DRAFT WATER RESOURCES MANAGEMENT PLAN 2024

APPENDIX 9A: SENSITIVITY TESTING

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1 INTRODUCTION

This appendix to Portsmouth Water's draft Water Resources Management Plan 2024 (dWRMP24), sets out how we tested the sensitivity of our best value plan against changes to the baseline assumptions used, and what insights this provided about how the resilience of our best value plan.

After considering potential risks to the plan including population growth, climate change, sustainability changes, resilience, risk profile, and delivery of our preferred programme, we have selected appropriate sensitivity tests to understand, and identify strategic alternative schemes or plans.

The decision-making approach already adopts an adaptive planning approach – solving 9 different plausible future scenarios simultaneously relating to the impacts of population growth, climate change and environmental ambitions on availability of sources. Some degree of scenario testing is therefore inherent through that adaptive planning process. This has been described in Sections 2 and 8 of the dWRMP24.

The **purpose of this appendix is to explain how we stress tested the plan** for a range of other "what if" scenarios, to **ensure it is as robust as possible.** By demonstrating the resilience of our Best Value Plan to a range of sensitivity tests we confirmed the decision that our best value plan is also our preferred plan for dWRMP24.

As described previously, the investment modelling was carried out at the WRSE regional level. The range of assessments and scenario tests has been used to inform the development of best value through the regional planning group. All the contributing water companies have been involved in reviewing and challenging the outputs, and identifying key scenarios for testing, so that, across the region, we can be confident in our plan.

2 STRESS TESTING

We have identified a number of key areas of stress test relevant to our company plan. These include the following,

- Demand management,
- Environmental destination,
- Excluding the options to use drought measures to reduce customer demand,
- Bulk supplies with neighbouring water companies, and
- Excluding the Havant Thicket effluent recharge option

Many other stress tests have been applied during development of the regional plan. These key areas were chosen to test how resilient the best value plan is by assessing how it performs if our planning assumptions turn out to be very different to our expectations.

2.1 Demand management

The best value planning assumed a "basket" of demand measures under a range of different demand management scenarios. These different baskets have some elements that may be harder to achieve or less certain than other elements, or the assumed savings may differ over the planning horizon from what was assumed (either providing greater savings than expected or not providing enough, which may present a risk of future deficits). For example:

- Universal metering, and adoption of smart meters: generally assumed to be reasonably reliable in terms of the savings in demand from metering – given evidence from a wide variety of companies. However, the level of metering that can be achieved can vary by area according to housing type etc.
- Leakage reductions of 50% by 2050: This target is likely to rely to some extent on new innovations that are yet to be developed. Achieving lower leakage levels may be more costly than anticipated without technological innovation (e.g. needing to focus more on widespread pipe replacements). Also, in any given planning year, other factors will affect the level of leakage such as the weather (freeze thaw type events, etc.).
- Enhanced water efficiency activity – will tend to comprise a range of measures such as household audits, provision of water efficient devices, awareness campaigns, etc. The efficacy of these measures can vary and assumptions around the number of customers that take up these offers can be particularly uncertain
- Government policies relating to mandatory water labelling and strengthened water regulation standards to drive water efficiency in homes: this is a key driver for driving reductions in customer demand for water, but there is no current legislation for these policies proposed, so the extent to which they will drive demand reduction is still uncertain at present.

For the best value plan for the WRSE regional work our "**high plus" demand management measure** was applied, together with assumed government-led policies. At a regional level several variations of government intervention were considered. Ultimately a "hybrid B" was considered. Further information on the government interventions is included within Appendix 7C of our dWRMP24.

Whilst we think this is an appropriate assumption from a societal and environmental perspective, we need to understand the risks if the assumed assumptions cannot be achieved. **We have therefore stress tested the plan with lower assumed demand management savings**.

2.1.1 Exclude high plus and high demand management basket of measures

The purpose of this run is to understand what is triggered as an alternative if the high plus or high levels of demand management saving are not deliverable.

This stress test run is set up as follows:

- Uses the "best value plan", with no changes to the 7 baseline Supply Demand Balances (SDBs) of the 9 branches (i.e. the SDBs that are input to the investment model for solving).
- Excludes the high plus and high demand management option from being selected.
- All other options are as in the best value plan.

