

TA 11.5 Havant Thicket Reservoir Resilience Project Technical Annex

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Navigation: TA.11.5 – Havant Thicket Reservoir Resilience Project

Purpose:

This Technical Appendix (TA) sets out our collaborative joint proposal, with Portsmouth Water, for the Havant Thicket reservoir. It comprises part of the supporting evidence for chapter 11 Wholesale Water.

The table below summarises the Ofwat tests that are addressed by the evidence presented in this Annex.

Table: Relevant Ofwat tests

Ref	Ofwat test		Comment
Primary Focus Areas			
Securing long-term resilience – LR2	How well has the company objectively assessed the full range of mitigation options and selected the solutions that represent the best value for money over the long term, and has support from customers?	<p>High-quality plan:</p> <ul style="list-style-type: none"> • An organisation-wide, integrated approach to appraising risks to resilience supported by strong evidence that takes suitably long-term views using a range of forward-looking appraisal techniques across key service areas. • Effectively engage with customers on resilience in the round, including facilitating informed choices. • Use innovative approaches to the appraisal of risks to resilience, supported by best practice techniques to understand and appraise uncertainty across the full range of pressures, from acute shocks to longer term chronic stresses. It should also consider hazards and threats, such as cyber security, flooding and disruptions to energy supplies. • Include cross-references to changes in operational risk and planned levels of service, supported by strong evidence. • Thoroughly appraise options for mitigating resilience presenting a full range of options as evidence that the plan will deliver the best value long-term options for customers. This will include utilising options beyond its boundary to mitigate risks in its own area (and also looking beyond its boundary to understand how it can 	<p>The Havant Thicket Reservoir Resilience project demonstrates an innovative approach to collaboration and water trading to provide resilient water supplies to the region.</p> <p>The project, which is supported by and developed with customers and stakeholders, forms one part of a package of solutions which can provide the best value resilient water supplies with the lowest bill impact, compared to other strategies.</p> <p>It is viewed as the first phase of a longer-term plan to increase water trading opportunities through ambitious demand reduction and the development of further regional infrastructure.</p>

support long-term resilience elsewhere).

Ambitious and innovative plan:

- Strong evidence that innovative approaches will deliver sector-leading operational resilience including the role of partnership, use of markets, catchment management and other softer option in combination with fixed asset based solutions.

Secondary Focus Areas

CMI2, CMI3 Targeted controls, markets and innovation

Havant Thicket Reservoir Resilience Project – a more resilient future for water in the South East

(This chapter is a collaborative submission by Portsmouth Water and Southern Water on this integrated long-term resilience solution and appears in both companies' plans.)

Executive summary

The £103 million Havant Thicket Reservoir Resilience Project involves the construction of a new winter storage reservoir – the first new reservoir to be built in the South East since the 1970s.

It is a collaboration between Portsmouth Water and Southern Water, through the Water Resources in the South East group, to provide resilient water supplies to the region. It supports reduced abstraction on chalk rivers, has an overall biodiversity net gain and will provide a new community leisure facility for the area.

The project's innovative approach to collaboration and water trading sets a precedent for the water industry and fulfils the recommendations of the National Infrastructure Commission's 'Preparing for a drier future' report as well as being in line with the Government's 25-year environment plan.

The reservoir, which will take up to 10 years to fully commission, will be filled with surplus spring water in winter and allow Portsmouth Water to provide a flexible bulk transfer of around 21 Ml/d to Southern Water, as part of an overall commitment to supply 60 Ml/d from a range of sources by 2029. This will help meet a deficit created by Southern Water's imminent reduction of its abstraction licences on the Rivers Test and Itchen.

It is part of a twin-track approach and both companies have ambitious plans to reduce leakage, help customers use less water and increase metering. A third track is to engage with partners on catchment solutions.

The project, which is supported by and developed with customers and stakeholders, forms one part of a package of solutions which can provide the best value resilient water supplies with the lowest bill impact, compared to other strategies.

Portsmouth Water and Southern Water are also committed to further exploring ways to increase resilience through additional enhancements, such as two-way transfers, to reduce risks from outage and events such as extreme droughts, heatwaves, freeze/thaw and pollution.

It is viewed as the first phase of a longer-term plan to increase water trading opportunities through ambitious demand reduction and the development of further regional infrastructure.

A Design and Build delivery approach is proposed, following a thorough review of alternative options, including a Direct Procurement for Customers model.

Portsmouth Water will deliver the reservoir and some of the associated network upgrades, and the relevant costs recovered from Southern Water through the pricing of the bulk supply arrangement.

Despite this being an exceptionally large project for Portsmouth Water, the company will use the existing TOTEX and cost-sharing frameworks to manage the risk to customers.

The full resilience potential of the project is proposed to be developed in phases:

- Phase 1:** Collaborative design, modelling, planning, of reservoir and bulk transfer agreement, construction of the reservoir by Portsmouth Water
- Phase 2:** Optimisation of transfers and network by the water companies in the South East to facilitate best use of overall water resources, under the auspices of WRSE
- Phase 3:** Companies to provide evidence to support a Government review of metering policy, supporting fast-tracked, more widespread metering for all customers, and further reductions in leakage and PCC to free up further resources
- Phase 4:** Continuing collaboration to evolve optimum regional water sources and transfers through WRSE.

