitoring is necessary and there may be additional reporting.
Drought	Actions required to manage drought once localised drought conditions impact on people, business and the environment. Other activities may be reduced or stopped.
Post drought	Actions required to monitor and manage the return to normal water resources conditions. Assess outcomes and review Drought Plan as necessary.

Table 2.2: Environment Agency drought stages

2.12.5 If a potential future need for restrictions or other measures is identified, the frequency of meetings will increase. The Environment Agency point of contact in severe droughts will be the Regional Drought Manager based at Lateral House, Leeds. Consultation on the sequence of any demand restrictions and the sequence and prioritisation of drought orders or permits is covered in this liaison process. The process will cover the following areas:

- Environmental assessment, mitigation and monitoring
- Data and information to be shared
- Relevant works in progress or works planned, including demand management measures.

2.12.6 Measures which may be triggered in the event of drought conditions developing throughout Yorkshire include drought orders or permits to increase the water available for supply to the company, by varying abstraction conditions or reducing reservoir compensation discharges. These would be granted by the Environment Agency (drought permits) or Defra (drought orders) following application. This process is described in Section 5.

2.13 Historic droughts

2.13.1 Our experience of historic droughts has helped us develop the processes and actions described in this Plan. Our modelling uses inflows which date back to 1920. This enables us to model our current system on significant droughts such as those that occurred in 1929, 1933-34 and 1959.

2.13.2 The concept of “grid management” followed on from the events of the 1975/76 drought. The drought of 1995/96 highlighted our reliability on the surface water reservoirs in the Pennines, and led to investment to increase the resilience of our system by laying a major raw water transmission pipeline.

2.13.3 The summer of 2003 was hot and dry late into the autumn, with no significant reservoir refill until November. In the summer of 2006 some very high temperatures led to extremely high peak demands. We have used this to reappraise our peak demand profile to reflect a worst case scenario of high summer demands.

2.13.4 The springs of 2010 and 2011 were uncharacteristically dry, which have led to earlier than usual reservoir drawdowns. Both springs were preceded by unusually cold winters. At the end of 2011 we recalculated our control lines using the latest data, and changing the way we dealt with the issue of supporting compensation reservoirs from supply reservoirs when deriving control lines, making them more conservative.

2.14 Links to actions/measures with timing information

2.14.1 Figure 2.2 represents regional stocks and provides an example timeline of the drought triggers and actions we would take leading up to implementation of drought orders and permits as stocks decline during a drought. More information on the drought actions is provided in section 3.

2.14.2 The timing of actions will vary depending on the rate of falling stocks. In Figure 2.2 all triggers are crossed in one year whereas in a real drought it is unlikely all triggers would be crossed in a single year and in some months reservoir stocks may increase before declining again.

2.14.3 Table 2.3 lists each trigger and the associated drought action. This table shows drought triggers included in Figure 2.2 and a trigger for long term drought actions. The trigger for considering long term drought options is when reservoir stocks are six weeks away from crossing the drought control line in a second year of drought.

2.14.4 If this trigger was crossed we would need to make an assessment on the benefits of implementing long term drought options. The crossing of this trigger would not lead to a long term drought option being automatically implemented. The decision to implement long term drought options would be based on reservoir stock predictions and the risk of them not recovering.

2.14.5 At this stage we would assess the feasibility of each long term drought option and consider the criteria listed in Section 2.2.

2.14.6 In a normal year we would expect regional reservoir stocks to be above the NCL (as shown by the blue NCL line in Figure 2.2). When this trigger is crossed Yorkshire Water's Optimal Planning and Performance team will maximise our river abstractions and reduce reservoir output where possible, in order to reserve stocks for later in the year. This action will depend on the resources available. Rivers will be maximised within licence conditions and reservoirs will only be reduced if sufficient resources are available from river sources.

2.14.7 As discussed above all our reservoir groups have an Environment Agency trigger line (as shown by the grey line in Figure 2.2). If regional stocks fall below this line we will meet with the Environment Agency and continue regular liaisons until stocks have recovered. We will also set up a Company Risk Management Team (CRMT). CRMT will monitor the performance of our assets to ensure we are maximising our available resources, see Section 5.

2.14.8 The Environment Agency trigger line will also trigger increased communications with the public and requests for our customers to reduce their water use to help preserve stocks.

Trigger	Action
Reservoir stocks below normal control line*	Reduce reservoir output Maximise all river abstractions
Reservoir stocks cross Environment Agency early warning trigger line	Start liaising with Environment Agency CRMT (Customer Risk Management Team) meet to implement the Water Supply Escalation Plan Enhance on going water conservation activity, request voluntary reductions
Reservoir stocks forecast to be 10 weeks away from DCL	Increase active leakage control Prepare adverts for temporary use bans Initiate preparation of Environmental Assessment Reports and drought order/permit applications Contact Natural England on any potential drought permits/orders that could damage sites designated under the Habitats Regulations or Wildlife and Countryside Act
Reservoir stocks forecast to be 8 weeks away from DCL	Advertise / consult on temporary use bans
Reservoir stocks forecast to be 6 weeks away from DCL	Impose temporary use bans CRMT escalated to CIMT (Company Incident Management Team)* In the second year of a drought we would start to consider long term drought options
2 weeks after impose temporary use bans	Apply for drought permits/orders to restrict use and to increase supply. Advertise and start consultation on drought orders/permits applications
3 weeks after impose temporary use bans	Review representations and objections on drought orders/permits
4 weeks after impose temporary use bans	Start public enquiry
5 weeks after impose temporary use bans	Inspection determination
6 weeks after impose temporary use bans	Receive drought orders/permits Implement drought orders/permits CIMT escalated to CMT (Crisis Management Team)

* There are a number of other triggers that could initiate CRMT escalating to CIMT, as shown in Table 5.1, but not related to reservoir stocks.

Table 2.3: Drought plan triggers and associated actions

2.14.9 If stocks are forecast to be 10 weeks away from the drought control line we will increase our leakage control activity (see Section 3), prepare adverts for temporary use bans, complete Environmental Assessment Reports and commence environmental monitoring in case drought order/permits are required later in the year.

2.14.10 At this stage we will also start liaising with Natural England on any drought order/permits that have potential to damage sites designated under the Habitats Regulations or Wildlife and Countryside Act.

- 2.14.11 If stocks are forecast to be eight weeks away from the drought control line we will start preparing for temporary use bans. This will involve publishing adverts on the bans in time to allow customers to be consulted on the restrictions before they are imposed. The representation period will be a minimum of two weeks but if time allows could be longer. In Figure 2.2 only two weeks is available as the diagram does not allow for any temporary refill of reservoirs.
- 2.14.12 Temporary use bans will be imposed if regional reservoir stocks are forecast to cross the DCL in six weeks (as shown by the red line in Figure 2.2).
- 2.14.13 Two weeks after imposing temporary use bans we will submit and advertise drought order or permit application(s) for both restrictions on use and supply side drought options. Table 2.3 shows the activity we will take in the four weeks between applying for and implementing drought orders/permits (if we receive permission). It is possible the temporary use bans and any rainfall will allow sufficient refill of the reservoirs to ensure drought permit/order applications are no longer needed. Assuming this does not happen we will aim to implement drought orders/permits six weeks after temporary use bans are imposed.
- 2.14.14 The timescales for the drought order/permit applications aim to comply with the Defra Drought Permits and Drought Orders May 2011 guidance which states: “Timings to process a drought order application will vary and depend on the urgency of the situation. If applicants follow and comply with the information in the following steps and if the process goes forward with no delays whatsoever, then the Secretary of State or Welsh Ministers will normally make a decision within 28 days. That is when there are objections and/or a public inquiry or hearing is held. The minimum achievable timescale for an application to which there are no objections and no public inquiry or hearing is ten days.”
- 2.14.15 Our triggers assume a decision on a drought order/permit application will take 28 days from us submitting an application. However, if there are delays the timescales for implementing a drought order/permit will inevitably take longer than proposed in Table 2.3.
- 2.14.16 Drought order applications are submitted to Defra and drought permit applications submitted to the Environment Agency. Any applications we make will be open to public consultation so that interested parties have an opportunity to make representations and objections. It is possible that a public enquiry may be held before Defra or the Environment Agency make a decision on granting the order or permit.

Regional Reservoir Group Triggers

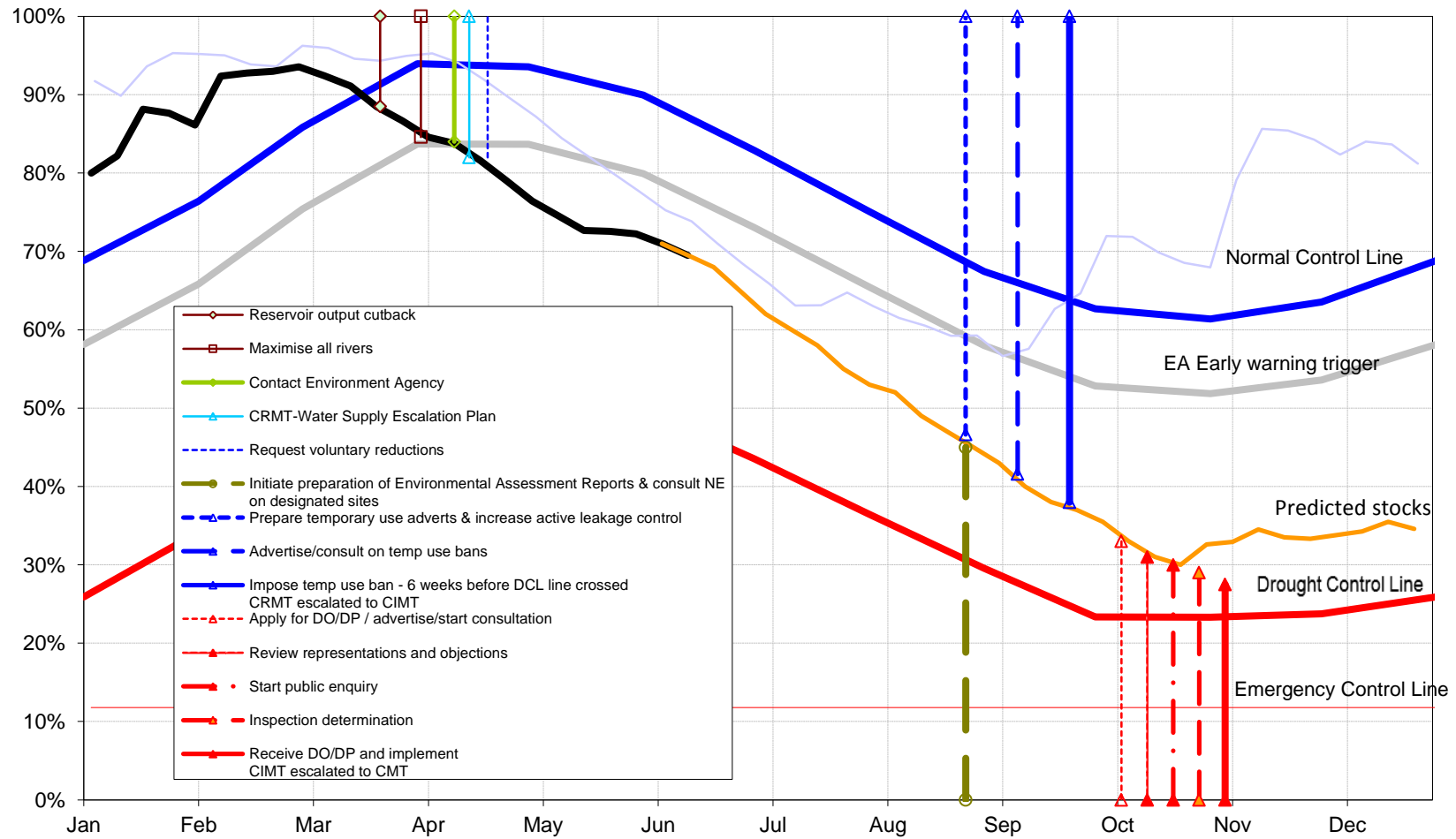


Figure 2.2: Regional reservoir group triggers.

3 Drought management action

3.1 Introduction

- 3.1.1 In the event of a severe drought we will be required to carry out measures to ensure we provide adequate supplies of wholesome water without the need for emergency drought orders.
- 3.1.2 Formal demand management options available to water companies have been extended following the Flood and Water Management Act 2010. Section 36 has amended the Water Industry Act 1991 and allows companies to temporarily restrict particular customer water use activities without requiring a drought order. The Drought Direction 1991 has been revoked and replaced by the Drought Direction 2011 which sets out those uses which still require a drought order to impose restrictions in a drought. A copy of the Drought Direction 2011 is shown in Appendix 3.