Under this scenario, the model instead does the following:

- Selects the "medium" basket of demand management measures
- Still selects the government policy – the same as in the best value plan
- Under the high environmental destination branches it ceases existing bulk exports and actually imports water from 2049 from Southern Water's Hampshire area. This is also the case in the best value plan, but the amount of water imported is greater to address the shortfall from the demand management activity.

2.1.2 Exclude both high plus, high and medium demand management basket of measures

The purpose of this run is to understand what is triggered as an alternative when only lower levels of demand management saving are delivered.

This stress test run is set up as follows:

- Uses the "best value plan", with no changes to the 7 SDBs of the 9 branches.
- Excludes the high plus, high and medium demand management option from being selected.
- All other options are as in the best value plan

Under this scenario:

- There is the risk of a small deficit in the DYAA case in the first year of the planning period (although this assumes all existing bulk exports are provided in full)
- Selects the "low" basket of demand management measures
- Still selects the government policy (hybrid B policy) – the same as in the best value plan
- Under the high environmental destination branches it ceases existing bulk exports and actually imports water from Southern Water's Hampshire area. It needs the import from 2040 in situations 1 and 4, and from 2044 in situation 7, which is earlier than in the best value planning case. The size of the import is also greater to address the shortfall from the demand management activity
- In the other environmental destination scenarios, whilst the existing bulk exports may continue, they are generally only provided at lower levels and some cease before the end of the planning period.

The impact of a reduced water saving from demand management is that we are in a less strong position to support our neighbours and are likely to rely on imports from Southern Water under high environmental destination scenarios – so are more reliant on the development of Southern Water's strategic resource options.

2.2 Environmental destination

2.2.1 Comparing the different environmental destination futures

The adaptive planning approach aims to address the impacts of different assumptions relating to environmental destination. This is inherently part of the adaptive planning approach. But we provide additional commentary here around the impacts and significance of the environmental destination scenarios used. This is focused on two parts:

- The initial phase from 2025–2040 used “low environmental destination ” in the supply demand balance in all branches (3 up to this point).
- From 2040, where three different environmental destination scenarios are applied. They are applied from 2040 onwards, with a further step reduction in 2044 in the high and then again in 2049 in both the high and medium scenarios
  - High environmental destination in situations 1, 4 and 7. This is based on the BAU+ combined with the enhance scenarios
  - Medium environmental destination in situations 2/5, and 8. This assumes licence reductions that are representative of the BAU scenario.
  - Low environmental destination in situations 3/6, and 6. This represents our best estimate of the potential licence capping impacts.

This stress test run is set up as follows:

- Uses the “best value plan”, with no changes to the 7 baseline SDBs of the 9 branches (i.e. the SDBs that are input to the investment model for solving).
- All options are as in the best value plan

Focusing in on 2050, by which point all branches are utilising the relevant environmental destination scenario, the key difference we see in our plan is our role supporting our neighbours with bulk exports of water from our supply area.

- Under the high environmental destination scenarios (situations 1, 4 and 7) we are able to provide support to our neighbours through the combined Havant Thicket reservoir and Southern Water’s effluent reuse scheme. Water goes to both Southern Water’s HSE WRZ and its SN WRZ directly from the Southern Water effluent recharge scheme using our reservoir
- The existing bulk supplies are not provided in addition. They are turned off in situations 1, 4 and 7 from 2049 onwards
- In the high environmental destination scenarios we start to import water from Southern Water’s Hampshire region (because they have sufficient new water available from new developments). This only happens in situations 1, 4 and 7, from 2049 onwards
- But under the medium and low environmental destination scenarios, the existing bulk supplies can still be provided in general through the planning period

2.2.2 Starting level of environmental destination – medium vs low

The purpose of this run is to examine the change if the environmental destination is brought in at a higher impact from 2029 following initial no-deterioration studies that will provide further clarity about the required reductions in existing supplies (delivered as part of WINEP). From 2040, the plan still branches into all three of the different environmental destination scenarios). This scenario identifies whether the medium scenario can be met, and whether additional options are triggered as a result. Note that low environmental destination may still involve reduced abstractions compared to the current case.

It should be noted that at the regional level, this scenario was unsolved – meaning there was a residual deficit early in the planning period because there were simply not enough options that could be brought in early enough to meet the increased regional deficit driven by the medium environmental destination compared to starting at low.