With the population in the South East expected to grow by 4.1 million people by 2045¹ it's widely recognised that as well as helping reduce demand for water, companies must develop infrastructure to secure the resilient supplies required to meet growing demand, with the right balance between the needs of society and the environment.

According to the NIC, without such action, there is a 1 in 4 chance over the next 30 years² that large numbers of households will have their water supply "cut off" for extended periods in a severe drought.

While addressing these challenges, this project overall has the potential to:

- improve the resilience of water supplies to customers by storing more water for use when it's most needed
- set an innovative precedent for national collaboration on infrastructure and water trading
- improve the environment by reducing abstraction from environmentally sensitive rivers
- provide a regional green, community facility with recreation and education facilities
- provide an accessible location for customers to engage face-to-face with their water companies
- create new wildlife habitats, wetlands and open freshwater habitats
- increase protection of water supplies for customers from unforeseen outages
- secure long-term resilience in the South East with best-value investment shared across generations through an affordable bill
- Enable economic and population growth in the region.

¹ From Source to Tap (WRSE, 2018)

² Preparing for a drier future: England's water infrastructure needs (National Infrastructure Commission, 2018)

The resilience proposal

The Havant Thicket Reservoir Resilience Project is a collaborative initiative between Southern Water and Portsmouth Water to construct a strategic new reservoir for the South East, strengthen the resilience of the regional network to facilitate more water trading and create a community facility and new wildlife habitats.

Southern Water and Portsmouth Water are both fully committed to delivering this key regional resilience project for the South East. The project is included in both companies' long-term revised draft Water Resource Management Plans and Business Plans for 2020-25, with an operational delivery date by 2029.

The transfer and reservoir are possible because Portsmouth Water, whose area is classified as moderately water-stressed, has surplus supplies from existing sources, including springs in Havant, which can be captured for reservoir storage in winter.

The reservoir, when combined with Portsmouth Water's existing sources and enhancements to its groundwater sources, would create sufficient surplus to support an additional flexible daily transfer of nine million litres from existing sources by 2024 and a further 21 MI/d by 2029 (facilitated by the reservoir) – a total of around 30 MI/d.

Southern Water requires this transfer to help meet a significant deficit in its Southampton East, Southampton West and Isle of Wight resource zones. This deficit arose after the company agreed to reduce its abstraction licences on the Rivers Test and River Itchen at a public inquiry in March 2018, to help protect the environment. As Southern Water supplies the majority of its customers in south Hampshire from these sources, it now has less than half the usual amount of water available in droughts (more than 180 MI/d).

In the short term this means drought permits and drought orders to secure supplies to Southern Water customers could be used more frequently than the average of one in every 20 years planned for previously, until the deficit can be met.

The reservoir

A proposal to build a reservoir at Havant Thicket, in Portsmouth, was last considered by Portsmouth Water in 2008 but could not be progressed at that time due to insufficient need for the resource.

As a result, an outline design for the reservoir and support structures, environmental surveys and customer and stakeholder engagement have already been progressed.

The reservoir is earmarked for a 160-hectare site which has been owned by Portsmouth Water since 1965 and sits next to Havant Thicket, Rowlands Castle, Staunton Country Park and Leigh Park. It will be approximately one mile (1.6 km) from east to west, 0.5 miles (0.8 km) from north to south and able to hold approximately 8,700 MI of water, providing an average deployable output of 23 MI/d.

The water to be stored in the reservoir will be supplied from surplus winter yield pumped from the prolific springs in Havant, which would normally flow out to sea at Langstone Harbour.

Habitat and Biodiversity

The proposed site is currently grassland used for grazing, with a few small areas of woodland. The woodland at Havant Thicket to the north is owned by the Forestry

Commission and Staunton Country Park to the south is owned by Hampshire County Council.

The history of the site means that the habitats have changed over hundreds of years, and in the 1700s the site was relatively open heathland, with thicket and plantation woodland developing from the mid 1800s, until 1954 when the majority of woodland was cleared, before Portsmouth Water purchased the land in 1964-5.

Nevertheless, four of the remaining woodland blocks are designated by Natural England as ancient woodland due to the history of wood pasture in the wider landscape.

The construction of the reservoir would mean the loss of terrestrial habitats, most notably the designated woodland, and areas with habitats used by species of principal importance that fall under section 41 of the Natural Environment and Rural Communities Act 2006, including dormice and Bechstein's bats.

Portsmouth Water is fully committed to delivering a habitat and biodiversity mitigation and compensation programme that achieves a net environmental gain. By working closely with Natural England, the Forestry Commission, Hampshire County Council (Staunton Country Park), the Environment Agency, local planning authorities and wildlife trusts, Portsmouth Water is developing a plan which would include creation of new woodland habitats, better management of existing woodland and a capital grant scheme to help others deliver important new habitats.

The new site will include a large wetland, creating an important roosting site for wetland birds. It has the potential to provide an inland refuge, with open water and islands, for birds disturbed from the marshes and mudflats in Special Protection Areas and Special Areas of Conservation along the coast. In this way, the benefits of the reservoir will be felt further afield than simply on the site itself.

Further long-term enhancements would include embankments seeded with wild flowers, planting new broad-leaved woodland, hedgerow planting and enhancements to existing ancient woodland in the vicinity of the site.