	No legal measures required	Legal measures required
Customer Management	Demand management – water conservation promotion for domestic and business customers Support business customers with recycling and use of alternative sources e.g. boreholes Temporary ban on water use	Drought orders through Defra
Distribution Management	Leakage reduction – increased find and fix, pressure management	
Resource Management	Use of alternative supplies, underutilised licensed resources e.g. mothballed and recently abandoned sources. Tankering where appropriate	Drought permits through the Environment Agency Drought orders through Defra

Table 3.1: Drought management actions

- 3.1.3 A number of drought management actions can be considered, and these will be implemented as appropriate depending on the severity and geographical extent of a particular drought event.
- 3.1.4 We will liaise with our regional Environment Agency contact to agree arrangements for implementing specific drought management actions. A summary of the actions we will take to ensure the provision of adequate supplies is given below. Details of these activities are provided in Table 3.1.
- 3.1.5 Applications for drought permits are made to the Environment Agency and for drought orders they are made to the Secretary of State at Defra. Consultation with the Environment Agency and other groups will normally be undertaken prior to the identification of the appropriate actions and to the applications being made.

3.2 Demand-side options

- 3.2.1 Possible drought management options to restrict demand for water are listed in Appendix 4. These include publicity campaigns, temporary use bans, leakage control and restriction of use drought orders, which would normally be introduced progressively as a drought develops.
- 3.2.2 In any year we undertake activity to encourage our customers to be water efficient. This includes providing free water saving devices to domestic customers and providing water saving advice to our domestic and commercial customers. In a drought we will increase this activity through media campaigns, city centre events and our website (see Appendix 11 for more details).
- 3.2.3 Demand savings from temporary bans have been assumed based on advice published in the UKWIR Code of Practice and Guidance on Water Use Restrictions.
- 3.2.4 We will increase find and fix activity and man power as part of an active leakage control programme during a drought. The savings made from leakage can be found in Appendix 4. Savings are cumulative year on year as a drought progresses.
- 3.2.5 We will increase liaison on water efficiency with business customers as well as domestic customers during a drought. Potential support to business customers in the event of a drought includes:
- Maintaining effective communications with business customers and trade bodies
 - Resources updates
 - Operational issues
 - Water quality changes
 - Support with conservation, re-cycling, re-use of grey water
 - Support with use of alternative sources, e.g. private boreholes
 - Initialise contingency plans for efficient water e.g. use of on site storage
 - Support customers with best practice guidance
- 3.2.6 Two weeks after imposing temporary use bans we may apply for drought orders to restrict commercial non-essential use (see Table 3.2).
- 3.2.7 Our current Drought Plan is consistent with our Level of Service and the methodology that we use for the estimation of deployable output (yield).
- 3.2.8 Our policy for restrictions and drought orders is:
- Prior to the use of temporary use bans we will implement our communications plan, enhance our water conservation campaign and undertake additional leakage control, leading to demonstrable water savings.
 - Temporary use bans will be implemented when reservoir stocks within key areas are within 6 weeks of the DCL.
 - No restrictions will be imposed between the months of November and March.
 - Drought orders for restrictions of non-essential use will be imposed when reservoir stocks are at the DCL. At this time supply drought permit/orders may also be in place.
 - We will also ensure that all available sources will be maximised, whilst ensuring that security of supply, drinking water quality and safety are not compromised.

- We will notify our customers when temporary restrictions and drought orders have been lifted.
- 3.2.9 All these activities will be discussed with the Environment Agency as a part of a joint planning process, instigated by the Environment Agency early warning trigger line.
- 3.2.10 The timing of actions is understandably a contentious issue. We will be required to demonstrate the effectiveness of all our drought management activities prior to the use of water supply drought orders or permits. Our analysis of previous droughts in the Water Resources Management Plan and our scenario modelling in the Drought Plan shows that drought orders and permits are likely to be phased in over a period of months.
- 3.2.11 There is likely to be intense interest in the activities we have implemented and the benefits that were achieved. The phasing will enable a continuous review of progress and an opportunity to modify future actions and drought orders. In addition, should the drought be prolonged for two years or more, we would review our policy on the benefits of temporary use bans. The renewal of drought orders will require a similar benefit analysis and demonstration of demand management.

3.3 Temporary use bans

- 3.3.1 Section 36 of the Flood and Water Management Act 2010 (FWMA 2010) allows water companies a wider range of temporary use bans that they can implement during a drought without requiring a drought order. The Water Use (Temporary Bans) Orders 2010 provides details on certain types of customer water use which can be restricted in relation to these new powers. In addition, the updated Drought Direction 2011 sets out those uses which still require an ordinary drought order to restrict under drought conditions.
- 3.3.2 A UK Water Industry Research (UKWIR) project has been carried out to provide a voluntary Code of Practice and guidance to water companies on implementation of water use restrictions to manage demand during times of drought.
- 3.3.3 Under the Code of Practice we will act in accordance with four principles when considering whether and how we will implement water restrictions:
- Ensuring consistent and transparent approach
 - Ensuring that water user restrictions are proportionate
 - Communicate clearly with customers
 - Consider representations in a fair way.
- 3.3.4 We envisage temporary restrictions of water use will be in place before we apply for a water supply drought order or drought permit. Table 2.2 and Table 2.3 show temporary restrictions of water use to be in place two weeks before we submit drought order/permit applications. However, if reservoir stocks were to decline more rapidly than in previous drought scenarios an application for a drought order or drought permit could be made at the same time as implementation of temporary use bans.

3.4 Consultation on temporary use bans

- 3.4.1 During preparation of our Drought Plan we have consulted with our customers and key interest groups on the new temporary use bans imposed by the Flood and Water Management Act 2010 (FWMA 2010). Research was commissioned to investigate customer awareness and understanding of the new powers and to seek views on the prioritisation and potential concessions for restrictions.
- 3.4.2 The results support a non-phased approach to implementation of temporary bans on water use. The majority of customers were of the opinion that the maximum water saving will be made from temporarily banning the washing of cars and watering of gardens with a hosepipe during drought. Temporarily banning other activities listed under the FWMA 2010 were perceived to be of little benefit to conserving water under drought conditions. More details of the findings can be found in Appendix 5.
- 3.4.3 Temporary bans which will be implemented under drought conditions are listed in Table 3.2

Temporary ban to be implemented in a drought:
Watering a garden using a hosepipe
Cleaning a private motor-vehicle using a hosepipe
Watering plants on domestic or other non-commercial premises using a hosepipe
Cleaning a private leisure boat using a hosepipe
Filling or maintaining a domestic swimming or paddling pool
Drawing water, using a hosepipe, for domestic recreational use
Filling or maintaining a domestic pond using a hosepipe
Filling or maintaining an ornamental fountain
Cleaning walls, or windows, of domestic premises using a hosepipe
Cleaning path or patios using a hosepipe
Cleaning other artificial outdoor surfaces using a hosepipe.

Table 3.2: Activities to be temporarily banned under drought conditions

- 3.4.4 We have considered guidance and incorporated UKWIR's Code of Practice in estimating the demand savings from imposing temporary use bans. Estimated savings from demand-side options can be found in Appendix 4.
- 3.4.5 Water companies may be required to make payments (or give credits) to customers if their supply of water is interrupted or cut off under the authority of a drought order. If payable, the payments for each day (or part day) during which a supply is interrupted or cut off would be £10 for household customers to a maximum of our average domestic water charge in the previous year. For commercial customers we will pay £50 per day to a maximum of the amount of water charges payable by the customer for the premises for the previous charging year. If this is not applicable, a maximum of £500 applies.
- 3.4.6 We will consider any representations received before we implement restrictions. Representations are likely to include requests for exemptions and concessions. Exemptions will include people who are disabled or otherwise physically impaired. Before imposing temporary use bans we will consider exemptions and or concessions for businesses whose commercial activity would be unduly affected by the imposition of the ban. However, as a drought progressed this exemption could be withdrawn to help reduce demand.
- 3.4.7 The estimated "dry-year-effect", i.e. the demand increase that could be expected if a 1995/96 drought reoccurred, is an increase of 50MI/d. This is included in the Water Resources

Management Plan and used in establishing Levels of Service and in drought order modelling. The savings given in Appendix 4 indicate the reduction in dry year demand that could be achieved should demand saving measures be implemented.

3.5 Private supplies and vulnerable customers

- 3.5.1 We will consider the needs of private supplies and how we can meet their demands during a drought period.
- 3.5.2 We will consider the needs of vulnerable customers such as those on the Helping Hands register when implementing temporary bans on water use. Prioritisation will be given to maintaining water supply to these customers during a drought period. Staff at our customer contact centre will be able to provide information to vulnerable customers.

3.6 Supply-side actions

- 3.6.1 Supply-side drought management actions are used to increase supply during a drought. In a drought we will consider using these options in addition to resources permitted under normal operating conditions.
- 3.6.2 Appendix 6 gives a summary of each supply-side action we would consider during a drought. Before we utilise these options we will look at ways to maximise our existing resources.
- 3.6.3 During normal operation it is not always necessary to fully utilise our existing abstraction licences. In a drought we would review our operations and where possible increase yield taken from sources within the existing abstraction licence.
- 3.6.4 We manage a routine programme of borehole yield testing to establish the actual and potential deployable output. Where additional yield is identified we will implement projects to achieve that yield within the abstraction licence. We would also review and implement projects to maximise our river abstraction licences.
- 3.6.5 We have the following actions available to increase supply during a drought:
 - Reducing compensation releases
 - Increasing existing abstraction licences
 - Re-commissioning of unused sources
 - Long term drought actions, including alternative sources of supply and an inter-company bulk transfers
- 3.6.6 During a drought we will also consider how our normal operations can be varied to provide alternative compensation to rivers or to reduce our bulk transfer from Severn Trent Water if required.
- 3.6.7 A number of our supply side options will require a drought order or permit and are discussed in section 3.7.

3.7 Drought orders and permits

- 3.7.1 Drought orders or permits will be required to obtain additional supplies of water over and above those available through existing unused sources discussed above. We will choose the most appropriate water supply options in consultation with the Environment Agency, Drinking Water Inspectorate, Natural England and other groups as appropriate.
- 3.7.2 Our supply-side options for droughts lasting one or two years will increase supply through reducing compensation or increasing abstraction. We have a number of options that we would only utilise in a long term drought. A number of these, but not all, would require drought orders or permits. Details of all potential supply side options are given in Appendix 6.
- 3.7.3 We also have two options to provide additional river compensation during a drought. These options would be used to mitigate against the impacts of other drought options and would not provide any additional supply. One of these options would require a drought order.
- 3.7.4 Central to the selection of the appropriate option will be the amount of water that would be made available; how effectively this water can be utilised; and the environmental impact of the option.
- 3.7.5 In the first stages of a developing drought, typically 20-75 MI/d of additional resources will be required. As the drought intensifies it may be necessary to increase this to 100-150 MI/d. Only in very exceptional circumstances would more than 150 MI/d be required.
- 3.7.6 The trigger for temporary use bans, as discussed in section 2, is when we forecast a reservoir group to be six weeks away from crossing the drought control line. At this stage we will be preparing drought order/permit applications and environmental assessment reports. We would submit drought order/permit applications two weeks after imposing temporary use bans. A drought order application will be submitted to Defra, whereas a drought permit application will be submitted to the Environment Agency.
- 3.7.7 We would start to consider long term drought options if we were six weeks from the drought control line and in a second year of drought.
- 3.7.8 To help us prepare a drought order or permit application in the time available we have prepared templates for both compensation release and river abstraction drought orders and permits. The templates will ensure we provide the supporting documentation that Defra and the Environment Agency will expect to be submitted with the applications.
- 3.7.9 The drought order or permit application will provide information on the following;
- Details of the drought management actions we will have taken before applying for a drought order/permit. This will include the demand management actions taken, as discussed in section 3.2.
 - An environmental assessment to show the likely impact the actions will have on the environment. Where possible we will prioritise actions where the environmental impact would be least damaging. A summary of the environmental approach taken is provided in section 4, and potential impacts are summarised in Appendix 6.
 - Details of environmental monitoring and mitigation requirements. A summary of the approach is provided in section 4 and details are included in Appendix 6.

