draft Water Resource Management Plan 2024

Appendix C

October 2022

bristolwater.co.uk

HR Wallingford
Working with water

Bristol Water WRMP24 technical support

Problem characterisation

FWR6644-RT002-R01-00

17 February 2022

Document information

Document permissions	Confidential - client
Project number	FWR6644
Project name	Bristol Water WRMP24 technical support
Report title	Problem characterisation
Report number	RT002
Release number	01-00
Report date	17 February 2022
Client	Bristol Water
Client representative	Liz Cornwell
Project manager	Eleanor Hall
Project director	Gina Tsarouchi

Document history

Date	Release	Prepared	Approved	Authorised	Notes
17 Feb 2022	01-00	JEN	ABL	EMN	

Document authorisation

Prepared	Approved	Authorised
Jo Ennis	Andrew Ball	Eleanor Hall

Executive summary

HR Wallingford were tasked with completing Bristol Water's problem characterisation, as part of the Water Resource Management Planning (WRMP) cycle for 2024. The process involved holding a workshop with Bristol Water representatives to gain an understanding on the water resources opportunities and issues currently present in the Bristol Water network. A method statement was produced and a pre-consultation meeting was held with the Environment Agency. An assessment was made on the strategic WRMP risk, supply side complexity factors, demand side complexity factors and investment programme complexity factors. These assessments were combined to produce a problem characterisation score for Bristol Water. This report provides the details of the workshop and a summary of the assessment and the output scores.

Problem characterisation sets out the risks to Bristol Water's supply demand balance. The problem characterisation is made up of a strategic needs score and a complexity factor score. It assesses the amount of deficit (if any) and the complexity of the options needed to meet this deficit and allows for better planning to meet future needs. It is essentially a risk assessment, based on WRMP19 and early work for WRMP24, to assess the amount of risk in delivering WRMP24 and to ensure this is reflected in the assessment methods adopted for the WRMP.

The approach to problem characterisation for WRMP24 follows the method set out in the Water Resources Planning Guideline and the WRMP 2019 methods – decision making process: guidance, 16/WR/02/10 (UKWIR, 2016). A method statement was also developed, which can be found in Appendix A.

In WRMP19, Bristol Water stood at a borderline "good" position. The strategic needs score was small (3), and the complexity factors score was medium (9). Whilst some things have changed since WRMP19 (e.g. the COVID pandemic and changes to the guidance about using a 1:500 year drought in planning) these have been offset to an extent by the improvements Bristol Water has made (e.g. in its Drought Plan and understanding the system yield of its system using Aquator). The outcome of this problem characterisation assessment puts Bristol Water in a "good" position, with a strategic needs score of small (2), and a complexity factor score of medium (8). There are however complex matters in neighbouring water companies and regions, so it is appropriate for Bristol Water to use approaches consistent with a "medium" score (as it did in WRMP19). A breakdown of scores and evidence are set out in Section 3 of this report.

It is recommended that Bristol Water should liaise with the West Country Water Resources Group (WCWRG) to ensure that the problem characterisation score remains appropriate.

It should also:

- Monitor the post-COVID pandemic changes in the demand forecast so that by WRMP29 there is more certainty in Per Capita Consumption (PCC) and the overall demand forecast.
- Work with regulators and others to get improved clarity on how the 1:500 assessments should be incorporated into the supply demand balance and the uncertainty around these assessments.
- Continue to develop its Aquator model to better understand system yield in the context of stochastic data assessments and the 1 in 500 year drought.

Contents

1 Introduction

HR Wallingford was instructed to undertake a problem characterisation for Bristol Water's Water Resource Management Plans (WRMP) for 2024. Problem characterisation sets out the risks to Bristol Water's supply demand balance. The problem characterisation is made up of a strategic needs score and a complexity factor score. It assesses the amount of deficit (if any) and the complexity of the options needed to meet this deficit and allows for better planning to meet future needs. A workshop was run by HR Wallingford for Bristol Water in order to discuss key issues that would impact Bristol Water's supply, demand, headroom and outage, and to think about the options available to mitigate a supply demand balance deficit. Further details of this workshop are given in Appendix B.

A method statement was produced (Appendix A) and a pre-consultation meeting was held with the Environment Agency on the 18th January 2022.

This information was then collated to produce a draft score for the problem characterisation which was discussed with Bristol Water staff for review. This report provides a summary of the outcomes from the problem characterisation.