Indirectly, the reservoir will also benefit the conservation of the Rivers Itchen and Test. Natural England, in its advice to the Secretary of State on Portsmouth Water's dWRMP, recognised there are highly significant positive impacts from the project.³

An [Environmental Impact Assessment Scoping Report](#) was carried out in 2009, and Portsmouth Water has already commissioned further monitoring with a view to developing a full Environmental Impact Assessment. This builds on five full years of ecological surveys.

Leisure, community and education facility

In addition to providing a new strategic water source, the reservoir would create a new place for people to visit, offering facilities to experience nature, leisure and education. It would add invaluable publicly-accessible green space in the South East, with the associated well-documented benefits for mental and physical wellbeing. (*See Natural Capital accounting*)

³ Graham Horton, Natural England Water Manager; Hampshire, Sussex, Kent and the Isle of Wight advice to Secretary of State for Defra on dWRMP.

The community benefits of the reservoir have been developed over a number of years in partnership with the local communities, young people and interested parties such as Staunton Country Park and the Forestry Commission.

The amenities would include new footpaths for walking, cycling and horse riding, facilities for bird watching, picnic and play areas and car parking. The site will provide education facilities and through the visitor centre, opportunities to engage communities in co-delivery of outcomes e.g. water-saving, affordability.

Due to its location in Hampshire, both water companies' customers would benefit from this new amenity.

The wider water resources network

Supply

While the reservoir is at the core of the project – there are also additional resilience benefits to the South East. This includes the extension and strengthening of the existing regional grid in West Sussex and Hampshire and opportunities for more network transfers and trade in the future.

It creates an opportunity to become part of the wider South East network for strategic water transfers, operating as part of a wider South East network operation.

This project encompasses the enhancement of Southern Water's network in Hampshire and the use of Portsmouth Water's existing abstraction – to create a balance of sources from which both companies' customers could be supplied. This is a further step to increasing long-term resilience and avoiding dependency on one source in the long term.

- Currently, Portsmouth Water transfers up to an average of 15 MI/d to Southern Water in West Sussex, from its existing sources (groundwater, springs and river) through a pipeline connecting the two companies' water resource zones.
- From 2018, Portsmouth Water will transfer a further average of 15 MI/d to Southern Water in east Hampshire, again from its existing sources, through a new transfer pipeline – further connecting the companies' water resource zones.
- By 2024, Portsmouth Water will supply around a further 9 MI/d to Southern Water in east Hampshire, as a first step to support Southern Water's deficit, through the existing pipeline.
- And by 2029, when the reservoir is complete, Portsmouth Water will supply a further flexible bulk transfer of around 21 MI/d to Southern Water in east Hampshire, through the existing pipeline.

By 2029, Portsmouth Water will be trading around 60 MI/d of its total 226.5 MI/d deployable output with Southern Water. For Southern Water, it represents an increase in trade of 5.6%.

As part of the project, Portsmouth Water will lay 2.1km of pipeline at 700mm diameter and 2.4km at 1600mm diameter between the springs in Havant and the new reservoir – to fill the reservoir in winter and draw off supplies to transfer to its water treatment works.

This pipeline will also provide an emergency discharge for the reservoir if required. Portsmouth Water will also carry out work to re-inforce its existing trunk mains, where required in the future.

Southern Water is also proposing to extend its connectivity between four water resource zones in Hampshire – Andover, Kingsclere, Winchester and Southampton East.

Both companies will carry out joint studies to understand how their networks can be further developed and re-inforced to achieve greater resilience in the future.

Water quality

Water quality studies will be key at all stages of the project, to ensure customers' water supplies continue to be treated to the highest quality they already enjoy and expect, whatever the source of their drinking water.

Both companies will undertake further work to ensure high standards are maintained, in addition to carrying studies, consultations and customer surveys on taste and odour to determine where additional treatment is required.

The companies will ensure they meet the updated Drinking Water Directive (2013), including updating and revising their Drinking Water Safety Plans to ensure the project meets all customer acceptability tests, in line with the expectations of the Drinking Water Inspectorate (DWI).

Portsmouth Water is reviewing the need for pre-treatment using Dissolved Air Flotation (DAF) to remove algae from the water taken from the reservoir before it is transferred to the water treatment works.

Demand

This supply-side project is part of a twin-track approach by both companies, which also includes:

- Reducing leakage 15% by 2025, with further long-term reductions
- Extension of metering, making a case for compulsory metering in Portsmouth Water's area and trialling smart meters
- Water efficiency – reducing per capita consumption and helping customers use less water
- Catchment management – working with farmers and wider partners to improve the quality of water sources and protect supplies
- Working with developers and house builders to ensure more water efficient homes are built
- Getting existing assets to work better – so they are more efficient.

More detail can be found in the relevant chapters of the companies' Business Plans.

Why is the reservoir needed?

The initial need for the reservoir project was driven by the requirement for Southern Water to significantly reduce its abstraction on the Rivers Test and Itchen, as set out by the Environment Agency to meet the requirements of the Habitats Directive and Water Framework Directive.