This stress test run is set up as follows:

- Uses the “best value plan”, but **changes the seven baseline SDBs of the nine branches** (i.e. the SDBs that are input to the investment model for solving). Instead of the early part of the planning period having a “low” environmental destination scenario, the run instead is

set at the “medium” environmental destination scenario. From 2040 the baseline SDBs in the nine branches are identical to the best value plan baseline SDBs
- All options are as available for the best value plan

What this run effectively means is that the water available for use in our supply area in the years (2029–2040) is around 9 Ml/d lower than in the best value plan example. Note that in the low environmental destination scenario used in the BVP, there is also a step reduction in 2036, whereas, in the medium environmental destination scenario that step reduction comes in earlier in 2034.

The impact this has on our plan is:

- The Havant Thicket recharge scheme is utilised to a greater extent earlier in the planning period (i.e. throughout the 2030s in all branches)
- As well as meeting the additional needs in our supply area, this also supports the Southern Water SN zone through a transfer to SRN Source D throughout the 2030s in all branches, whereas that additional support was not selected in the BVP under low environmental destination in the 2030s. This suggests that an earlier move to the medium environmental destination scenario would prove challenging for our neighbouring water companies too.
- Indeed, at a regional level this run contained some unsolved deficits

2.3 Excluding demand reduction drought interventions

The purpose of this run is to examine whether the plan can solve the deficits without the ability to select media, Temporary Use Bans (TUBs) or non-essential use ban options.

Note that at the regional level, this scenario was unsolved – meaning there was a residual deficit in the planning period because there were simply not enough alternative options that could be brought in to make up for the lack of drought interventions on demand options.

This stress test run is set up as follows:

- Uses the “best value plan”, with no changes to the seven baseline SDBs of the nine branches (i.e. the SDBs that are input to the investment model for solving).
- Excludes the demand reduction options (TUBS, NEUBs) from being selected.
- All other options are as in the best value plan

The key highlights from this run are:

- There is a deficit in the first years of the planning period until the Havant Thicket reservoir comes online
- No additional options have been triggered for us.
- The key difference is that, in the high environmental destination scenarios, the need for an import from Southern Water is brought forward to the early 2040s (in contrast to the best value plan, when these are not required until 2049 at the earliest
- The existing bulk supplies under these scenarios tend to cease, but for the lower environmental destination scenarios they tend to continue through the planning period to some degree

2.4 Bulk supplies with neighbouring water companies

Currently, we are a **net provider of water to our neighbouring water supply areas, which contributes to greater regional resilience**. The “baseline” assumption is that existing bulk supplies will be maintained throughout the planning period. Our “baseline” bulk supplies are as follows:

- Up to 15 Ml/d eastwards to Southern Water's SN WRZ (SRN Source D)
- Up to 24 Ml/d westwards to Southern Water's HSE WRZ, based on supplies from our Itchen water abstraction and a further 9 Ml/d that is contingent on the success of AMP7 works at our Source J to provide additional capacity to transfer water.
- A further 21 Ml/d to Southern Water's Hampshire Southampton East WRZ, in accordance with WRMP19 plans, assuming the implementation of Havant Thicket Reservoir (for which we have received planning permission). This is assumed to be available from 2030.

Our ability to continue to provide the above bulk supplies, or additional ones, is related to our existing surplus, plus our Source J, our Havant Thicket Winter Storage Reservoir (for which we have received panning permission), along with the Southern Water-driven strategic regional variant of it (using effluent recharge).

However, were other resource options to be developed by neighbouring companies, this may release water to be used in our supply system instead. This is likely to be most critical under some environmental destination scenarios as we have discussed previously in sub-section 2.2.

2.4.1 Source J related bulk supply

There remains a potential that the Source J development cannot proceed, which would impact on our ability to provide the 9 Ml/d bulk supply to Southern Water's HSE WRZ. The purpose of this run is therefore to explore the alternatives if that bulk supply cannot be provided from Source J.