2 Workshop overview

The workshop provided an overview of what problem characterisation entails and opened a discussion with Bristol Water about the key issues which will affect the supply, demand and investment components of the WRMP process. Changes since WRMP19 were also discussed. The participants from Bristol Water were:

- Liz Cornwell – Water Resources Manager;
- Owen Smith – Energy Optimisation Engineer;
- Patric Bulmer – Head of Water Resources & Environment;
- Nigel Howard – Asset Risk Manager;
- Mike Sumbler – Water Supply & Energy Manager;
- Alex Mortlock – Head of Asset Management.

The points raised during the workshop were used to populate the four tables which make up the problem characterisation (strategic WRMP risk, supply side complexity factors, demand side complexity factors and investment programme complexity factors) to produce a first draft score for each aspect, with a record of the discussion as evidence to justify the scores given. The evidence and scores obtained from the workshop are included in Section 3.

3 Problem characterisation evidence

This section provides each of the problem characterisation tables, populated with extracts of the discussion to support the scores assigned to each section.

3.1 Strategic needs

3.1.1 Key issues table

Table 3.1: Strategic needs table

Strategic WRMP risks	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S. Level of concern that customer service could be significantly affected by current or future supply side risks, without investment.		The move from using a 1 in 200 year drought event to a 1 in 500 year drought event means that Bristol Water are expecting their supply to drop slightly (estimations to reduce DO by about 15Ml/d before any climate change, which will manifest in a deficit of some sort, possibly 2039 deficit of 4.5Ml/d increasing to 25Ml/d at 2080). There is also some uncertainty about the risk associated with the supply from Sharpness in the context of the River Severn Drought Order. The WRMP19 included a planned reduction in the water transferred to Wessex Water at Newton Meadows from Bristol's Purton WTW. If this is not implemented it could change the supply demand balance by reducing WAFU by 6.97Ml/d. The legal agreement for this transfer is currently outstanding/under review, and Wessex Water are likely to want to maintain this transfer due to their updated resource position. There are 2 sites, Sherbourne and Honeyhurst, where risks about licencing are present. In both cases licences could be revoked if certain conditions do not apply, however Honeyhurst could provide a counter option if the Wessex Water reduction in transfer at Newton Meadows does not occur. Despite these areas of risk, the issues raised will be taken into consideration, and Bristol Water is confident that the current set up can be managed.		

Strategic WRMP risks	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
D. Level of concern that customer service could be significantly affected by current or future demand side risks, without investment.		There is some uncertainty around the demand forecast and Bristol Water are working with Ovarro to get agreed modelling assumptions and scenarios in place. Draft population forecasts are lower than WRMP19 (1% lower at the beginning of the planning period, and up to 3.5% lower by 2045), but draft property forecast is looking higher than WRMRP19 (at least at the beginning of the planning period). PCC is yet to be confirmed as there is ongoing debate about how to handle the uncertainty around the long term effects after the pandemic. COVID-19 will be a complicating factor on demand forecast, it poses a definite uncertainty increase and it is uncertain how long this will last due to factors such as changes to working patterns and locations. In addition, the move to using a 1 in 500 year drought event raises complications. It will be very difficult to estimate a 1 in 500 year demand if this is even possible. Uncertainty has also arisen over the non-household forecast method. Overall, these uncertainties have opened discussion about demand concerns, but do not seem to pose a concerning risk.		
I. Level of concern over the acceptability of the cost of the likely investment programme, and/or that the likely investment programme contains contentious options (including environmental/planning risks).	It is likely that the complexity score of options will increase, but generally these will not be majorly complex or expensive. Where more complex or expensive options are required, these will be shared with neighbouring companies, and therefore not pose concerning issues for Bristol Water.			

3.1.2 Scores table

Table 3.2: Strategic needs scores

	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S		✓		
D		✓		
I	✓			
Totals	0	2	0	0

3.2 Supply side complexity factors

3.2.1 Key issues table

Table 3.3: Supply side complexity table

S	Supply side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S(a)	Are there concerns about near term supply system performance, either because of recent Level of Service failures or because of poor understanding of system reliability/resilience under different or more severe droughts than those contained in the historic record? Is this exacerbated by uncertainties about the benefits of operational interventions contained in the Drought Plan?	Bristol Water has recently updated their drought plan and worked with the Environment Agency on this matter to ensure it is clear how these interventions will be implemented. There is some concern over the uncertainty in the risk of some resilience/drought supplies such as Sharpness and the effects of the River Severn Drought Order, but this is not substantial. Likewise, the move to a 1 in 500 year drought event will prompt additional consideration, but not pose concerns.			
S(b)	Are there concerns about future supply system performance,		Bristol Water is confident that the current network set-up is suitable and will be manageable.		