- Following agreement to the reductions at a public inquiry in March 2018, Southern Water expects to have less than half the usual amount of water available to supply

customers some of its Hampshire zones in droughts. In the short term this risk creates a need for more frequent drought permits and orders – a situation which Southern Water is seeking to address as soon as practicable by securing alternative supplies for its customers in Hampshire.

In addition, both companies are planning for forecasted increases in housing and population and as a result of impacts of climate change.

- Southern Water (2070) – a range of 7 to 71% population growth, -56% to +44% potential variance for climate change.
- Portsmouth Water (2045) – 15% population growth, 0.5% reduction in yield and 0.6% increase in demand for climate change.

(These figures will be reviewed against updates from the UK Climate Impact Programme in 2018).

Both companies are also seeking to increase short-term operational resilience and long-term resource resilience in the water-stressed South East, in the most cost-effective way for customers.

Increasing the choice of resources and regional connectivity is crucial to achieving this, particularly in light of the fact there may be further reductions to abstraction licences in the future. This should be made clearer by the Environment Agency after 2020.

In response to recommendations in the National Infrastructure Report: 'Preparing for a drier future', both companies are seeking to increase resilience to reduce the impact of droughts on customers. As their report states, the costs of being without water in a severe drought far outweigh early investment now.

The NIC report sets out a range of measures to achieve this – by developing new supply infrastructure alongside reducing leakage by half by 2050 and widespread metering. Crucially it says a range of studies have found a positive-cost-benefit case for greater transfers and water trading.

Development of the Havant Thicket Reservoir Resilience Project is an exemplary example of collaboration and joined-up thinking to develop new storage infrastructure to allow transfers and trading, alongside a comprehensive mix of leakage reduction, metering and water-saving targets.

In addition, [The Environment Agency's WISER \(Water industry strategic environmental requirements\)](#) supports a wider need for sustainable abstraction from our environment. The development of the Havant Thicket Reservoir Resilience Project, along with other measures, would play a vital role to support sustainability reductions from the Rivers Test and Itchen and offset the short-term frequency of drought actions required to maintain customers' essential supplies.

In light of these long-term drivers, the project is a critical step to begin increased collaboration, which in the longer term can progress to include wastewater recycling, desalination and greater connectivity with each other, other water suppliers and other water users – e.g. industry and agriculture.

A step change in resilience

This resilience project will help protect customers from the emergency measures necessary to manage at least a 1 in 200-year drought, which could include rota cuts and standpipes.

It will increase the strength of the network and provide a substantial new source of water which will broaden the balance of Portsmouth Water's current sources (60% boreholes, 31% springs, 9% river) and be a strategic new resource for the wider South East.

This will support greater transfers of water from an area of moderate water stress to an area of serious water stress and strengthen the region's resilience to more extreme droughts.

It will provide Defra's four key pillars of resilience:

- Resistance – strength and ability to adapt
- Redundancy – an alternative option, choice or substitution
- Reliability – performing consistently well
- Response and recovery – ability to respond to and recover from disruptions.

In the longer term, the two companies are committed to exploring further resilience opportunities to optimise the use of available supplies through additional bi-directional transfers.

This could provide greater flexibility and increased connectivity to better manage extreme droughts and unforeseen outages, such as major bursts, heatwaves, freeze/thaw and pollution e.g. oil spills.

An innovative approach

This is an innovative approach to a resilient future for the following reasons:

1. We're committing to different ways of running the water network to increase operational resilience and improve levels of customer service
2. The step change in connectivity will open the doors to future movement of water and trading and encourage a more dynamic and transparent marketplace
3. We're setting a principle for new bulk transfer opportunities – which are being called for across the industry
4. We're setting a precedent for water company co-working and collaboration – meeting NIC recommendations within the current regulatory framework
5. We've taken the opportunity to work in partnership to explore the natural capital value of the project.

Customer and stakeholder support

Engagement with customers, stakeholders and regulators over several years has consistently demonstrated strong support for the reservoir project.

The headlines from recent public consultation on the two companies' draft Water Resources Management Plans in 2018 are:

Portsmouth Water

Do you support our plans to build Havant Thicket reservoir as a regional water source and community facility?

2,084 responses – **87% yes**, 11% don't know and 2% no.

Do you support our plans to share water with our neighbours in Hampshire (who are supplied by Southern Water) as part of a solution for the shortage of water in the South East as a whole?

2,084 responses – **80% yes**, 12% don't know, 8% no.

Example responses:

“The reservoir at Havant Thicket is an excellent idea. That the community and people further afield can enjoy this leisure facility, its beautiful surroundings and be part of something that will preserve the natural wildlife, is a wonderful development.”

Southern Water

Do you think it's a good idea to trade water with neighbouring water companies in a 'regional grid' as part of the Water Resources in the South East group?

128 responses – **82% yes**, 14% don't know, 4% no.

Example responses:

“Every provider should work together to make sure that every part of the country has plentiful, clean water.”

“I think the WRMP should be developed in conjunction with other companies and to be developed for the big catchment areas (hydrographic areas).”

The responses showed the project was supported on the basis of being cost effective and part of a wider regional, and potentially national, grid.

There were no significant objections to the Havant Thicket reservoir project – concerns raised by customers and stakeholders were principally in relation to impact on existing wildlife and habitats, creation of new ones, appropriate community facilities and parking, impact on customer bills and ability to withstand climate change and changing weather.