3.8 Potential drought order and permit sites

Reducing compensation releases

- 3.8.1 We have a number of reservoir groups providing compensation to rivers in our region. In the event of a drought we would consider applying for a drought permit or order to reduce the compensation releases in order to save water for supply.
- 3.8.2 Details of these options are provided in Appendix 6 and information on the triggers for the options provided in section 2. The decisions on which orders or permits to apply for would be made in consultation with the Environment Agency and other interested parties. The environmental impacts of the options are discussed in section 4 and Appendix 6.
- 3.8.3 We also have two options, described in Table 3.3, to re-commission unused sources to increase compensation and mitigate drought impacts. The Boshaw Whams Reservoir option would require a drought order or permit but the Cod Beck and Oakdale Lower Reservoir options would not.
- 3.8.4 These options will not provide additional supply therefore are not included in Appendix 6 and do not have triggers associated with them. We would consult the Environment Agency on how this additional compensation could be of benefit.
- 3.8.5 North York Moors expressed concern in its representation on our drought plan that Cod Beck reservoir is a regionally important site for breeding toads. This option is to mitigate against drought impacts and not to increase supply therefore we will only operate the release if there is an environmental benefit. We will take advice from the Environment Agency and North York Moors on when to avoid drawdown during the toad breeding season.

Option name	Status	Drought option
Cod Beck & Oakdale Lower Reservoirs	Licence reduced to a nominal value of 10 MI/a following closure of Osmotherley WTW	Potential to increase compensation to augment rivers downstream of these two reservoirs which are affected by other drought options. Cod Beck existing compensation 0.7 MI/d, Oakdale Lower existing compensation 1.1 MI/d. This option is to help mitigate impacts of supply side drought options and will not provide additional supply.
Boshaw Whams Reservoir	Not in use	The existing licence authorises a daily average transfer of 0.151 MI/d (max 0.45 MI/d) to Holme Styes reservoir. This licence is currently not in use but is an option in a drought to provide compensation to rivers affected by other drought options. A drought order or permit application would be required for an increased daily maximum abstraction to 7.0 MI/d.

Table 3.3: Drought options to re-commission unused sources for compensation releases

Increasing existing abstraction licence

- 3.8.6 It may also be possible to gain additional yield through increasing our existing abstractions. We have a number of river abstractions that could provide additional yield during a drought. We would require a drought order or permit to utilise our river abstraction options.
- 3.8.7 Details of these options and environmental impacts are provided in Appendix 6. The triggers for the options are discussed in Section 2. The decisions on which orders or permits to apply for would be made in consultation with the Environment Agency and other interested parties.
- 3.8.8 Currently we have identified no sites where drought powers would be required to increase groundwater abstraction. Our experience in 1995/96 shows the potential for increasing supplies of potable water is limited by treatment capacity and mains infrastructure.

Long term drought options

- 3.8.9 The options described above would be used in a drought lasting one or two years. We have a number of long term drought options some of which will require a drought order or permit. These are discussed in section 3.9 below.

Compensation for adverse impacts from implementation of supply side drought actions

- 3.8.10 Under the Water Resources Act 1991 other abstractors adversely affected by a water company's drought management measures may make a claim for compensation. Under the act "a claim may be made at any time not later than six months after the end of the period for which the order authorises." Where a claim is "made during the continuance of the ordinary drought order, the Lands Tribunal may, if it thinks fit, award a sum representing the loss or damage which is likely to be sustained by the claimant" in respect of each day the claimant is affected.
- 3.8.11 When we advertise and consult on drought order/permit applications, to provide us with additional supply in a drought, we will reference the above to ensure abstractors potentially impacted by the drought measures are made aware that they may make a claim for compensation to the Lands Tribunal.
- 3.8.12 We have a spreadsheet file detailing abstractors downstream of drought permit sites that might be at risk of derogation due to drought permit being implemented. This was obtained from the Environment Agency abstraction database in July 2011. We will check for any additional abstractors with the Environment Agency at the time of making a permit application.

3.9 Long term drought options

- 3.9.1 Historically there has not been a drought event in Yorkshire that has lasted more than two years. In 1995/96 there was a two year drought where had the situation continued we would have required resources in addition to those made available through first and second year drought options. In 1996 we started to construct a transfer from Northumbrian Water's River Tees abstraction but this was never completed as the situation improved.

- 3.9.2 Since 1996 we have improved our grid system and the ability to transfer resources around the region. These improvements mean a repeat of the 1995/96 drought would not require us to consider a transfer from Northumbrian Water. However, in a severe drought not previously experienced Yorkshire we may need to implement long term drought options.
- 3.9.3 In the Draft Drought Plan, we included an option to transfer water from Northumbrian Water in the event of an extremely severe drought that extends into a third consecutive year (with reservoir storage continuing to remain at very low levels and falling below the Drought Control Line). A three year drought has never been experienced in the Yorkshire region since reliable records began, and there is a very low probability (greater than 1 in 400 years return period) of such an event occurring. Nevertheless, in accordance with national drought planning guidance, it is important for us to demonstrate that we have considered what actions could be implemented if such an unprecedented severe drought were to occur in the future.
- 3.9.4 Consultation feedback on our Draft Drought Plan raised concerns about the potential environmental impacts of a transfer from Northumbrian Water that would abstract from the River Tees and discharge into the River Swale. In response to this, further work has been carried out to assess the environmental impact.
- 3.9.5 Concern was also raised in the consultation feedback that our Drought Plan did not include alternative long term drought options. Our consultees thought alternatives could be required if the River Tees to River Swale transfer option be found to have major environmental impacts, or if other issues prevented its implementation or operation.
- 3.9.6 In response to this concern, we have now included additional alternative supply-side options in our Drought Plan that could be implemented in a third year of drought. These alternatives were taken from our Water Resources Management Plan options list and are provided in Table 3.4. Further details are provided in Appendix 6.
- 3.9.7 Our Draft Drought Plan included reinstating two previously closed sources of supply at Gorpley Reservoir and Silsden Reservoir as supply-side options. These would also be long term drought options and we have included them in Table 3.4 to clarify when they would be considered.
- 3.9.8 Assets will only be re-commissioned if there is no environmental, safety or drinking water quality risks in accordance with the Water Supply (Water Quality) Regulations. The assets will be assessed prior to implementation to determine the risk to water quality and the environment. If any risks are found that cannot be mitigated the sources will not be used. We will consult the Environment Agency, Natural England and DWI (Drinking Water Inspectorate) during the assessment process.
- 3.9.9 Table 3.4 provides us with a number of long term drought options which we would consider in an extreme drought situation. Section 2 discusses an unprecedented scenario in which a long term drought option would be implemented. In this scenario the decision to implement a long term drought option is made in the second year of an extreme drought and the Ouse to Elvington pipeline option is selected. Each drought event will be different and the magnitude and duration cannot be predicted. The timing of implementation and the option(s) selected from Table 3.4 will be dependent on the drought situation as it develops.
- 3.9.10 When selecting which options to implement in a drought lasting more than two years we would consider yield availability and where in our supply system the additional yield was needed. Depending on which areas are most affected by a drought the yield for some options may not be available in a drought and we would have to discount these. Our grid system allows us to transfer water around the region but in a drought situation we would consider where additional resource were most needed and select the most appropriate option for that area.

- 3.9.11 In Appendix 6 we have included the potential risks associated with implementing individual options and the risks to the environment that we would need to consider in a drought when deciding on the feasibility of each option.
- 3.9.12 The timescales for implementing each option will also determine the feasibility of a scheme. Appendix 6 gives an estimate of the time to implement. These timescales allow for planning and environmental assessment (see Section 4) as well as construction. In the scenario presented in Section 2 some of these options would not be completed in time to be available in a third year of drought, however we may consider implementing schemes if there is a risk the drought could last longer than three years.
- 3.9.13 Where resources allow we may consider implementing more than one of these options. We have an existing abstraction licence on the River Ouse that we do not fully utilise. We have included a number of drought options to take additional resources from the River Ouse within our existing licenced capacity. This licence allows us to abstract up to 130MI/d from the Ouse at York but to reduce the potential impacts on the river's environment we would not abstract more than 96MI/d in total.
- 3.9.14 We have identified the appropriate planning requirements and Local Authority planning authorities who would give the required permits and approval for each of the long term drought options. Details are provided in Appendix 6. This allows compliance with Drought Plan Direction 2011 (Direction 4 (1) (b), (c) and (d)).
- 3.9.15 We will discuss these schemes with the relevant planning authorities when we are moving into a long term drought situation and the implementation of one or more of these schemes looks to be becoming more probable. We have strong relationships with the planning authorities in Yorkshire and discussion around permits and approvals could be quickly arranged when appropriate.
- 3.9.16 The trigger to contact the local planning authorities would be the second year of drought where reservoir stocks are forecast to be 6 weeks from the drought control line. We would contact the relevant planners by telephone or email to arrange a meeting to discuss our proposals and the required permits and approvals.

Option	Time to implement (months)	Yield MI/d	Comments
Water efficiency - commercial properties	12	Up to 5	Yield achieved dependent on commercial customers' participation.
Tees to Swale transfer	12-18	40	Import from Northumbrian Water. via rivers Swale and Ouse.
Tees to Elvington pipeline	12-18	40	Yield agreed with Northumbrian Water. Transfer via a pipeline to Elvington WTW.
Acomb Landing licence optimisation	12	22	Increase treatment works capacity to use water available under current licence.
Ouse to Elvington pipeline	12	60	Construct a pipeline at Acomb Landing intake to transfer water using an existing licence to Elvington WTW.
Increase Moor Monkton pumping station capacity	6-9	10	Construct an additional pipeline to transfer increased flow, under the existing licence, from an abstraction on the Ouse to a WTW near York
Abstraction from River Aire at Esholt	12	up to 50MI/d	Construct a new intake on the River Aire to be piped to a Leeds water treatment works. A drought order would be required to abstract from the Aire.
Desalination - Hull	12-18	20	Construct a reverse osmosis plant to treat saline water
Reinstate Gorpley Reservoir & WTW	4	4.9	This closed WTW could be temporarily reinstated. Only valid if water available in the reservoir. Three months before the source was put into supply we would submit a risk assessment on the water quality and drinking water suitability to the DWI.
Silsden Reservoir	1	up to 10	Reservoir currently not used for supply. A drought order/permit would be needed to abstract up to 10 MI/d, to be piped into the Nidd Aqueduct, when yield available. There is also a drought option to reduce the compensation release from Silsden Reservoir (see Appendix 6).

Table 3.4: Long term drought options

3.10 Alternative source – Inter-company bulk transfer

- 3.10.1 The Yorkshire Water region is bordered by four water companies; Anglian Water, Severn Trent Water, United Utilities and Northumbrian Water. We maintain a routine dialogue with each of these companies and in the event of drought would contact the relevant company water resource managers regarding their water supply situation and options for cross border support. The opportunities between Yorkshire Water, Anglian Water and United Utilities are minimal.
- 3.10.2 In 1989 we entered into an agreement with Severn Trent Water for an import of untreated water from Severn Trent Water reservoirs to a Yorkshire Water reservoir in South Yorkshire. The agreement secures a maximum of 21,550MI per year (59MI/d) until March 2084.
- 3.10.3 The amount that can be taken by both Yorkshire Water and Severn Trent Water is set in operating guidelines based on the principal that we are entitled to 24.1% of the available water. The minimum supply rate set in the guidelines between Severn Trent Water and Yorkshire Water is 35MI/d. However, there is provision in the agreement to modify these rules and this was carried out in 1995/96 and in 2003.
- 3.10.4 In the event of serious drought in Severn Trent we can assist by taking a reduced supply.
- 3.10.5 In operating the Severn Trent bulk supply we use five control lines, taking different amounts from the reservoirs depending on the time of year and the reservoir stocks. This is illustrated in Figure 3.1 below. Severn Trent Water operates using several control lines, and the amount it takes depends on where reservoir stocks lie in relation to its “storage alert line”. These lines show the maximum that will be taken by either Severn Trent Water or Yorkshire Water at any time, including in a drought situation. We have agreed with Severn Trent Water that we will endeavour to reduce our minimum transfer to 15MI/d in the lowest band (below State 5). However, in this event we would not impose demand restrictions on our customers even if they were in force in Severn Trent.