S	Supply side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
	primarily due to uncertain impacts of climate change on vulnerable supply systems, including associated source deterioration (water quality, catchments etc.), or poor understanding?		Uncertainty is introduced through the risk associated with some of Bristol Water's drought/resilience supplies, which could be affected by climatic change, and also through the possibility of needing to maintain the current volume supplied to Wessex Water via Newton Meadows. It is therefore concluded that there are some concerns which need to be managed through to WRMP24.		
S(c)	Are there concerns about the potential for 'stepped' changes in supply (e.g. sustainability reductions, bulk imports etc.) in the near or medium term that are currently very uncertain?		The potable water export to Wessex Water poses some concern. There is currently moderate uncertainty surrounding the export to Wessex Water given its supply demand deficit. The legal agreement has not yet been confirmed, and it is likely that Wessex Water may want to retain the transfer, which will have implications for Bristol Water's supply demand balance.		
S(d)	Are there concerns that the 'DO' metric might fail to reflect resilience aspects that influence the choice of investment options (e.g. duration of failure), or are there conjunctive dependencies between new options (i.e. the amount of benefit from one option depends on the construction of another option). These can both be considered as non-linear problems.	There has been major investment into achieving a resilient supply system and good network connectivity (Southern Resilience Scheme and IPSOS), and the reservoir network is operated using an optimisation model to manage and control supply. Consequently, there are no significant concerns in this area.			

3.2.2 Scores table

Table 3.4: Supply side complexity scores

	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S (a)	✓			
S (b)		✓		
S (c)		✓		
S (d)	✓			
Totals	0	2	0	0

3.3 Demand side complexity factors

3.3.1 Key issues table

Table 3.5: Demand side complexity table

D	Demand side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
D(a)	Are there concerns about changes in current or near-term demand, e.g. in terms of demand profile, total demand, or changes in economics/demographics or customer characteristics?		The ongoing COVID-19 pandemic poses significant uncertainty on demand. It is anticipated that this could affect demand profile, total demand, and the balance of business vs household demand. Draft population forecasts suggest they are lower (1% lower at the beginning of the planning period, and up to 3.5% lower by 2045), but property forecast is currently higher than WRMRP19 at least at the beginning of the planning period. PCC forecasts are still being confirmed as there are ongoing discussions on how to handle the uncertainty around the long term		

D	Demand side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
			effects after the pandemic. As a result. we believe there are moderate concerns regarding this area.		
D(b)	Does uncertainty associated with forecasts of demographic / economic / behavioural changes over the planning period cause concerns over the level of investment that may be required?		COVID-19 is increasing the uncertainty surrounding demand forecasts, and it is unclear how long this could last. It is estimated to have an effect on terms of demand profile, total demand, and balance of business vs household demand, which in turn could affect the investment options necessary.		
D(c)	Are there concerns that a simple 'dry year/normal year' assessment of demand is not adequate, e.g. because of high sensitivity of demand to drought (so demand under severe events needs to be understood), or because demand versus drought timing is critical.		The difficulty in forecasting what a 1 in 500 year demand would look like due to the lack of evidence to inform such an assessment is a concern. Bristol Water has developed a micro-component analysis model, which considers trends on how each component is used (e.g.: dishwasher and toilet use), and on the efficiency of these. Due to the conjunctive use nature of the Bristol Water WRZ it is not peak demand constrained, and therefore only produces a dry year annual average forecast (no critical period forecast). As a result, there are only moderate concerns with relation to demand forecast sensitivity.		

3.3.2 Scores table

Table 3.6: Demand side complexity scores

	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
D (a)		✓		
D (b)		✓		
D (c)		✓		
Totals	0	3	0	0

3.4 Investment programme complexity factors

3.4.1 Key issues table

Table 3.7: Investment programme complexity table

I	Investment programme complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
I(a)	Are there concerns that capex uncertainty (particularly In relation to new or untested technologies) could compromise the company's ability to select a 'best value' portfolio over the planning period?	Early work has been undertaken for WCWRG and on SROs such as Cheddar 2. Many of the options are likely to be demand and leakage reduction with low cost uncertainty.			
I(b)	Does the nature of feasible options mean that construction lead time or scheme promotability are a major driver of the choice of investment portfolio?		As with WRMP19, there is likely to be adequate time available to plan for any options required to be implemented based on the current supply demand position. Early work by WCWRG has identified a list of demand side options and assessment has been undertaken to look at what would be needed to deliver proposed PCC targets. Supply side options have also been identified at a regional level and significant work has been undertaken on Cheddar 2 already.		