Historical support

When Portsmouth Water first explored the reservoir option in 2008, the company held several public exhibitions attended by more than 850 people, with 250 people sharing feedback (including 60 responses from young people).

This feedback, along with a community workshop, presentations and engagement with local schools and Havant Youth Council, helped shape the proposal, in particular in relation to the access, conservation and recreation and educational aspects. It also influenced the level and type of activities, the pipeline route (from five options), use of renewable energy and location of the embankment.

Nearly 80% of respondents were in favour of the final (slightly longer) pipeline route, which avoided the need for traffic to pass through community areas and limited the potential impact of the access on the ecology and walking, cycling and horse riding routes.

Overall, public response to the proposal has been very positive, with the majority of people indicating they viewed it as a potential benefit for the local area.

Stakeholder panel

Portsmouth Water has worked with a stakeholder panel on the project since 2008, alongside Southern Water. The representatives include:

- Officers and councillors from East Hampshire District Council
- Havant Borough Council
- Portsmouth City Council
- Hampshire County Council
- South Downs National Park Authority
- Forestry Commission
- Environment Agency
- Natural England
- CC Water
- Hants and Isle of Wight Wildlife Trust
- Hampshire Ornithological Society
- Staunton Country Park.

This stakeholder panel was reconvened in 2018 and has so far met twice this year, on site visits and to collaborate on environmental monitoring and preparations for a planning application.

Planning authorities

Positive discussions have been held with the local planning authorities over a number of years and the reservoir and associated pipeline route are included in [Havant Borough Council's Local Plan to 2036 \(pages 63-64\)](#) – with a statement that planning permission is likely if stated conditions are met.

The plan states: *“It would be a key piece of infrastructure required to meet the demand for increased water supply in the south-east in the future. The reservoir and adjacent greenspace will also have major leisure and recreation potential which complements Staunton Country Park with significant benefits for health and wellbeing.”*

The reservoir is also referenced in East Hampshire District Council's 2014 Local Plan, and in its emerging Local Plan, currently being updated.

In addition, the project is supported by PUSH (the Partnership for Urban South Hampshire), which is dedicated to delivering sustainable, economic-led growth and regeneration in the region. The PUSH 2010 Green Infrastructure Strategy identified the reservoir as one of 10 selected green infrastructure sites – generating local employment both during and post construction.

The evidence: Regional planning

The selection of the Havant Thicket reservoir project as a preferred option for Southern Water and Portsmouth Water arose out of modelling by the Water Resources in the South East (WRSE) group.

WRSE is a sector-wide partnership which develops a regional strategy every five years to inform water companies' individual WRMPs. It includes six water companies working alongside the Environment Agency, Ofwat, the Consumer Council for Water, Natural England, Defra, the Canal and River Trust and the Greater London Authority.

Its modelling work for the region in 2017-18 identified the development of Havant Thicket reservoir as a 'prevalent' strategic option to help meet future demand in the majority of the option portfolios and it is identified in the [WRSE's From Source to Tap: The south east strategy for water](#) as one of eight 'big ticket' items which each deliver more than 15 MI/d of water.

The work of WRSE and its option selection and promotion are set to become more critical to regional and national planning in the near future as the Environment Agency develops a national water resources framework to meet the expectations of customers and the Government.

The evidence: Companies' individual plans

The reservoir project and associated transfers were selected as preferred options in both water companies' draft Water Resources Management Plans (WRMPs) and remain so in revised plans submitted to Defra in August and September 2018.

Southern Water

Southern Water's 50-year WRMP takes a multiple track approach to securing long-term water resources, using a real options methodology to forecast for a wide range of future scenarios based on variations in population growth, climate change and licence reductions.

The plan also used a multi criteria assessment in its option selection, incorporating customer views at its core.

Across its region, Southern Water plans to:

- Reduce leakage by 15% by 2025 and 50% by 2050.
- Target 100 – work towards an average of 100 litres per person per day by 2040 .

Specifically in Hampshire and the Isle of Wight, key elements of the plan for the first **10 years** are:

- Catchment management to reduce nitrates and pesticides
- Catchment work to support the Rivers Test and Itchen and increase drought resilience
- Increase metering from 88% to 92%
- Receive a 9 MI/d transfer and subsequent 21 MI/d transfer from Portsmouth Water
- Receive an additional bulk supply of 20 MI/d from South West Water
- Pipelines to increase connectivity between four water resource zones
- Desalination on the Solent, around the Fawley area.

In combination these options seek to make up the deficit in reductions to the abstraction licences on the River Test and Itchen and a forecast increase in demand by 2029. The Portsmouth Water transfers form an integral part of this strategy.

Portsmouth Water

Portsmouth Water's 25-year WRMP similarly takes a twin-track approach, featuring demand-side options, alongside new infrastructure and catchment management initiatives. It has revised its planning for climate change and planned for a wider range of droughts – increasing the overall peak demand by 7%.

By 2045, Portsmouth Water expects to supply a similar amount of water but to more people (further detail is set out in the company's revised draft WRMP). It will cater for this growth by reducing leakage (15% by 2025 and 30% by 2040) and a reducing trend in personal water use (PCC) to 100 litres per day by 2050.