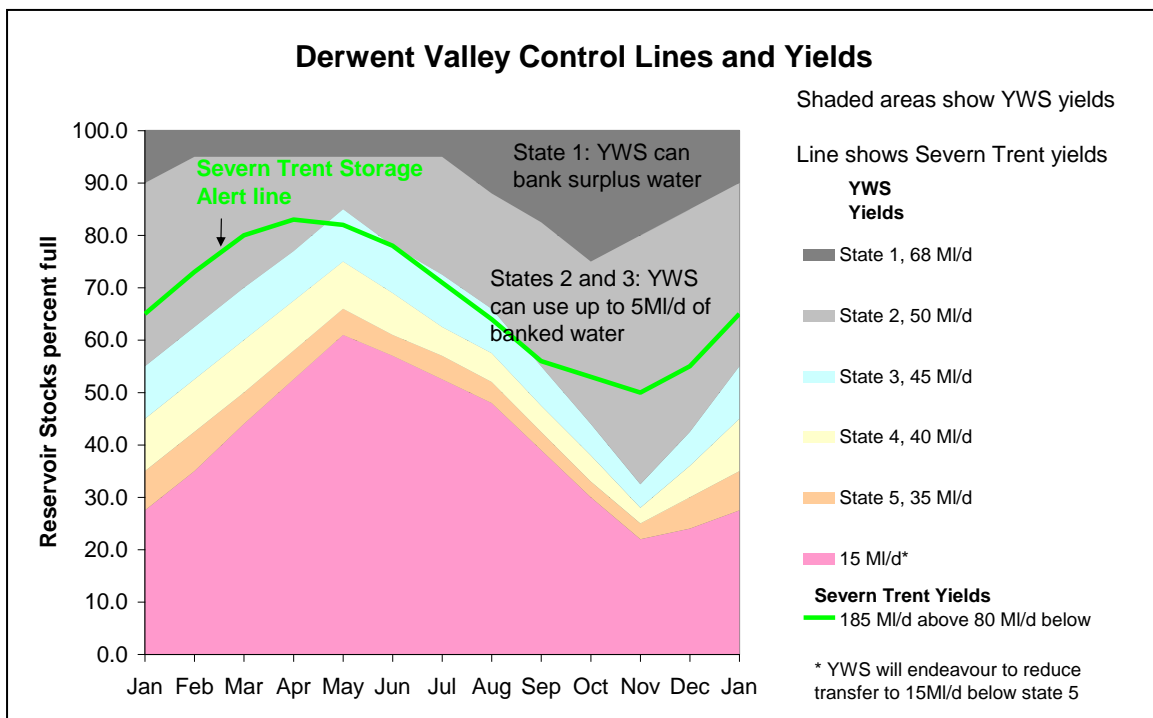


Figure 3.1 Severn Trent reservoir control lines and yields

- 3.10.6 The decision to implement restrictions in Yorkshire is triggered by our own resources. The scale, timing and duration of any reduction in supply will depend on the scale and extent of drought impacts in Severn Trent and Yorkshire. We hold routine meetings with Severn Trent on the operation of the reservoir sources.
- 3.10.7 Likely changes to the supply rules will be agreed prior to any change being made.
- 3.10.8 When we are in drought we will consult with Severn Trent Water on short term bulk transfers. The availability of a transfer from Severn Trent would be dependent on its own water situation. If Severn Trent Water is also in a drought situation the yield is unlikely to be available. However, we would always discuss the possibility of increasing the import with Severn Trent Water.
- 3.10.9 In our Draft Drought Plan we included a small quantity of treated water we imported from Northumbrian Water into the East SWZ. This import ceased in 2012. We have not included the re-commissioning of this import as our Water Resources Management Plan shows the East SWZ to have a large surplus and this import is no longer required.
- 3.10.10 We have an option to import water from a Northumbrian Water abstraction on the River Tees in a prolonged drought. We would request this import from Northumbrian Water in a long term drought and this option is included as a long term drought option in Section 3.9 and discussed below in more detail.

3.11 Northumbrian Water transfer option

- 3.11.1 We have a long term drought option to take water from Northumbrian Water's abstraction on the River Tees. There are two alternatives for transferring this resource to a treatment works near York. One option is to transfer it via the rivers Swale and Ouse and the other is to transfer it via a pipeline. We previously did not include this alternative due to lengthy timescales associated with pipeline procurement and construction which are in excess of a year. We have now included this option and when considering long term drought options in a drought we will review the timescales available and the feasibility of the pipeline option.
- 3.11.2 Surplus water resource is available in the Northumbrian Water supply area at certain times of the year, even during severe droughts. Discussions have taken place between Northumbrian Water and Yorkshire Water to quantify this potential surplus. These discussions concluded that a volume of 40MI/d could be made available to Yorkshire Water for use during periods of sustained dry weather.
- 3.11.3 The use of the transfer from the River Tees is a feasible option for water supplies in Yorkshire should there be an exceptional drought lasting three or more years, provided that environmental sensitivities are managed, assessed and understood as detailed in Section 4 and Appendices 6 and 7. The water would be made available under a bulk supply agreement with Northumbrian Water and the abstraction would be covered by the existing Northumbrian Water abstraction licence on the River Tees. Therefore, no drought order or permit would be required for this abstraction. The option to discharge to the River Swale would be require a drought order to discharge into the Swale.
- 3.11.4 We will consider the inter-company bulk transfer and other long term drought options included in Table 3.4 in a second year of a drought if reservoir regional stocks are six weeks away from crossing the drought control line. We will build on the preliminary Environmental Assessment

Report (pEAR) completed prior to finalisation of this Drought Plan, and a full Environmental Assessment will be completed to consider any potential impacts and monitoring and mitigation arrangements will be set out in detail.

3.12 Emergency drought orders

- 3.12.1 The drought liaison meetings with the Environment Agency would consider emergency options for drought orders. In the event of an exceptional drought it may be necessary to consider emergency drought orders.
- 3.12.2 Emergency drought orders may cover river abstraction, compensation reductions and restrictions in supplies to customers e.g. rota cuts or standpipe use
- 3.12.3 Prior consultation and liaison with Local Authorities and the Consumer Council for Water will be an important component of the planning.

4 Environmental impacts

4.1 Introduction

- 4.1.1 The Environment Agency's Water company drought plan guideline (June 2011) requires that the Drought Plan is supported by a comprehensive level of environmental assessment. Much of this work is to be completed in advance of a drought, during the preparation of the Drought Plan, with a summary published within the plan.
- 4.1.2 The guideline sets out how a company should assess and mitigate the impacts of its supply-side drought management options on the environment, how it should monitor and measure these impacts, and outlines the requirement to consult relevant bodies where potential environmental impacts have been identified.
- 4.1.3 According to the guideline, a water company is required to:
- Assess the potential environmental impacts of each supply-side drought management option, through undertaking a staged and risk-based environmental assessment. The environmental assessment will establish whether there are likely to be any environmental impacts from implementing the option. Further detail on the environmental assessment process is provided later in this section.
 - Prepare a monitoring plan for each supply-side drought option, providing details of any further surveys that are required to support completion of the environmental assessments, together with details of in-drought and post-drought monitoring requirements. Further detail is provided later in this section.
 - Set out the details for any data sharing and monitoring agreements. Further detail is provided later in this section.
 - Detail the mitigation or compensation measures which may be required for each supply-side drought management option, should environmental impacts be predicted from the environmental assessments. Further detail is provided later in this section.
 - Determine whether any supply-side drought option, either alone or in combination, is likely to result in a significant effect on European sites, as designated under the Habitats Directive. This includes carrying out a Habitats Regulations Assessment (HRA) of the Plan, and if necessary, a Strategic Environmental Assessment. Further detail is provided later in this section and Appendix 7 (HRA) and Appendix 8 (SEA).
 - Provide a map showing the locations of potential drought permit or order sites together with important ecological sites that may be affected. Maps are provided in each Environmental Assessment Report. (Note that maps for the inter-company bulk transfer options have not been included in the interests of national security).
 - A summary of the environmental assessment, together with potential mitigation measures for each supply-side drought management option is given in Appendix 6.
 - Carry out a review of the Drought Plan on an annual basis. Further detail is provided later in this report.
- 4.1.4 In preparing the environmental components of the Drought Plan, we have worked closely with the Environment Agency, following the recommended approach set out in the guideline. The 2011 guideline differs from the 2005 predecessor in that it requires a more comprehensive level

of environmental assessment of each supply-side drought option, whilst weighting the level of detail against the risk posed by the potential drought action. The objective is to complete as much of the environmental work as is practical during the preparation of the Drought Plan.

- 4.1.5 We will work with the Environment Agency to agree the terms of any drought permit or drought order, to strike a balance between maintaining water supplies and protecting the environment. Selection of drought orders or drought permits, including the sequence of applications, considers a number of factors: the amount of water that the measure will make available; how effectively this water can be utilised within the grid; and the environmental impact of the measure. The majority of the measures within the Drought Plan have been utilised previously during the 1995/96 drought, where impacts detected through intensive baseline and post-drought monitoring were minimal.
- 4.1.6 Drought planning is a continuous process. We continually review reservoir stocks, rainfall data, river flows and demand on a weekly basis. The drought line triggers referred to in Section 2 forecast ten weeks between updating the environmental assessments/commencing monitoring and receiving a drought permit/order. However, we are likely to know in advance of this whether there has been a rainfall deficit, and that these measures are likely to be needed. We have extensive experience of the monitoring and mitigation of drought and drought measures, and of assessing the environmental effects of river abstractions, river transfers and reservoir compensation releases. In considering the environmental requirements of the Drought Plan, we have drawn on this considerable experience including:
- Applications for drought permits and orders during the 1995/6 drought: Environmental Assessments together with extensive monitoring to support 36 drought order applications.
 - Applications for time limited abstraction licences on the Rivers Ouse, Ure and Wharfe 1998 and 2003: Full environmental assessments and associated monitoring programme.
 - Reservoir Compensation review project: Modification of compensation flows at 14 reservoirs, including supporting monitoring, flow model development and post-graduate studies.
 - Tees Transfer feasibility study: Detailed environmental study (1997 to 2000) to provide an assessment of the construction and operational impacts of 3 pipeline and river transfer options.

4.2 Environmental assessment

- 4.2.1 In order to understand the effects of any proposed drought measure, we have carried out an environmental assessment for each supply-side drought management option. The environmental assessments consider the potential impacts of each proposed measure on a range of receptors. The scope and content of the environmental assessment follows the Environment Agency's guideline (specifically Section 7 and Appendix H). In addition, regular liaison with key specialists within the Environment Agency has been carried out throughout development of the plan, to ensure appropriate methodologies have been applied and all relevant potential impacts have been assessed.
- 4.2.2 As recommended by the guideline, a staged and risk-based approach to the environmental assessments has been followed, which means that the level of environmental assessment carried out for a particular option depends on the likelihood and severity of its impacts.

- 4.2.3 The suggested activities that we need to complete in order to assess the likely environmental impacts of our supply-side drought management options are presented in Figure 4.1: Environmental impacts activities flowchart below, which has been sourced from the Environment Agency’s guideline.
- 4.2.4 The environmental assessment begins with an environmental impact screening exercise, which fulfils the guideline requirement to “assess how sensitive each feature is to the likely flow/level impacts caused by the supply-side drought management option”. Screening involves two stages:
- Stage 1 Hydrological impact assessment
 - Stage 2 Environmental sensitivity assessment
- 4.2.5 Three types of supply-side drought management options have been assessed: Reservoir compensation release reductions, increased river abstractions and an inter-basin transfer. The first two of these results in a reduction in flow in the river downstream, and the third results in an increase in flow before the transferred water is abstracted further downstream.
- 4.2.6 Stage 1 determined the zone and extent of hydrological influence of each supply-side drought management option, both on an individual basis, and taking into account cumulative effects of simultaneous option deployment where options are located within the same catchment and across catchments.
- 4.2.7 Stage 1 also considered cumulative effects of other discharges and abstractions using abstraction licence and discharge consent information from the Environment Agency. Using the outputs from Stage 1, sites and features which could be impacted by the hydrological changes were identified, together with their sensitivity to those changes, based on the risk of them being impacted by the drought management option during the period of its operation (Stage 2).