I	Investment programme complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
I(c)	Are there concerns that trade-offs between costs and non-monetised 'best value' considerations (social, environment) are so complex that they require quantified analysis (beyond SEA) to justify final investment decisions.		Bristol Water will be using the best value approach and work is being undertaken by HR Wallingford and Ricardo on the identification and assessment of the options. Many of the options have already been considered (e.g. WRMP19 and WCWRG).		
I(d)	Is the investment programme sensitive to assumptions about the utilisation of new resources, mainly because of large differences in variable opex between investment options?		There will be lots of options regarding leakage reduction and demand management as well as supply improvements. Between all of these options there will be a trade-off between capex and opex, but this is unlikely to pose significant concern. The proposed modelling approach takes into account opex and capex in the decision making, and utilisation can be determined by using the Aquator modelling platform.		

3.4.2 Scores table

Table 3.8: Investment programme complexity scores

	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
I (a)	✓			
I (b)		✓		
I (c)		✓		
I (d)		✓		
Totals	0	3	0	0

4 Problem characterisation results

The total scores assigned in each of the tables is presented in Table 4.1.

The strategic needs for Bristol Water was scored as 2, which corresponds to a 'small' scale problem. The complexity factor was scored as 8, corresponding to a 'medium' complexity problem. This has reduced since WRMP19, where the strategic needs score was 3, and complexity factor was scored as 9. There are however complex matters in neighbouring water companies, so it is appropriate for Bristol Water to use approaches consistent with a "medium" score (as it did in WRMP19).

Table 4.1: Summary of the problem characterisation results

	Bristol Water's WRZ Score
Strategic Needs	**2**
Complexity Factor (CF)	**8**
A - Supply CF	2
B – Demand CF	3
C – Investment Programme CF	3

This puts Bristol Water in a 'good' position for the problem characterisation, as shown in Table 4.2.

Table 4.2: Problem characterisation results

		Strategic Needs Score ("How big is the problem")			
		0-1 (None)	2-3 (Small)	4-5 (Medium)	6 (Large)
Complexity Factors Score ("How difficult is it to solve")	Low (<7)				
	Medium (7-11)		**Bristol Water**		
	High (11+)				

5 Recommendations

Bristol Water has undertaken significant work since WRMP19 which has improved understanding of risk and the data. This study has highlighted three main areas of uncertainty; COVID-19, the 1:500 assessments, and system yield. It is therefore recommended that Bristol Water should liaise with the West Country Water Resources Group to ensure that the problem characterisation score remains appropriate, while also:

- Monitoring the post-COVID pandemic changes in the demand forecast so that by WRMP29 there is more certainty in PCC and the overall demand forecast.
- Working with regulators and others to get improved clarity on how the 1:500 assessments should be incorporated and the uncertainty around them.
- Continue to develop its Aquator models to better understand system yield in the context of stochastic data assessments and the 1 in 500 year drought.

The position of Bristol Water has not significantly changed since WRMP19 however guidance on the development of WRMPs has been updated, including further clarification on the approach to developing a best value plan.

For WRMP24 the EBSD approach should be used to produce the least cost plan as a benchmark to appraise the other 'best value' programmes against. Bristol Water then needs to use a decision making approach to appraise the selected options for inclusion in the preferred programme in the best value plan. Alternative programmes will need to be appraised and a preferred plan selected and justified.

Whilst Bristol Water's problem characterisation is low, there are uncertainties in Bristol Water's supply and demand data, but perhaps more uncertain is the need for shared schemes with other water companies. An adaptive planning approach increases the flexibility and decision points within the planning cycle. For WRMP24 this may help mitigate future risks associated with ensuring that regional requirements are adequately addressed. As a result, formal adaptive planning should be considered.

6 References

UKWIR (2016) WRMP 2019 Methods – Decision Making Process: Guidance. Report Ref. No. 16/WR/02/10.