This water-saving programme will include:

- developing a smart network of sensors and using big data and artificial intelligence to detect leaks – a first step towards a smart and remotely operated network
- adoption of supply pipes, with wall-mounted boundary boxes
- the installation of 5,000 meters each year for customers who choose to opt for a meter and on change of occupancy or in empty buildings
- providing evidence to support a Government review of metering policy to support more widespread metering for all customers
- trialling smart meters with next generation technology to encourage awareness of water use and increase meter optants and reduce PCC, with a long-term smart network in mind.

On the supply-side, the company's plan promotes:

- the Havant Thicket reservoir and associated infrastructure (23 MI/d)
- groundwater enhancements (20.3 MI/d)
- a drought permit in West Sussex.

Why was this option chosen?

The Havant Thicket reservoir project was chosen in the companies' revised draft WRMPs and WRSE scenarios as part of a preferred strategy when considering all factors – construction, operating costs, customer preferences, environmental and social impact and deliverability.

The transfer was selected in Southern Water's revised dWRMP as one of a set of core options to meet the deficit resulting from its agreement to licence changes in Hampshire. The increased transfer is a key component of a range of options Southern Water has put forward, which also include metering, leakage reduction, a wastewater recycling scheme and a bulk transfer from South West Water. The residual deficit following the implementation of these options will be made up by a desalination plant. This portfolio of options informs the best-value solution for customers.

In the short term, Southern Water will use drought orders and drought permits in order to maintain supplies to its customers following the licence changes. This dependence on drought orders has been set out in a Section 20 agreement between the Environment Agency and Southern Water. As the schemes outlined in Southern Water's revised dWRMP are delivered, the frequency of use of these permits and orders will diminish. The reservoir is the last scheme for delivery, by 2029, and will then allow Southern Water to meet its environmental levels of service.

The reservoir was evaluated in terms of average incremental cost (AIC) against other potential supply strategies, which could allow Southern Water to meet some of its projected deficit by 2029.

The AIC for Havant Thicket Reservoir is calculated at 66 p/m³ (as provided by Portsmouth Water). Southern Water's market figures give a range of 117-203 p/m³ for desalination and 115-342 p/m³ for wastewater recycling.

Therefore, Havant Thicket reservoir has been selected as a key cost-effective solution to contribute to meeting the sustainability reductions in Southern Water's Hampshire zones and for its potential to play a wider role in an expanded regional grid.

The success of the project has a high level of certainty given the land ownership, support from customers, stakeholders, regulators and planners, evidence of need and alignment with national and industry policy.

Planning approach

The preferred planning approach is to submit an early 'hybrid' application – part outline and part full. This would provide outline details of the embankment and structures, with stated engineering parameters to define the shape and size.

This would allow the companies to retain flexibility while securing consent early in the programme and the planning authorities have indicated they are satisfied with this approach.

The aim is to submit this early hybrid application in 2019.

Finance

The total cost for the project is just over £103 million (estimated at P50).

The costs are based on an outline design prepared in 2009 and updated and benchmarked against similar projects in 2018. A summary report setting out the benchmarking and cost assurance processes and describing the high-level costs is included as an appendix in Portsmouth Water's Business Plan.

Cost agreements

The companies have agreed that Portsmouth Water will deliver the reservoir and network upgrades in their area, and incur the associated development, finance, capital, operational and other costs.

Portsmouth Water will recover the relevant costs through the pricing of the bulk supply arrangement with Southern Water.

The recovery of costs will be, in principle, through two routes:

- a regular fixed cost recovering capital, maintenance, financing and other related fixed costs
- a volumetric charge to recover any incremental operating costs incurred through demand for the bulk supply.

The economic profit will be consistent with Ofwat's principles for pricing bulk trade agreements and when finalising the cost recovery process and the bulk supply agreement, the companies have agreed to be guided by their Trading and Procurement Codes. The companies expect the bulk supply to be a long-term commitment.

Some of the upgrades to the network may further improve the resilience of supplies to Portsmouth Water’s customers, so Portsmouth Water has agreed to support the principle of proportionality in cost recovery for this part of the investment. Therefore, an element may be paid for by Portsmouth Water customers and this will be determined by further network analysis.

In order to progress the project for efficient delivery by 2029, action must be taken in 2018-2020, which will incur costs. Southern Water has agreed in principle to contribute its portion of these costs and the two companies are collaborating to develop a mechanism to reconcile them.

Risk

The HM Treasury Green Book guidance recommends the application of a specific adjustment to cost estimates at the outset of an appraisal to allow for the tendency of estimates to be over optimistic.

In this context the reservoir project would be classed as ‘Standard Civil Engineering’, which would provide for an optimism bias range of 3-44% addition to base cost where there has been no risk management or mitigation undertaken.

In the case of this project, a detailed review of the project risks has been carried out and a quantitative risk analysis completed, allowing elements of the optimism bias to be replaced by specific risk provisions with a small allowance for unknown risks. These analyses combined give Portsmouth Water a reasonable degree of confidence in the project costs.

To ensure consistency with Ofwat’s approach to RoRE scenario modelling, described in Final Guidance appendix 12 (aligning risk and return), we have carried out a RoRE scenario analysis of p10 to p90 range of costs.