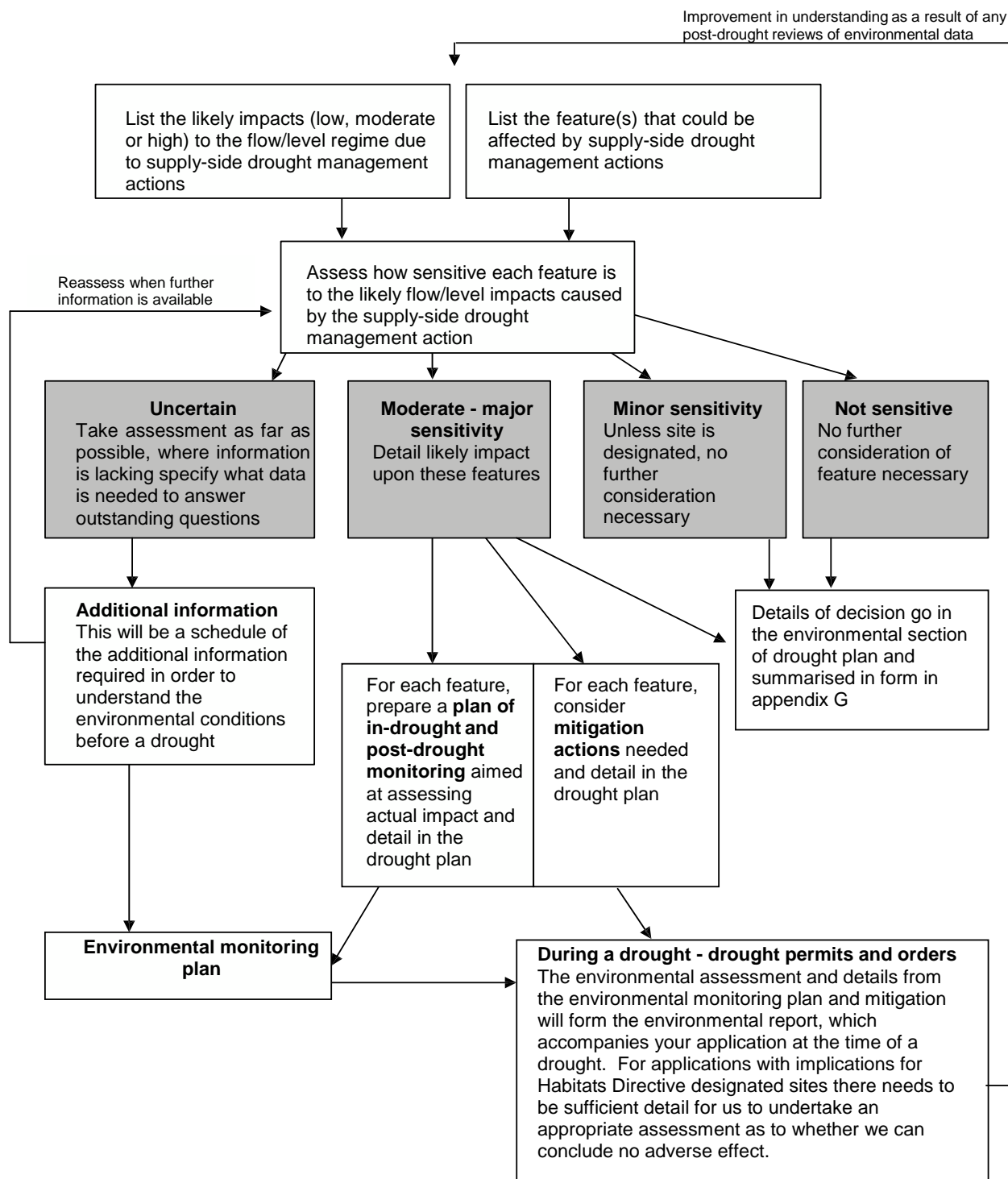


Figure 4.1: Environmental impacts activities flowchart

- 4.2.8 Sensitivity of receptors has been assessed considering the context that when drought options are actually implemented, the baseline conditions are likely to be characteristic of a severe drought. The basis for assessment therefore compares the impacts of drought option implementation against those that would occur naturally in an actual drought.
- 4.2.9 The environmental impact screening identifies the outcome for each listed feature, categorised in Figure 4.1 as either uncertain, moderate-major sensitivity, minor sensitivity or not sensitive, and identifies appropriate next steps.

- 4.2.10 In accordance with the guideline, results of the screening will also be used to inform the Habitats Regulations Assessment (HRA) and a decision as to whether the Drought Plan requires a Strategic Environmental Assessment. See sections 4.5 and 4.6.
- 4.2.11 The screening process has considered relevant data types as specified in the Environment Agency's guideline. These include:
- Hydrometric data (various modelled and measured flow data)
 - Designated site citation information (accessed from JNCC and MAGIC websites)
 - Water Framework Directive (WFD) status information, including status classifications for fish and invertebrates
 - Freshwater Fish Directive (FFD) designation status
 - Biodiversity Action Plan (BAP) species distribution
 - MAGIC website (for scheduled ancient monuments, recreational resources and landscape features)
 - Environment Agency local knowledge
- 4.2.12 The scope, methodologies and findings of the environmental impact screening were agreed with the Environment Agency and are presented in a series of Options Impacts Screening Reports (OISRs). The outcomes are also presented in summary form within Appendix 6 of this draft Drought Plan (which equates to Appendix G in the environmental impacts activities flowchart (Figure 4.1)). The full OISRs, whilst not published with the draft Drought Plan, can be made available on request.
- 4.2.13 The OISRs form the preliminary stages of the environmental assessment and inform which sensitive features are to be carried forward for further assessment. Where an option includes at least one feature identified as either: 1) uncertain; 2) moderate-major sensitivity; or 3) minor sensitivity in a designated site; in accordance with the Environment Agency's guideline, these features will be screened in for consideration during further environmental assessment, monitoring and mitigation.
- 4.2.14 Where an option includes at least one feature identified as either 4) minor sensitivity (BAP species); or 5) not sensitive, no further work is required. For such features, the information contained within the OISRs alone will form the supporting environmental information to accompany an application for a drought permit or order.
- 4.2.15 Following screening, the types of sensitive features which remained were:
- WFD Status: Fish and aquatic macro invertebrates
 - Freshwater Fish Directive: Salmonid waters, Cyprinid waters
 - BAP species (individually): white-clawed crayfish, brown trout, Atlantic salmon, grayling, lamprey, European eel, otter
 - Designated sites
 - Navigation, angling, canoeing
- 4.2.16 As identified in the screening process, Environmental Assessment in the Environmental Assessment Reports (EARs) only investigates the potential impacts of the drought option for these sensitive features, and only at those sites where screening has included them.

- 4.2.17 Each type of sensitive feature forms a chapter within the EAR, with key components of the assessment based on the 2005 Defra guidance (Table 4.1).
- 4.2.18 The further assessment work is presented in separate Environmental Assessment Reports (EARs), which are prepared in accordance with Government regulations and good practice guidance, including:
- Environment Agency (2011) *Water company drought plan guideline*.
 - Defra (2005) *Drought Orders and Drought Permits - information from the Department for the Environment, Food and Rural Affairs (Defra), Welsh Assembly Government and the Environment Agency*.
 - Institute of Environmental Management and Assessment (2004) *Guidelines for Environmental Assessment*
 - UKWIR (2007, updated 2011) *Strategic Environmental Assessment – Guidance for Water Resources Management Plans and Drought Plans*.
- 4.2.19 The scope of the EARs is set out in a separate Environmental Assessment Scoping Report, the principles and methodologies within which have been agreed with the Environment Agency.

Environmental report contents		Additional information notes
1	A summary of the main environmental report using non-technical language	
2	This should include a synopsis of major conclusions, controversial issues, unresolved issues and options selected	Include maps and plans
3	A description of the proposal including details of the site, location and duration	This can be kept brief as the detail will be elsewhere in application
4	Details of alternative sources considered	This should demonstrate justification for the proposed option
5	Description of the current environment (such as the aquatic and physical environment and associated habitats) and its setting in a national/regional/local context	This should include existing features and, if already in a prolonged drought, whether there are any recognised impacts. Key information includes: the importance of the site (international and domestic designations) Water Framework Directive classification status and any associated issues relating to the site surface flow and groundwater data ecological and habitat sensitivity to flow/level changes and supporting data heritage/culture value current abstractions
6	Identification and prediction of impacts on the current environment	This should include short and long term (acute and chronic) direct and indirect, cumulative, and permanent and temporary effects. It should be at the point of change and downstream and include water quality, in-river needs, associated wetlands, other water users and navigation and recreation. The assessment should focus on the features sensitive to flow/level alteration and should be quantified where possible, showing change from base level Details on the quality of the data used, analysis/modelling and interpretation methods and the range of uncertainty should be included as well as appendices to present data and references to data source
7	Mitigation measures	Where significant effects are identified, a description of the measures to be taken to avoid, reduce or remedy these effects should be included. Any proposed or actual agreements to minimise impacts on other users (for example lawful abstractors) should also be included
8	Additional information to enable an appropriate assessment of environmental impacts, where a proposal could have an adverse impact on a Habitats Directive site	The scope and content of this assessment will vary depending on the case but it must relate to the specific site and its conservation objectives
9	Additional information to enable the authority under section 28G of Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) to fulfil its duties, where a proposal can affect a SSSI site	The scope and content of this assessment will vary depending on the case but it must relate to the specific site and its conservation objectives. See box two for further information
10	Monitoring plan, where proposed	This should include details of what evidence/data collection will be undertaken including locations, timings and frequency
11	Any further information relevant to impact on water users and environment	
2	Conclusions	This should draw together and summarise the reasoning (for and against) the proposals
13	Appendices	Such as methodologies used; data/evidence and surveys taken or planned

Table 4.1: Environmental Assessment Report contents

4.2.20 EARs will provide the results of the assessment of potential impacts arising from the drought measure, and inform monitoring and mitigation actions to protect rivers, ecology and industrial and recreational users. The EARs are not published as part of this Drought Plan, but are to be completed as far as is reasonably practicable in advance of a drought, in parallel with the preparation of this Drought Plan. The EARs are finalised in the run up to a drought and then submitted alongside an application for a drought permit or drought order.

4.2.21 This approach ensures that much of the environmental information is collated in advance of a drought, whilst ensuring that the environmental assessment is based on the specific environmental and hydrological conditions occurring at the time, which cannot be predicted in advance. This enables the Environment Agency to make a swifter determination of drought orders or permits and ensures that any issues may be dealt with early.

4.2.22 For the purposes of reporting, the supply-side drought management options considered for environmental screening and assessment are grouped as follows:

Compensation release reductions:

- North area reservoir drought options
- South area reservoir drought options
- Calder area reservoir drought options
- North West area reservoir drought options

River abstractions:

- River Ouse drought option
- River Ure drought option
- River Wharfe drought option
- River Hull drought option

Inter-basin catchment transfer:

- Tees-Swale transfer drought option

4.2.23 Cumulative impacts of options both within groups and across groups have also been considered, as outlined within the Cumulative OISR and each Environmental Assessment Report, with the outputs summarised in Appendix 6.

4.2.24 We have also carried out assessments of the potential environmental effects of the seven alternative supply-side options for a third consecutive year of drought in discussion with the Environment Agency and Natural England. In line with Environment Agency guidance, environmental impact screening reports have been completed for each of the seven options, categorising impacts as either uncertain, moderate to major sensitivity, minor sensitivity or not sensitive. The outcomes are summarised in Appendix 6.

4.2.25 In addition, a Preliminary Environment Assessment Report has been prepared in consultation with the Environment Agency and Natural England for the River Tees to River Swale Transfer option, assessing the potential impact of implementing this option on those features where the impact screening identified impacts as uncertain or moderate to major.

- 4.2.26 The assessments provide the basis for setting out the further baseline information that is required to address uncertain impacts, as well as to define the likely environmental monitoring that would need to be put in place during a drought (as defined in the Environmental Monitoring Plan – see following section).
- 4.2.27 As these options would not be implemented until the third year of a drought, the more detailed Environmental Assessment Reports would be developed and finalised as necessary during the second year of a drought, prior to triggering construction activities required and making any applications for drought permits or orders where this is required (this only applies to the River Aire and desalination options).

4.3 Environmental data provision and monitoring plan

- 4.3.1 To monitor the effects of any implemented drought measure, the guideline requires that we develop an Environmental Monitoring Plan (EMP). The EMP uses outputs from the EARs to confirm the features for which further monitoring is required, and is designed to differentiate the impacts of the drought measure from those of natural drought. It would monitor the range of potential receptors in the reaches that would be affected by the drought measure, to identify effects and, where necessary, trigger the introduction of mitigation measures.
- 4.3.2 The EMP sets out in detail any additional baseline monitoring required to fill data or information gaps. It also identifies the locations at which monitoring will be undertaken, the frequency and the organisations responsible for carrying out the monitoring. The EMP has been produced as a separate document, which is not published with the draft Drought Plan. However, a summary of the approach is provided below and copies of the EMP can be made available on request.
- 4.3.3 The approach within the EMP is staged, so that the coverage and frequency of monitoring is progressively increased as the drought proceeds, low flows are experienced and the potential for impact from the drought measure increases. The triggers for increasing this targeted monitoring are based on flow and have regard to the most sensitive receptors. As flows recover, so monitoring intensity decreases, extending into a drought recovery period. The duration and context of the post-drought monitoring will depend on the severity of impacts detected and the recovery time for the various receptors. This flexibility is essential during a drought as no two droughts are the same and environmental conditions change over time, necessitating a robust and flexible approach. All additional monitoring and mitigation measures would be agreed through liaison with the Environment Agency Regional Drought Co-ordinator and Fisheries and Environment Teams.
- 4.3.4 Monitoring and mitigation associated with designated sites will be discussed and agreed through close working with Natural England. The EARs have listed a number of designated sites which will require increased targeted monitoring and have also identified sites for which the impact of a drought has currently been assessed as “uncertain”. In order to reduce this uncertainty, baseline monitoring has been proposed in the EMP. Once this monitoring has been carried out, the Habitats Regulations Assessment and SSSI Screening, together with relevant EARs will be updated.
- 4.3.5 Baseline monitoring within each of the rivers potentially affected by a drought measure is an essential part of the EMP and the EARs. A large amount of baseline monitoring of the rivers in the Yorkshire region is routinely carried out by both the Environment Agency and Yorkshire Water. This includes biological monitoring in the form of macro-invertebrate, fish and River Habitat Surveys, chemical water quality monitoring and flow gauging.