Appendices

A Method statement

Method Statement - Problem Characterisation

Bristol Water WRMP24

1 Background

Problem characterisation sets out the risks to Bristol Water's supply demand balance. The problem characterisation is made up of a strategic needs score and a complexity factor score. It assesses the amount of deficit (if any) and the complexity of the options needed to meet this deficit and allows for better planning to meet future needs.

In WRPM19, Bristol Water stood at a borderline good position. The strategic needs score was small (3), and the Complexity factors score was medium (9).

		Strategic Needs Score ("How big is the problem")			
		0-1 (None)	2-3 (Small)	4-5 (Medium)	6 (Large)
Complexity Factors Score ("How difficult is it to solve")	Low (<7)				
	Medium (7-11)		**Bristol Water**		
	High (11+)				

The approach to WRMP24 will follow the method set out in the Water Resources Planning Guideline and the WRMP 2019 methods – decision making process: guidance, 16/WR/02/10 (UKWIR, 2016)

2 Approach

There is a prescribed approach which involves completing a series of tables (see Tables 1-4) and then combining the results to create a score. We will collect the data, undertake a review of the supply demand balance and options and make a draft assessment.

2.1 Demand

We understand that separate work is being undertaken on the demand forecast. The forecast will be reviewed with Bristol Water and compared to WRMP19's to assess the changes, considering any planned programmes of work (e.g. leakage reduction and metering programmes).

2.2 Supply

The WRMP19 forecast will be reviewed and an assessment made (based on our current work with WCWRG) to assess the likely changes for WRMP24 resulting from changes such as increasing resilience to 1:500 and climate change. We will consider the current discussions on the different statistical approaches to 1:500 and the subsequent implications for the overall integration of the supply forecast into the WRMP. We will produce a draft supply forecast based on this work.

2.3 Outage and Headroom

Once we have completed a review of the demand forecast and supply forecast we will consider any material changes in Outage or Headroom. Whilst the changes in Outage are unlikely to be significant, we have concerns that Target Headroom could increase as a result of uncertainty in the supply forecast and demand options, so we will re-assess key areas of uncertainty.

2.4 Options

We will also consider factors such as the uncertainty caused by neighbouring water companies' requirements and the need for any adaptive planning to consider uncertainty and some of the complex options which may feature in WRMP24 (such as reservoir extensions).

3 Future steps

Once we have completed all the above we will prepare a draft technical note setting out our proposed assessment of Bristol Water's Problem Characterisation. This will be reviewed with Bristol Water's team to ensure that it is robust. If necessary, the technical note will be updated and we will produce a final version of the report

Table 1 - Strategic Needs Assessment

Strategic WRMP risks	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S. Level of concern that customer service could be significantly affected by current or future supply side risks, without investment.				
D. Level of concern that customer service could be significantly affected by current or future demand side risks, without investment.				
I. Level of concern over the acceptability of the cost of the likely investment programme, and/or that the likely investment programme contains contentious options (including environmental/planning risks).				

Table 2 - Complexity factors - Supply

S	Supply side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S(a)	Are there concerns about near term supply system performance, either because of recent Level of Service failures or because of poor understanding of system reliability/resilience under different or more severe droughts than those contained in the historic record? Is this exacerbated by uncertainties about the benefits of operational interventions contained in the Drought Plan?				
S(b)	Are there concerns about future supply system performance, primarily due to uncertain impacts of climate change on vulnerable supply systems, including associated source deterioration (water quality, catchments etc.), or poor understanding?				
S(c)	Are there concerns about the potential for 'stepped' changes in supply (e.g. sustainability reductions, bulk imports etc.) in the near or medium term that are currently very uncertain?				
S(d)	Are there concerns that the 'DO' metric might fail to reflect resilience aspects that influence the choice of investment options (e.g. duration of failure), or are there conjunctive dependencies between new options (i.e. the amount of benefit from one option depends on the construction of another option). These can both be considered as non-linear problems.				

Table 3 - Complexity factors - Demand

D	Demand side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
D(a)	Are there concerns about changes in current or near-term demand, e.g. in terms of demand profile, total demand, or changes in economics/demographics or customer characteristics?				
D(b)	Does uncertainty associated with forecasts of demographic / economic / behavioural changes over the planning period cause concerns over the level of investment that may be required?				
D(c)	Are there concerns that a simple 'dry year/normal year' assessment of demand is not adequate, e.g. because of high sensitivity of demand to drought (so demand under severe events needs to be understood), or because demand versus drought timing is critical.				