This stress test run is set up as follows:

- Uses the "best value plan", with no changes to the baseline SDBs of the 9 branches (i.e. the SDBs that are input to the investment model for solving).
- Excludes the Source J reliant 9 Ml/d bulk supply to SWS from being selected.
- All other options are as in the best value plan

The key features of this run are:

- There is less risk of the need for non-essential use bans or the Source S drought permit during the first 5 years of the planning period
- Other than that, there is little other changes to our plan.
- There is, however, a small deficit in the initial years of the plan for Southern Water's HSE WRZ, which is where the 9 Ml/d bulk supply driven by Source J would have been supplied to.

2.5 Excluding the Havant Thicket recycled water recharge option

As described in other sections of this WRMP, Havant Thicket Reservoir is part of our baseline plan and has therefore been pre-selected in the regional investment model in 2029–30 (when it is expected to have been built and will be ready for use). This scheme uses water from our Source B Springs in winter to fill the reservoir.

As part of our neighbouring water company Southern Water's WRMP, there is also a strategic scheme that uses Havant Thicket reservoir. This scheme would use treated recycled water from the Southern Water SRN Works A Wastewater Treatment Works as a source of additional reservoir refill, which would ensure there is more water available during periods of drought. This scheme would be combined with a new pipeline to Southern Water's treatment works on the river Itchen. It has been assessed by Southern Water to also provide significant conjunctive use benefits.

A scenario has been run without the strategic water reuse scheme to explore its impacts on Portsmouth Water. For our WRMP, alternative schemes that are triggered in Southern Water are not necessarily directly relevant to our plan. However, the key consideration is **whether a new scheme may allow bulk supplies (currently we supply Southern Water with our spare water) to be reversed in future**, so that we receive water imports in future under certain events when we need it.

This stress test run is set up as follows:

- Uses the "best value plan", with no changes to the 7 baseline SDBs of the 9 branches (i.e. the SDBs that are input to the investment model for solving).
- Excludes the Havant Thicket with recycled water recharge option from being selected.
- All other options are as in the best value plan, including the PW-only Havant Thicket Reservoir scheme that is part of our baseline.

The key features from this run are:

- The only Havant Thicket scheme is our winter storage reservoir – the effluent recharge scheme has been excluded, with the subsequent supplies to Southern Water
- However, there is no immediate impact to our plan – it is otherwise largely the same.
- The high environmental destination scenarios require an import from Southern Water from the 2040s onwards, and the maximum magnitude of this is just under 40 Ml/d. Under these circumstances, the existing supplies to Southern Water's Hampshire area cease (although there may be a small supply to Southern Water's Sussex area (to SRN Source D)
- Whilst the existing bulk exports tend to continue under the low and medium environmental destination scenarios, they may not always be able to meet the full capacity amount

3 INFORMING OUR FINAL PREFERRED PLAN

From the above outputs and analysis we can conclude and infer the following:

- Our plan can generally be seen to be robust in the face of the uncertainties examined in the stress testing work we have carried out. This is demonstrated by how stable the plan is under different stress tests.
- The key components of our plan are:
  - High levels of demand management
  - Use of our planned Havant Thicket Winter Storage Reservoir (2030)
  - Southern Water's use of our Havant Thicket reservoir with their effluent recharge scheme to provide significant additional regional benefits
  - Net exporter of water through the planning period, except under the higher environmental destination scenarios from the 2040s onwards
  - In some circumstances later in the planning period, we can cease our existing exports and start to import water from Southern (this is driven only by the high environmental destination scenarios)
- No key alternatives are required in our plan. However, the strategy may be impacted under high environmental destination scenarios if the Southern Water effluent recharge scheme is not deliverable – an alternative strategic option or options will need to be developed by Southern Water
- We are intrinsically linked to the resilience of the region – we are a net provider of bulk supplies to neighbouring company areas throughout the first 15 years of the plan at least, and under the medium or low environmental destination scenarios throughout the planning period
- Our Havant Thicket Winter Storage reservoir contributes significantly to this resilience. It is a key part of the Southern Water strategic reuse option.
- Once Southern Water have a strategic option in place, we are in a position to reduce or cease our bulk supplies to our neighbours, and under some of the high environmental destination scenarios, we may import some of this new water into out supply area to provide the resilience we need.
- The impact of a reduced water saving from demand management is that we are in a less strong position to support our neighbours, and are likely to rely on imports from Southern Water under high environmental destination scenarios – so are more reliant on the development of Southern Water's strategic resource options