- 4.3.6 Our water resource modelling indicates that it is highly unlikely that supply-side options would be required until the second year of a drought event. This therefore allows sufficient time for collation and basic analysis of the baseline dataset to be undertaken in advance of the trigger that indicates that additional pre-drought monitoring is required, in addition to completing the EARs.
- 4.3.7 Typically, analysis of the data would commence 1-2 months before the drought line triggers are crossed. In some circumstances e.g. reservoir stocks being low at the start of the year following a poor winter recharge, preliminary data analysis could start much earlier.
- 4.3.8 A data exchange process is being discussed with the Environment Agency, by which baseline monitoring data from work carried out by either the Environment Agency or ourselves is made available to the other organisation on a 6-monthly basis against an agreed data schedule set out within the EMP. We will collate this baseline data to ensure the data set remains up to date.
- 4.3.9 We meet the Environment Agency at least annually to discuss their routine monitoring programme, the data exchange process and to review our baseline monitoring programme, to ensure their effectiveness. This baseline data schedule in the EMP is also reviewed annually to ensure it remains up-to-date.
- 4.3.10 We will also meet with Natural England on an annual basis to discuss and agree any additional monitoring required for protected sites, which is beyond Natural England's condition assessment monitoring programme.

4.4 Environmental mitigation measures

- 4.4.1 The Environment Agency's Water company drought plan guideline specifies that any serious impacts on the environment that are predicted to occur through the implementation of any drought management actions are mitigated against. The environmental assessments undertaken (described in section 4.2) identify the sensitive features for which mitigation may be required and also specify associated monitoring requirements.
- 4.4.2 Discussions were held with the Environment Agency to identify serious impacts and to agree appropriate mitigation measures that are both available and practicable. Details of these are documented in the Environmental Assessment Reports and EMP (not published but available on request) and summarised in Appendix 6. The Environment Agency and other relevant parties will also be consulted further, prior to applying for an individual drought permit.
- 4.4.3 Details of potential mitigation measures and targeted monitoring are provided in Table 4.1. Please note that "potential mitigation option" is a separate list to "potential targeted monitoring" and the table is not intended to be read as discrete rows. The EMP provides further details on these mitigation measures, including any permissions or permits required. The mitigation measures, along with the drought monitoring, are based on experience from previous droughts in Yorkshire or other parts of the UK, providing assurance that they will be sufficient to protect the environment during drought.

4.5 Habitats Regulations assessment and SSSI screening

- 4.5.1 As set out in the drought plan guideline, each water company is required to ensure that its Drought Plan meets the requirements of the Habitats Regulations (Conservation of Habitats and

Species (Amendment) Regulations 2010), through undertaking a Habitats Regulations Assessment (HRA).

4.5.2 The purpose of the HRA is to determine whether implementing the plan will have no adverse effect on the integrity of European sites which are designated under the Habitats Directive. Such sites include:

- Special Protection Areas (SPA)
- Special Areas of Conservation (SAC)
- Candidate Special Areas of Conservation (cSAC)
- Ramsar Sites

		WFD (Inverts)	Fish (& WFD)	FFD (Salmonid)	F-L pea mussel	Otter	Water vole	W-C crayfish	Potential targeted monitoring
1. Working with form and function	1-1	Creation of alternative refuges in deeper water						x	A Walkover survey to identify and characterise pools at low flow prior to DP
	1-2	Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive taxa.	x	x					B One-off measurement of pool depth under DP conditions C Ground-truthing of Lidar data of pools at low flow prior to DP
	1-3	Artificial channel narrowing to provide functional refuges to support species and enable swift re-colonisation.	x	x		x	x		D Walkover survey to locate flow types (notably riffles) at low flow prior to DP E Targeted cross-section measurements at low flow without DP F Targeted cross-section measurements under DP conditions G Fixed point photography of in-channel features to catalogue changes to key features over time
	2-1	Modification to barriers and/or flows to improve passage		x					H Walkover survey to identify and characterise in-channel barriers at low flow prior to DP
	2-2	Screening of intakes to reduce entrainment with regular inspection		x				x	I Walkover survey to characterise barriers under DP conditions J Visual inspection of screens
	2-3	Provision of freshets to ensure fish are capable of migrating		x					K Installation of underwater cameras at barriers L Installation of telemetered pressure transducers u/s barriers M Installation of fish counters at fish passes N Tagging of migratory fish
	3-1	Gravel washing		x					O Review of routine EA water quality monitoring data (WFD compliance) immediately following analysis
2. Structural modification	3-2	Enhancement of WwTW treatment to improve quality of discharged effluent		x	x				P Review of routine EA ecological monitoring data (WFD compliance) immediately following analysis
	3-3	Aeration of watercourse (note: limited benefits except for use in ponds. To discuss with EA prior to consideration)	x	x	x		x	x	Q Deployment of fine sediment traps with routine inspection programme
	3-4	Appropriate techniques to prevent transfer of invasive species					x	x	R Installation of telemetered turbidity sensors
	3-5	Appropriate vegetation control techniques	x		x				S Installation of telemetered DO probes
	3-6	Piscivorous bird scarers		x					T Installation of telemetered temperature sensors U Programme of water quality monitoring (in situ analysis - DO, temperature, ammonia, turbidity, conductivity, pH) V Programme of water quality monitoring (lab based analysis - BOD, ammonia, suspended solids) W Fixed point photography of margins/in-channel vegetation X Avian survey (piscivorous birds) during DP Y Invasive species survey prior to DP Z Invasive species survey during DP AA Invasive species survey post DP
	3-1	Gravel washing		x					O Review of routine EA water quality monitoring data (WFD compliance) immediately following analysis
	3-2	Enhancement of WwTW treatment to improve quality of discharged effluent		x	x				P Review of routine EA ecological monitoring data (WFD compliance) immediately following analysis
	3-3	Aeration of watercourse (note: limited benefits except for use in ponds. To discuss with EA prior to consideration)	x	x	x		x	x	Q Deployment of fine sediment traps with routine inspection programme
	3-4	Appropriate techniques to prevent transfer of invasive species					x	x	R Installation of telemetered turbidity sensors
	3-5	Appropriate vegetation control techniques	x		x				S Installation of telemetered DO probes
3-6	Piscivorous bird scarers		x					T Installation of telemetered temperature sensors	
3. Operations and maintenance									U Programme of water quality monitoring (in situ analysis - DO, temperature, ammonia, turbidity, conductivity, pH)
									V Programme of water quality monitoring (lab based analysis - BOD, ammonia, suspended solids)
									W Fixed point photography of margins/in-channel vegetation
									X Avian survey (piscivorous birds) during DP
									Y Invasive species survey prior to DP
									Z Invasive species survey during DP
									AA Invasive species survey post DP



Potential Mitigation Option		WFD (Inverts)	Fish (& WFD)	FFD (Salmonid)	F-L pea mussel	Otter	Water vole	W-C crayfish	Potential targeted monitoring
4. Water management	4-1	Artificial freshet releases to provide temporary variation in the flow regime	x		x	x	x	x	AB Walkover survey to locate areas of flow-sensitive physical habitat at low flow prior to DP
	4-2	Gradual phase in of compensation release to avoid displacement of flow sensitive taxa.						x	AC Walkover survey at time of DP implementation to identify flow-stressed physical habitat
	4-3	Gradual phase in of compensation release to avoid stranding or displacement of individuals	x	x	x		x	x	AD Targeted visual inspection at time of DP implementation at flow-sensitive physical habitat
	4-4	Gradual phase in of reduction in water volume/flows to avoid stranding of individuals	x	x	x				AE Fixed point photography of extent of exposure (wetted width)
	4-5	Temporary reduction in volume of abstraction or increase in compensation release		x					AF Visual observation of water depth over spawning habitats
	4-6	Freshet release to dilute/displace water quality reduction		x					AG Review of flow/level gauge network data
									AH Targeted spot flow gauging
5. Ecological intervention									AI Installation of telemetered pressure transducers
	5-1	Capture and relocate across barrier (taking into account migratory periods)	x					x	AJ Walkover survey at time of DP implementation to identify flow-stressed fish communities
	5-2	Fish rescue in consultation with Environment Agency	x						AK Fisheries survey at low flow prior to DP implementation to characterise fisheries community present
	5-3	Relocation of adults	x						AL Fisheries survey during DP implementation to quantify DP impact
	5-4	Relocation of individuals to less impacted suitable habitat					x		AM Fisheries survey at low flow post DP to characterise fish community loss
	5-5	Relocation of juveniles	x						AN Walkover survey prior to DP implementation to identify suitable habitat for relocations
	5-6	Relocation of populations by trapping and retention for later release	x						AO Monitoring of spawning habitats to ensure favourable conditions remain
	5-7	Restocking coarse fish	x						AP Monitoring of nursery habitats to ensure they are not eroded by elevated flows
	5-8	Restocking using juvenile ammocoetes within the catchment	x						AQ Monitoring of marginal habitats to ensure no erosion of sensitive habitats
	5-9	Restocking using offspring of broodstock from the catchment	x						
6	6-1	Habitat enhancement beyond impacted reach	x	x	x		x	x	
7	7-1	Changes to navigation controls to reduce disturbance/damage	x	x					
8. Education									
9. No mitigation feasible									

Table 4.1 Potential mitigation measures and targeted monitoring

- 4.5.3 If the HRA concludes that significant effects on one or more European sites are likely, or if we cannot be certain whether the plan will result in likely significant effects, then an Appropriate Assessment will be required.
- 4.5.4 As described in above, the Drought Plan requires a more comprehensive level of environmental assessment of each supply-side drought option. This includes the requirement to identify the sites and features which could be impacted by the Drought Plan, including both European and nationally designated sites, and the consideration of cumulative effects.
- 4.5.5 In addition, all protected sites within a catchment will be assessed for potential impact in more detail during the EAR process during the lead in to an application for a specific drought measure. This will include SSSI, SAC and SPA already covered in the screening process, with more detailed information provided about why there is no impact where a site has been screened out, and a full impact assessment for all sites remaining. The EAR will also assess any impact of the drought permit/order option on other local statutory sites, for example Sites of Importance to Nature Conservation and Local Nature Reserves.
- 4.5.6 A copy of the HRA and SSSI Screening for this Drought Plan is provided in Appendix 7. This report has been updated since the Draft Drought Plan 2011 to include assessment of the additional alternative options for a third consecutive year of drought. The updates were discussed with Natural England and the Environment Agency.
- 4.5.7 The HRA and SSSI screening process considered all nationally and internationally protected sites in the catchment and moved progressively through a series of steps to establish whether a site could be affected by a proposed drought measure. Factors such as proximity to the river, the nature and designation of the site and its hydrological connectivity to the river were considered. HRA screening also considered the potential for likely significant effects on designated European sites due to cumulative, in-combination effects from two or more drought options being implemented in the same river system.
- 4.5.8 The HRA concluded that there would be no likely significant effects on European designated sites, including the Humber Estuary European Marine Site. Consequently, there is no requirement to undertake an Appropriate Assessment of the Drought Plan. The potential for adverse effects on a number of SSSIs has been highlighted and would need further monitoring and investigation as set out in the EMP. The HRA and SSSI screening assessments would be reviewed as part of updating the Environmental Assessment Reports at the time of triggering the need for any particular drought option, recognising that the environment is not static and changes could take place that influence the assessment.
- 4.5.9 Given the sensitivity of the Humber Estuary to drought, and the potential for cumulative impacts (although not considered significant), we will discuss these findings further with the Environment Agency and Natural England. This will enable any issues or concerns relating to the cumulative impact to be explored, and if necessary, to agree any further analysis to be carried out as part of the next annual review of the Drought Plan in 2014.