Table 4 - Complexity factors - Investment

I	Investment programme complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
I(a)	Are there concerns that capex uncertainty (particularly In relation to new or untested technologies) could compromise the company's ability to select a 'best value' portfolio over the planning period?				
I(b)	Does the nature of feasible options mean that construction lead time or scheme promotability are a major driver of the choice of investment portfolio?				
I(c)	Are there concerns that trade-offs between costs and non-monetised 'best value' considerations (social, environment) are so complex that they require quantified analysis (beyond SEA) to justify final investment decisions.				
I(d)	Is the investment programme sensitive to assumptions about the utilisation of new resources, mainly because of large differences in variable opex between investment options?				

B Workshop minutes

HR Wallingford

Minutes

Problem Characterisation Workshop 07/01/2022

Attendees

Emily Strathdee	Liz Cornwell	Owen Smith
Andrew Ball	Patric Bulmer	Nigel Howard
Jo Ennis	Mike Sumbler	Alex Mortlock

Workshop to understand whether there is a water resource issue for Bristol Water and the severity of the potential issue.

Slide 1 – What is Problem Characterisation (PC)?

- Problem characterisation is identifying the risks to the BW customers in terms of supply demand balance. Risk assessment on how complicated the SDB is and what the options are, how feasible these steps are. 1st step of WRMP development.
- Important in getting methodology/approach approval and WRMP accepted.

Slide 2 - WRMP19 PC

- WRMP19 BW was in green position. Extent of problem - small (3), Complexity - medium (9). To move into amber zone we would have to slip to a strategic need score of 4 or complexity of 11.

Slide 3 - WRMP19 baseline supply demand balance

- Baseline SDB position – this is an unconstrained (no restrictions) forecast
- Deficit predicted at 2034/35 in WRMP19. This is predicted based on a dry year annual average for supply (based on 1in200 drought event).
- Water available for use jump up is caused by Wessex water transfer reduction at Newton Meadows, and the gradual reduction is as the result of climate change
- Changes in demand are a result of changes in percentiles of headroom included in the calculations. The step at ~5 years indicates a review and a re-evaluation of the risk which we are willing to take on.

Slide 4 options

- Demand management options, leakage reduction options, water efficiency projects, larger reservoir (/Strategic options) and groundwater options
- Past options will be reviewed and plans for future options will be considered including regional options (West Country Water Resource Group)
- Work looking into strategic regional options (SROs) including:
- Cheddar two reservoir with a view to transferring to Southern Water or within the West Country

- New: Mendip quarries bigger than Chew Valley lake.
- Complexity - Wessex is facing a large sustainability abstraction reduction - this will change a lot for Wessex Water and will potentially become quite complicated in the context of water supply in the West Country as a whole.
- The focus will be on Bristol Water Problem Characterisation but we still need to ensure it aligns with the regional plan (which has a range of maturity).

Slide 5 - supply forecast

- Move from 1in200 to 1in500 drought event - this means we expect the supply to drop slightly (estimations to reduce DO by about 15Ml/d before any climate change, which will manifest in a deficit of some sort, possibly 2039 deficit of up to 4.5Ml/d increasing to 25Ml/d at 2080). This includes a lot of uncertainty.
- Supply from Sharpness provided by Canal and Rivers Trust - uncertainty over risk associated with this source relating to the implementation of a River Severn drought order by the Environment Agency. River Severn counter drought order could possibly be filed to mitigate this risk (if the water is available!).
- BW still confident we can manage with the current system set-up.
- Forecast will include known sustainability reductions, can't include uncertainty of sustainability reductions in headroom, but scenario assessments will be undertaken to try and test these reductions and demonstrate the effects of actions on the risk.
- Some concern over the dual use of Southern Resilience Scheme (Bristol to Cheddar area), which feed Weston Super Mare and to have a resilience supply. Concern over double counting of assumptions leading to misestimation and resource concerns.
- Peak treatment works output is relevant for water resource modelling (all have a maximum capacity in models) and will be captured in the SDB as outage and possible outage. Need to be careful with this to avoid including outages that would only occur in 'wet' years.
- Key distinction between Peak output restrictions i.e. cannot deliver that output at any time, vs outage – i.e. can't deliver that output temporarily
- One conjunctive use water resource zone. Supply across the system in a drought - more simple due to there being a few large storage sources rather than multiple smaller supply sources.
- Legal agreement on reduction of supply to Wessex is not yet set up - and they are likely to want to keep this transfer, which will result in a loss of 6.97 Ml/d of WAFU from the supply demand balance
- Newton Meadows is a key risk that we need to consider - Wessex sustainability reduction will affect this and their need to maintain this transfer at it’s current capacity.
- Sherbourne - assumption needs considering, licence is included in the baseline DO, but in reality not in supply. If it is not utilised, the licence may be revoked
- Honeyhurst is listed as a drought option, licence is disused (again could be revoked) and under WINEP investigation for sustainability, may be a counter option for the Newton Meadows issue.