Natural Capital

The Hampshire and Isle of Wight Wildlife Trust has worked in partnership with Portsmouth Water to evaluate the benefits of the proposed reservoir, using a natural capital accounting approach.

The report demonstrated that although there will be substantial costs to develop the site, and site maintenance costs will be higher than in its current state, the development will add substantial value in terms of ecosystem service delivery. This value increases when taking drought years into account.

The report concluded that there would be some gains and losses in the ecosystem services benefits the site could deliver, given the changes in habitat type from terrestrial to aquatic. However, it concluded that overall there would be a substantial net gain, with a focus on recreation, health, well-being and water provision, particularly in drought years.

The report also states the economic impacts of the reservoir construction are likely to be high due to employment demand to build the site (estimated 53.3 FTEs over six years) and spend on materials. Further economic impacts would arise from direct employment as well as through spending by employees, volunteers, visitors and on goods and services, totalling an estimated 30.98 FTEs.

ECOSYSTEM SERVICE	Annual physical flow	Annual monetary value (£ - 2017)	Present value (£)
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Carbon sequestration (tCO ₂)	- 146.77	- 9,393	- 239,722
Timber production (m ³)	- 128.4	- 2,218	- 56,596
Air pollution regulation (t)	- 2.06	- 37,447	- 955,697
Agricultural production (ewes and grazing)	- 219.93	- 38,604	- 985,228
Recreation – visitor spend (no of visitors)	+ 105,000	+ 688,800	+ 17,579,119
Health and wellbeing (QALYs)	+ 40.11	+ 802,107	+ 20,470,844
Water provision (Ml)			
Normal year	+ 1,387	+ 485,450	+ 12,389,348
Drought year	+ 9,015	+ 3,155,250	+ 80,526,297
Total			
Normal year		+ 1,888,696	+ 48,202,069
Drought year		+ 4,558,495	+116,339,017

Table 3: Difference between current and future states at reservoir site

Source: *Havant Thicket Winter Storage Reservoir: A natural capital account*

Delivering the project

In considering the optimal means for delivering the project that would (by reference to various criteria such as whole life cost) represent best value for customers, Portsmouth Water asked PA Consulting (PA) to apply Ofwat’s guidance concerning Direct Procurement for Customers (DPC) to assess the suitability of a DPC delivery model for the project. This full assessment of comparative delivery models was undertaken notwithstanding that the project Whole Life Totex scope of the DPC project was initially below the £100 million mandatory assessment threshold at £86m. The PA report is in Appendix 8.3 of Portsmouth Water’s Business Plan.

A further examination of the DPC scope confirmed that all engineering elements of the project would be included in a DPC, apart from the pump enhancements, visitor centre and recreational facilities. All other non-engineering costs would be excluded, apart from the detailed design. On this basis, the overall DPC project costs are considered to be at circa £66m Capex, excluding allowances for risk and efficiencies. This is at the lower end of (or perhaps even beyond) what may be considered to be an appropriately-sized project financing scheme, and as a consequence may suffer from lack of market appetite given likely bid cost burdens.

The assessment was undertaken in comparison with other delivery models, with the key comparator model being a standard in-house Design and Build (D&B) delivery model. The two principal delivery models can be summarised, *viz*:

Design and Build (D&B) Model

Initial outline design carried out by Portsmouth Water, detailed design and construction carried out by third-party contractor. The contract itself for the reservoir would be let on a target cost basis with a pain/gain share mechanism.

DPC Model

Outline design carried out by Portsmouth Water, then financing, detailed design, construction and maintenance carried out by a contractor (the Competitively Appointed Provider or CAP) on a fixed price basis (save for specifically agreed aspects).

Delivery of the project

From PA's detailed assessment their recommendation and Portsmouth Water's conclusion is that for the project, the D&B delivery model would achieve greater benefits to customers than a DPC model. While the DPC model has some advantages versus the D&B delivery model, (for example the DPC model means Portsmouth Water retains less overall risk for a premium), when compared with DPC the D&B delivery model has some key advantages:

- The majority of project costs are associated with the initial construction of the asset and there is limited Operation and Maintenance (O&M) scope. Indeed, non-recreational facility related Opex costs are estimated to be on average c.£330k per annum. The project is therefore considered a relatively straightforward D&B with limited opportunity for risk transfer and innovation during the contract period. There seems little merit in incurring additional costs and a longer delivery period to allow a DPC entity to manage risks such as business continuity, which cannot effectively be transferred to them;
- The potential for DPC driven innovation is considered relatively limited with respect to the project. Further, and in this context, the effect of lower Capex costs under DPC, driven by a whole life costing approach, are diminished when added to the other costs associated with DPC procurement;
- The DPC model will take up to two years longer to deliver the project, when compared to the D&B delivery model, due to a more complex procurement process and the need to engage in more detail at each stage, driven in part by the additional time required to procure the CAP. The consequent delay to start of operations under DPC results in the water supply resilience benefits being marginally higher under the D&B delivery model when considered over the project's life;
- In the base case, the project's cost to customers (including interest costs) under the DPC model is materially higher than the D&B delivery model, due to higher financing costs and equity hurdle rates. This was on the basis of equity and cost of debt benchmarks from a number of public sector PFI projects. Furthermore, noting results of soft soundings from Aviva and RBS, PA modelled further cost of debt sensitivities. Neither exercise caused PA to change its recommendation or Portsmouth Water to alter its proposal to deliver the project through the D&B delivery model.
- Given the relatively long design and construction period and the relatively small project size (in a DPC context), the project might not attract adequate financing; and
- Highly-integrated projects, or projects with complex operational or other dependencies with existing assets, may not be suitable for DPC, as Ofwat acknowledges. The assets delivered by the project will be fully integrated into and operated as part of Portsmouth Water's network of assets. Given the interface with a long-term DPC contractor, delivery through the DPC model would dilute Portsmouth Water's operational flexibility. Furthermore, Portsmouth Water already operates the day-to-day delivery of three major bulk supplies to Southern Water. Once the project is in place, Portsmouth Water will trade around 60 MI/d of the 226.5 MI/d deployable output. Portsmouth Water's long-term strategy to create further surplus to trade with neighbours will require a high level of operational flexibility in resources and the distribution network. Network modelling and option development, taking place in the period up to December 2018, will provide an indication of the degree of further integration required.