4.6 Strategic Environmental Assessment (SEA)

- 4.6.1 The Strategic Environmental Assessment Directive (2001/42/EC) requires a formal environmental assessment of certain categories of plans and programmes which are likely to have significant effects on the environment. The aim of the SEA Directive is “to provide for a high level of protection of the environment and to contribute to the integration of environmental

considerations into the preparation and adoption of plans and programmes, with a view to promoting sustainable development”.

4.6.2 Further to comments received during the Draft Drought Plan consultation, we decided to undertake an SEA between draft and final Drought Plans. The SEA Environmental Report is a separate document which was published in December 2012 alongside an Addendum to the Draft Drought Plan for consultation on our website.

4.6.3 The flow diagram presented in the government’s SEA Practical Guide was applied to the Draft Drought Plan to illustrate the agreed position as to the requirement for SEA (Figure 4.2). The key driver for the SEA arose from concerns from the Environment Agency and Natural England about the uncertain potential effects on the River Tees to River Swale transfer option on several European Sites. Further investigations were therefore carried out during 2012, culminating in the publication of the SEA Environmental Report. The SEA was informed by the updated HRA report, the Environmental Assessment Reports (EAR), Preliminary Environmental Assessment Reports (pEAR), environmental screening reports, Environmental Monitoring Plan and consultation feedback on the Draft Drought Plan (Figure 4.3).

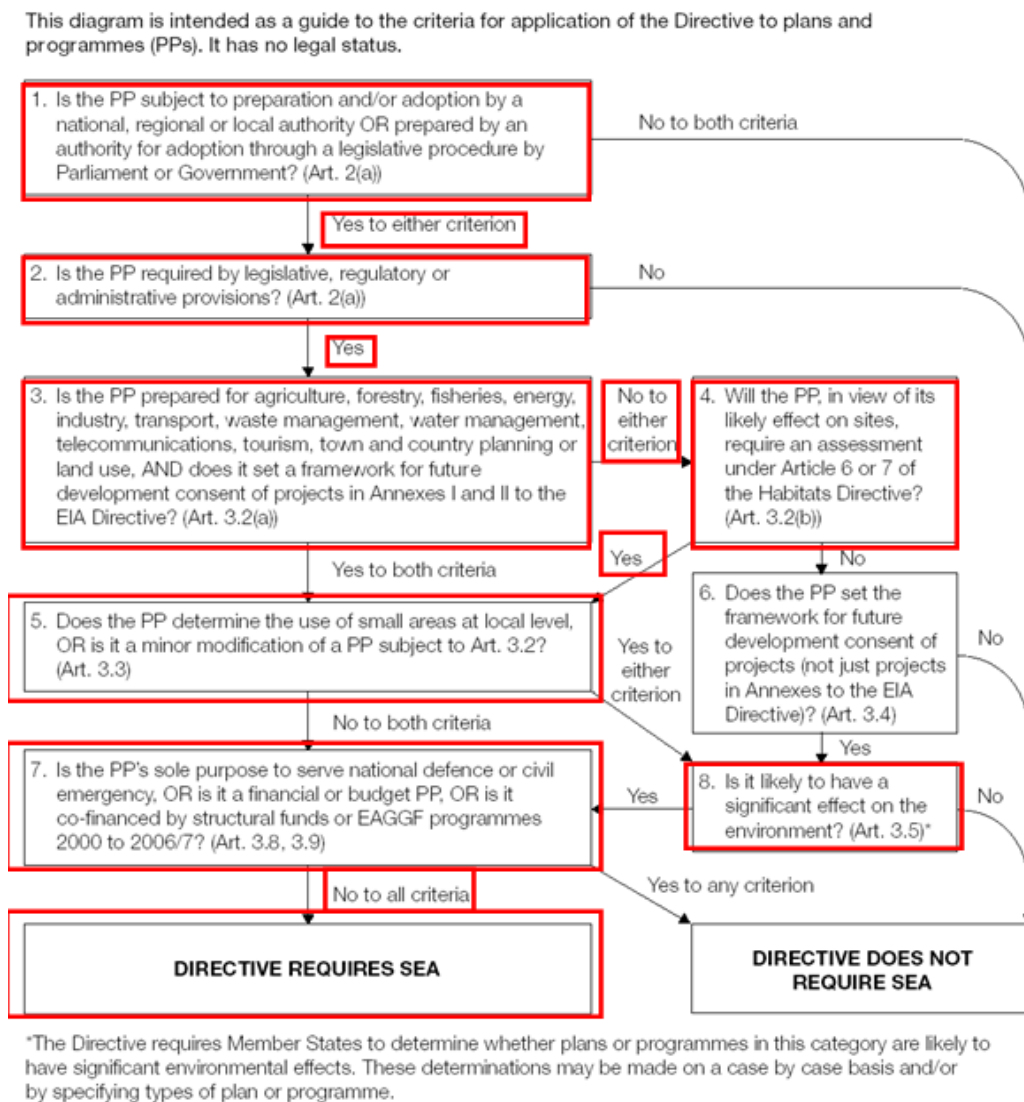


Figure 4.2: Application of SEA Directive to plans and programmes

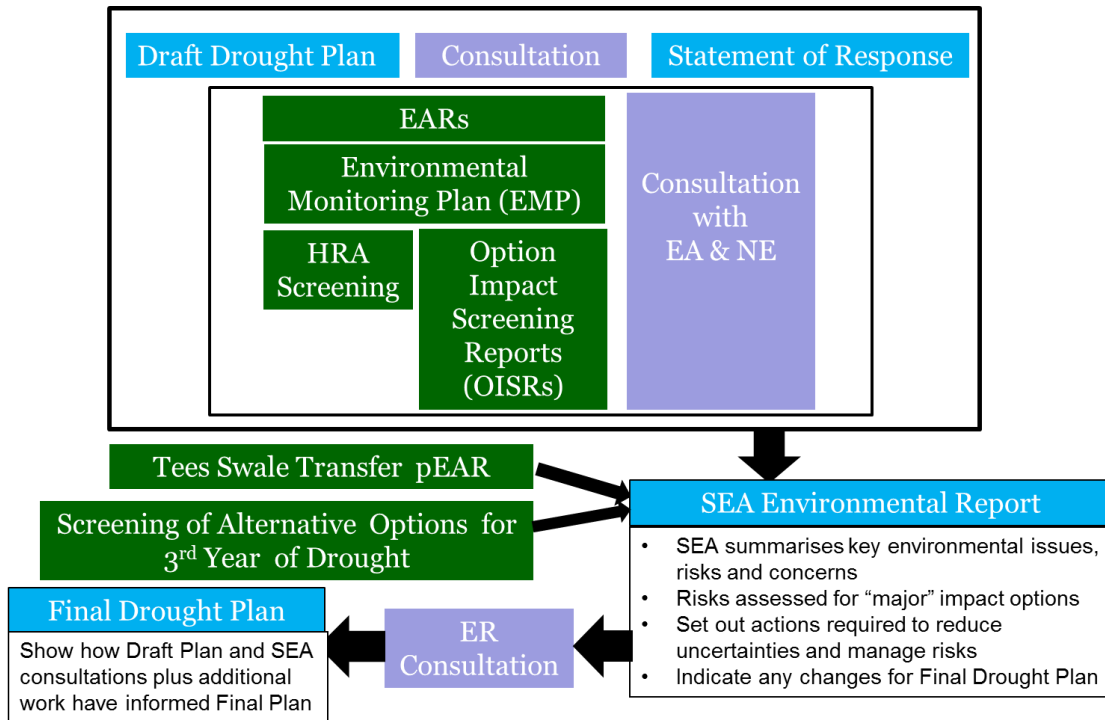


Figure 4.3: Integration of environmental reports, SEA and HRA into the drought planning process

4.7 Use of SEA in developing this Drought Plan

- 4.7.1 We actively consulted with the SEA statutory consultees during the SEA Scoping phase and subsequent development of the SEA Environmental Report. As the SEA assessments developed, we also discussed how the SEA findings, along with other evidence, influenced the drought planning process (Figure 4.3).
- 4.7.2 Using objective-based criteria, the SEA helped to consistently assess all of the demand-side and supply-side options in the Draft Drought Plan, including the Tees-Swale option and the six other alternative supply-side options that would be considered in the third consecutive year of a drought.
- 4.7.3 The SEA assessment of the demand-side option supports the ordering and sequencing of implementation of these options relative to supply-side options set out in the Drought Plan. The impacts of water use restrictions on customers and the local economy become more severe as the scale of water use restrictions widen. It is therefore appropriate that the Drought Order to prohibit non-essential water use is only implemented once reservoir storage falls below the Drought Control Line.
- 4.7.4 An emergency drought order to restrict supplies to customers through rota cuts or standpipes has significant risks of adverse impacts on public health, social welfare and the regional economy. It would therefore only be considered as an option in an exceptionally severe drought, one that would far exceed the severity of any recorded historic droughts in Yorkshire. All other appropriate supply-side options, including the supply-side options for a third year of drought, would need to be implemented before implementing an emergency drought order.

- 4.7.5 The SEA assessment of the supply-side options indicated the relative impacts of each option. This information has informed the development of this Drought Plan and will equally help in making decisions during a drought as to the sequencing of implementing supply-side options.
- 4.7.6 The SEA indicated those supply-side options with a lower level of environmental impact that should be considered for implementation in the first stages of a developing drought. Options with a greater environmental impact would be implemented if the drought intensifies. If the drought extends into an unprecedented third year, the options set out in this Drought Plan would need to be considered taking account of the SEA assessments, as well as wider factors such as the spatial distribution of drought impact, the prevailing environmental conditions and the time of year. Other factors, such as drinking water quality risks, will also need to be taken into account.

4.8 Reservoir options – SEA findings

- 4.8.1 Of the reservoir drought options available for the first or second year of a drought, the SEA highlighted 21 options that carry a greater level of environmental impact compared to other options. These include all of the reservoir options in the South area, and all but one option in both the North and North West areas. These drought permit/order options could have a greater adverse effect on flows in downstream reaches compared to other reservoir drought permit/order options. This flow reduction could have significant adverse impacts on biodiversity, flora and fauna: principally in relation to BAP species, in particular BAP fish species and white-clawed crayfish.
- 4.8.2 The SEA identified those drought order/permit options with lower impacts that could therefore be considered for an initial phase of application as storage falls towards the Drought Control Line, with other options implemented later if required if drought conditions intensify. Options with lower environmental impact include: Lindley Wood Reservoir in the North area; Doe Park Reservoir in the North West area and fourteen reservoirs options in the Calder area.
- 4.8.3 Sequencing of implementation of the reservoir options should also take account of the cumulative effects of two or more options being implemented within the same river catchment. The SEA provided assessment of potential cumulative impacts, which can extend the downstream extent of impact and/or increase the overall impact magnitude.
- 4.8.4 Sequencing of implementation will however be dependent on the spatial distribution of drought, prevailing supply-demand conditions and the available infrastructure to move water to areas of greatest need within the integrated grid system.

4.9 River abstraction options – SEA findings

- 4.9.1 The SEA assessment of river abstraction options highlighted two options (the River Ure at Kilgram Bridge and the River Wharfe at Lobwood) with more significant environmental impacts than the other river abstraction options. Significant adverse effects principally relate to BAP fish species, macro invertebrates and white-clawed crayfish. The River Ure option also has a moderate cumulative impact with the Leighton Reservoir option; the River Wharfe option has a minor cumulative impact with the Lindley Wood Reservoir option.
- 4.9.2 The assessment highlighted two river abstraction options with lower impacts (River Ouse at Moor Monkton and River Hull at Hempholme) that should be considered for earlier implementation

once reservoir storage approaches the Drought Control Line. These do not have cumulative impacts with any other supply-side option available in the first two years of a drought.

- 4.9.3 Sequencing of implementation will however be dependent on the spatial distribution of drought, prevailing supply-demand conditions and the available infrastructure to move water to areas of greatest need within the integrated grid system.