Slide 6 - demand forecast

- Draft population forecasts and indicative PCC are present - population forecast is notably lower, PCC is not yet confirmed, currently some concerns.

- Leakage is already hit target (15% reduction)
- Meter penetration and PCC, unlikely to hit target - covid has affected PCC
- Covid will be a complicating factor on demand forecast - overall, definite uncertainty increase and we don't know how long this will last (eg changes to working patterns and locations).
- Non household forecast - previous trend based forecast OFWAT critical of this in Defra advice letter for publication of WRMP19. Damian working on improving the data for this, likely to begin with trend based and try to update this after.
- Assumptions of demand forecast: - dry year assumption, developed around a micro-component analysis, considers trends on how each component is used (dishwasher, toilet use), and on the efficiency of these.
- Difficulty as we know what a 1in500 drought **may** look like, but very difficult to guess what a 1in500 demand would look like. Overall estimations of 1in500 drought are very uncertain.

Slide 7 - outage

- Outage assessments don't tend to change too much between WRMPs
- Factors to consider since WRMP19:
    - Potentially not capturing the larger dents in peak outputs, large pumping gear at Purton has been out of supply since last year
    - Need to consider large strategic assets being out of action
        - Would require separate modelling to assess whether DO would reduce proportionally to the large asset outage, or if this can be covered by other resources
        - Outage vs resilience options - something to consider, maybe some options are resilience rather than supply demand balance, important to consider what would be included in each to avoid missing/double counting scenarios
            - Funding of options (resilience/Business Plan vs WRMP)

Slide 8 - headroom

- Account for uncertainty in predictions to 2080
- Look at areas of uncertainty
- Monte carlo simulation to understand the risks
- More risk in near future than further in the future - as we cannot make the changes to mitigate the short term risk in time
- Headroom changes
    - Does impacts of the South West merger affect headroom, and approach to risk vary?
        - SWW used 95th percentile to 85th at 2080, so more cautious than BW
    - Assess uncertainty of the demand forecast change given the PCC situation
    - Accounting for Climate change in headroom or tested in scenarios (as for regional plan)

    - Uncertainty in covid changes (eg working patterns and locations (moving to the country, balance in household vs non-household demand), and behaviours of use (eg more time at home allowing more gardening)), not enough data to represent well in headroom
        - May need explicit representation rather than generalised due to changes in significance of these factors

Slide 9 - options

- Changes in deficit or changes in neighbouring water companies strategy may result in changes to complexity of options
    - Changes in policy too, eg PCC or leakage reductions may also require new options
    - More interconnected, regional issues will result in more complicated options eg Mendip Quarries
- Possibility that complexity score will increase, moving us closer to amber section.
- Water reuse - could pose additional complexity

Draft assessment - will include comments on why we have given these scores which can then be discussed

Closing comments

- Looks that we could possibly be moving to amber
    - Level increase
        - PCC, climate change, and 1 in 500 drought level
    - Complexity increase too
        - But not unsolvable therefore not red, and increase in understanding
- Andy and Jo will complete the tables, with comments, and circulate to Liz to open discussions about the scores. These will be circulated to the rest of the team after an initial review.

HR Wallingford
Working with water

HR Wallingford is an independent engineering and environmental hydraulics organisation. We deliver practical solutions to the complex water-related challenges faced by our international clients. A dynamic research programme underpins all that we do and keeps us at the leading edge. Our unique mix of know-how, assets and facilities includes state of the art physical modelling laboratories, a full range of numerical modelling tools and, above all, enthusiastic people with world-renowned skills and expertise.

HR Wallingford Ltd, Howbery Park, Wallingford, Oxfordshire OX10 8BA, United Kingdom
tel +44 (0)1491 835381, email info@hrwallingford.com
www.hrwallingford.com