PA Consulting also note that there are features under the D&B delivery model (such as consideration of the technical specifications and works information so that they are less input-based and run-on periods to assist in operational integration and whole life costings) that can be seen to have parallels with a DPC model. This means that some of the efficiencies expected to be achieved by DPC can be realised without the delay to delivery of benefits and additional costs to customers that would occur under a full DPC model.

Management of the project

The size of the project is significant in the context of Portsmouth Water's wider business. Both delivery models considered allow for clear risk transfer, and single-point of responsibility for the discrete works packages, with appropriate oversight and minimal interface risk between packages of work. The additional client functions needed to deliver through the DPC model are not significantly different to the D&B delivery model given the nature of the project. So regardless of which delivery model is chosen, Portsmouth Water will need to strengthen its client-side capabilities. In this regard, it has, or will, put in place, for example, the following measures:

- Engaged a highly experienced core project team of nationally recognised experts that is integrated within the organisation, comprising Project Delivery, Stakeholder and Environment and Commercial Leads; and
- Engaged a Project Management Contractor (PMC) to manage the project to operational readiness. The PMC will provide further technical expertise in the areas of Delivery, Commercial and Procurement management, Project Controls, integrating the engineering management (including environmental management), planning and the project executive. As part of the PMC, well established processes and procedures will be applied to the project, alongside industry-recognised systems and tools to run the project to budget and time. The benefits of the PMC will be transferred to the internal project delivery of Portsmouth Water on other projects.

The outline business case is included as Appendix 8.3 in Portsmouth Water's Business Plan.

Next steps

Before 2020

To ensure delivery of the reservoir project by 2029, it's imperative the environmental monitoring, habitat re-creation, planning application, customer engagement and commercial agreements are completed in 2019.

Portsmouth Water has met with the local planning authorities (LPAs) in recent months to discuss the form the planning application will take and to confirm the studies needed before the application is made. Extensive ecological survey work has already been commissioned and is underway.

In June the company met with representatives from Natural England, the LPA ecologist, Forestry Commission, Hampshire County Council and the local wildlife trust to discuss the outline habitat mitigation and compensation strategy and consult in preparation for a more detailed strategy.

Several further studies also need to be completed in 2018-19 to provide greater certainty over the design scope and to inform the outline design. They include:

- Water quality study – to determine if pre-treatment of the spring water is required

- Raw water transfer study – to determine if existing trunk mains can provide a resilient transfer of raw water to the treatment works and consideration of alternatives
- Network resilience study – to confirm the scope of upgrades required to the companies' networks to distribute the additional water
- Emergency discharge review – to confirm the design is appropriate to meet the requirements of the Reservoirs Act (1975) and the Environment Agency
- Review of visitor centre and recreation facilities – to confirm the scope still meets the expectations of the local planning authority and communities
- Agreement of commercial and operating arrangements for the reservoir and bulk supplies.

In tandem, Portsmouth Water and Southern Water will carry out modelling to ensure the maximum resilience benefits are optimised from the overall project, model these benefits to customers and apportion costs accordingly. This work will be subject to independent verification.

Timeline

Years 1 and 2 (2018-2019) – Planning, monitoring and design

Submission of business case by Portsmouth Water and Southern Water to Ofwat
Collaboration on modelling of current and future water sources
Formal Southern Water and Portsmouth Water financial and operational agreement
Customer and stakeholder collaboration
Ecological surveys and Environmental Impact Assessment
Outline design for reservoir and pipelines
Preparation and submission of planning application
Commence procurement for Design and Build contractor
Habitat creation, enhancement and species relocation
Diversion of paths and bridleway

Years 3 and 4 (2020-2022) – Design and procurement

Complete procurement of Design and Build contractors
Secure planning consent
Commence detailed design
Commence mobilisation on site
Community engagement

Years 5 to 7 (2023-2026) – Main construction phase

Drainage works
Excavation of clay
Embankment construction to contain the water
Creation of path networks
Development of pipeline from springs to the reservoir site
Extension and strengthening of regional network

Years 8 to 10 (2027-2029) – Fill and commission

Pump water from the springs to fill the reservoir (three winters)
Construction of amenity buildings and facilities
Open to public and operate new strategic water source.