4.10 Options for a third year of drought – SEA findings

- 4.10.1 The SEA assessment of the seven supply-side options available in a third consecutive year of drought identified their relative environmental impact, both individually and cumulatively.
- 4.10.2 The SEA indicated that the River Aire at Esholt, the River Ouse at Moor Monkton and the River Tees Direct Pipeline have the lowest environmental impacts when the cumulative assessment is considered. The River Ouse at Moor Monkton provides the smallest benefit to supply and the River Aire the greatest benefit.
- 4.10.3 The River Ouse at Acomb Landing options have a greater cumulative impact if it is assumed that the Moor Monkton drought permit option has already been implemented in the first or second year of drought and remains in place. As the drought permit is already impacting on the lowest flows in the river, increasing the capacity to abstract more water (although under existing licence conditions) will increase the magnitude of impact on the River Ouse. However, dependent on the time of year and the criticality of storage, one possible mitigation measure may be to reduce or cease abstraction at Acomb Landing voluntarily at very low flows, whilst having the maximum abstraction capacity available to take more water at higher river flows, which will help reduce demand on depleted reservoir storage.
- 4.10.4 Whilst the River Tees to River Swale Transfer option would increase flows in the River Ouse to support a higher rate of abstraction, the risks of crayfish plague or fish disease transfer associated with that option would need to be weighed against the benefits. The direct abstraction from the River Tees to Elvington water treatment works carries a much lower environmental risk.
- 4.10.5 The desalination option at Hull carries the greatest engineering and drinking water quality risks and also has the potential to adversely impact on sensitive environments. There are minor cumulative effects with the River Hull at Hempholme option if that has been implemented earlier in the drought.
- 4.10.6 The SEA findings will be utilised in a drought to help make these decisions on option implementation, alongside the Environmental Assessment Reports and data from drought monitoring specified in the Environmental Monitoring Report. Given the severity of the situation in a third year of drought, the decision as to which of the options to implement will involve careful consideration in discussion with the Environment Agency, Natural England and other groups. Decisions will need to reflect how much additional water is required; how effectively this water can be utilised in those areas of greatest need; and the relative environmental impact of each option. The prevailing environmental conditions (informed by in-drought monitoring triggered in the second year of the drought) and the time of year will be key factors. Other factors, such as prevailing drinking water quality risks, will also need to be taken into account.

5 Management and communications strategy

5.1 Management structure

- 5.1.1 We continuously monitor our stocks and operations during normal conditions. Falling reservoir stocks trigger changes in source outputs and we review our operations to manage the situation and react to these changes.
- 5.1.2 If reservoir groups cross the Environment Agency early warning trigger line a Company Risk Management Team (CRMT) will be formed. The CRMT will be chaired by the Water Resources Manager and include representatives from teams responsible for managing resources. CRMT will meet weekly until stocks recover.
- 5.1.3 If the situation does continue CRMT will be escalated to CIMT (Company Incident Management Team). The CIMT will be chaired by Manager of Production Assets and be held twice weekly.
- 5.1.4 Table 5.1 gives the criteria for moving from CRMT to CIMT.
- 5.1.5 If reservoir stocks fall below the DCL, CIMT will be escalated to CMT (Crisis Management Team) and the meetings will be led by the Kelda Management Team (KMT).
- 5.1.6 The escalation of management groups will depend on the drought situation. As not all droughts are the same we have not defined a single trigger for moving from one management group to the next. If a single criteria or multi criteria in Table 5.1 is met we will consider escalating to the next management team.

5.2 Roles and responsibilities

- 5.2.1 The structures of the teams responsible for drought management can be found in Appendix 10.
- 5.2.2 CRMT will include key contacts as shown in Appendix 10. The key contacts will include representatives from water supply management teams responsible for planning, optimal supply and asset management. The structure of these teams is also provided in Appendix 10.
- 5.2.3 CRMT will review available resources and asset performance to ensure we maximise our resources to meet increased demand and where possible reserve stocks that may be required if the situation continues. A representative from our external communications team will provide an update on customer and media communications.
- 5.2.4 The details of key contacts will be provided to the Environment Agency at the first drought trigger during the initial Environment Agency / Yorkshire Water liaison meetings. Further details will be provided as the drought escalates.
- 5.2.5 The Manager of Production Assets will head CIMT. The structure of this team includes all representatives from CRMT and additional input from customer services and legal services.

5.2.6. The CMT will include all contacts included in CIMT and be headed by KMT.

YW Trigger	CRMT	CIMT	CMT
Reservoir Stocks	Below Environment Agency early warning trigger line	Predictions show summer restrictions are necessary Serious shortage likely in a supply area Reservoir stocks are likely to cross DCL in 6 weeks	DCL crossed and Drought Plan is fully implemented
Demand		Weekly demand crosses 75%ile high (weekly) trigger	
Asset		Loss /failure of critical asset leading to supply shortfall	
Water Companies		Restrictions imposed in neighbouring company (Severn Trent, Anglian, UU, NWL)	
Drought Measures		Planned/plan in progress	Implemented
Environment Agency	Environment Agency early warning trigger line crossed	Environment Agency Drought Status "Potential Drought"/"Drought"	
Defra		Water Summit (including Yorkshire Water)	
Media		Heightened media campaign regarding local/national water supply situation	

Table 5.1: Criteria for CRMT, CIMT and CMT

5.3 Communication plan

- 5.3.1 We promote water efficiency to customers throughout the year through our website, customer events and use of social media. In the event of a drought developing we will increase communications with our customers regarding the water supply situation and the need to reduce demand.
- 5.3.2 Publicity would start well before a drought develops to encourage water conservation and keep customers and stakeholders informed.
- 5.3.3 The nature of forward contingency planning is that publicity is considered early. The critical factor is the weather pattern, particularly rainfall and high temperatures, and choosing the most appropriate timing can be complicated. In the light of experience we would always take a prudent precautionary approach to ensure that customers are fully aware of the latest situation.

- 5.3.4 Full details of our Drought Communication Plan are given in Appendix 11.
- 5.3.5 We encourage our customers to use water wisely at all times by providing free water saving devices and advice through our website and other media. When reservoir stocks cross the Environment Agency early warning trigger line we would increase our normal water efficiency activity, for example increased city centre events offering advice and water saving devices.
- 5.3.6 To increase water efficiency we will use various communication channels to raise awareness to customers. This is likely to include the following;
- briefing updates on the water supply situation
 - information about water supply improvement schemes including leakage control measures
 - briefing on the weather for awareness of potential drought sequences
 - water saving advice for domestic and business customers
 - temporary use bans, restrictions and drought permit advertisements.
- 5.3.7 We will communicate this information through local meetings, newspaper adverts, media press releases, press conferences and our website. To ensure customers are kept informed and receive appropriate advice we will liaise with local authorities, parish councils and other groups.
- 5.3.8 We will consider joint press releases and advertising campaigns with the Environment Agency, Consumer Council for Water (CCWater) and other water companies affected by drought. This will help enhance the water saving messages and may be more cost effective.
- 5.3.9 When reservoir stocks are forecast to be within six weeks of crossing the Drought Control Line we will initiate the implementation of temporary use bans. Notifications will be published in advance (reservoir stocks forecast to be within eight weeks of crossing the Drought Control Line) offering customers the opportunity to make representations. These notices will explain the restrictions included under the Flood and Water Management Act 2010.
- 5.3.10 We will provide details of water supply areas where restrictions are being considered to Ofwat, CCWater, local authorities, health authorities and other interested parties using appropriate means. e.g. meetings, email, telephone media and press releases.
- 5.3.11 We will consider joint press releases and advertising campaigns with the Environment Agency, CCWater and other water companies affected by drought. This will help enhance the water saving messages and may be more cost effective.
- 5.3.12 It is likely that the level of calls to the customer contact centre will increase during a period of drought. Provision will be made to ensure that all staff in the contact centre are fully aware of the situation and are able to provide comprehensive information and advice to customers.
- 5.3.13 As the situation develops we will provide regular updates to our customers and stakeholders. This would include notification of when stocks recover and the removal of any restrictions if required.
- 5.3.14 All drought communication activities will be monitored to assess which are most effective. This will include recording website hits, number of devices requested and number of phone calls. We will request feedback on our communications from customer focus groups and CCWater.

5.3.15 As a number of our drought options have a potential to impact on the environment we will also consult Natural England regularly during a drought. If reservoir stocks are 10 weeks away from the drought control line we will contact Natural England on any potential drought permits/orders that could impact on the Habitats Regulations or Wildlife and Countryside Act.

6 Lessons learnt from previous droughts

- 6.1.1 Our previous Drought Plan was based on experience gained during the 1995/96 drought during which there was extensive use of drought orders and permits to manage supply and demand.
- 6.1.2 We have incorporated lessons learnt by other water companies during the drought in the south of England in 2005/06 and United Utilities in 2010.
- 6.1.3 We have considered the guidance for preparing drought applications and have reviewed the timescales required for preparing a drought order or permit.
- 6.1.4 Our demand-side options incorporate demand savings from the UKWIR (2011) *Code of Practice and guidance on water use restrictions* which is based on experience gained in previous droughts.

7 Post-drought actions

- 7.1.1 A return to 'normal' conditions can be difficult to determine and it is possible to confuse with a short wet period in a prolonged drought. Discussions and regular meetings with our local regional Environment Agency contacts will be ongoing throughout the drought. We will formally agree the end of the drought and a return to 'normal' conditions with the regional Environment Agency Drought Co-ordinator before publically declaring the end of the drought.
- 7.1.2 Where necessary we will model a range of rainfall scenarios to assess the risk of continued drought. We use a range of triggers to determine if we are in drought, and we will monitor our situation with respect to these triggers throughout the drought to help inform all actions and decisions. These triggers will be used to determine when we think the end of a drought has been reached.
- 7.1.3 De-escalation timetables for lifting demand restrictions and drought orders/permits would be discussed with the Environment Agency at regular intervals. We would generally retain a drought order or permit for its duration; however, it may expire due to pre-determined de-escalation triggers within the order.
- 7.1.4 Temporary use bans would be lifted when the risk of seeking further drought measures passed. Customers will be informed when restrictions on use are lifted through local meetings, press releases and our website.
- 7.1.5 In the event of a drought occurring which leads to enhanced drought planning between ourselves and the Environment Agency, a “lessons learnt” report will be produced. The report will list the post drought actions as detailed in the Environment Agency drought plan guidelines. We will produce the lessons learnt report within 3-6 months of conditions returning to normal.
- 7.1.6 The lessons learnt report will be followed within a year by evidence that recommendations have been acted on. The report will review the drought, actions taken, drought planning, communications, environmental impacts, the effectiveness of drought options that were adopted, and alternative strategies that could be adopted in future droughts.

8 Conclusion

- 8.1.1 This Drought Plan sets out how we would manage resources, mitigate impacts and communicate with our customers during a drought. It is based on previous experience of droughts and has been collated in accordance with the Environment Agency's Water company drought plan guideline 2011.
- 8.1.2 We will review our Drought Plan annually to determine if it is still fit for purpose and if any events in the preceding year result in a change to the plan.
- 8.1.3 If there is a material change in circumstances that affects our plan or if directed to do so by the Secretary of State we will republish a revised plan within 12 months of the change.
- 8.1.4 Our annual review will include a review of the supporting environmental assessments and monitoring plan. Specifically, we will consider whether there are any new designated sites or additional records for BAP species, over and above those already considered. Discussions will be held with the Environment Agency and Natural England, should any drought orders or permits have the potential to impact on designated sites.
- 8.1.5 Our compensation releases are currently being reviewed under the Water Framework Directive. We will consider the impacts of any changes to releases on the supply side options and update accordingly in the annual review.
- 8.1.6 Capital schemes we implement on our water treatment works have potential to improve discharge quality and therefore water quality of receiving rivers. The annual review will take this into account and we will update the drought plan if there is an impact on water quality.
- 8.1.7 In any event, in accordance with Environment Agency guidelines, we will revise and republish our Drought Plan no later than three years and six months after the date our final Drought Plan is published.

9 References

Water company drought plan guideline, Environment Agency, June 2011.

Drought orders and permits, Defra, Welsh Government and Environment Agency, 2011

Code of practice and guidance on water use restrictions, UKWIR, final report ref 11/WR/33/3, 2011

Estimating the water savings for baseline water efficiency activities, UKWIR, final report ref 09/WR/25/4, 2009

Water Resources Management Plan, Yorkshire Water, 2009

Joint Nature Conservation Committee <http://jncc.defra.gov.uk>

MAGIC <http://magic.defra.gov.uk>

Appendices

The following appendices are available in a separate document

Appendix 1 Example control curves

Appendix 2 Example control curves plus scenario lines

Appendix A2.1: 1995-1996

Appendix A2.2: 1929 or 1959

Appendix A2.3: 2nd year of serious 2 year drought

Appendix A2.4: 3rd year of extreme 3 year drought

Appendix 3 The Drought Direction 2011

Appendix 4 Demand-side drought management actions

Appendix 5 Temporary use bans consultation

Appendix 6 Supply-side drought management actions

Appendix 7 Habitats Regulations Assessment and SSSI Screening

Appendix 8 Strategic Environmental Assessment Screening

Appendix 9 Drought communication audiences

Appendix 10 Company drought management structure

Appendix 11 Communications plan

Appendix 12 Glossary of terms and abbreviations

