

Portsmouth Water – PR24 – Service Reservoir enhancement proposal review

Review and commentary upon PRT07.04 - “The isolation
and recovery of Service Reservoirs”

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1 Introduction and context

Water companies in England and Wales submitted their business plans for AMP8 to OFWAT in October 2023, and these have been assessed by OFWAT and a draft determination response issued 11th July 2024.

Portsmouth Water's PR24 proposal '*PRT07.04 The Isolation and Recovery of Service Reservoirs*' underwent a 'Deep Dive' assessment by OFWAT as part of its PR24 process for setting expenditure allowances, which consisted of assessing the proposal against the key areas within OFWAT's PR24 methodology. OFWAT identified areas of concern within the proposal, resulting in a reduced expenditure allowance for the project.

As part of the PR24 consultation process Portsmouth Water has engaged Arcadis to undertake an independent review of PRT07.04 and its supporting information against OFWAT's draft determination comments to assist Portsmouth Water in their formal response to OFWAT.

As part of our independent review, Arcadis have considered each of the headline topics against which OFWAT subjected the PRT07.04 proposal to, namely:

- Best Option for Customers
- Need for enhancement expenditure
- Cost efficiency

The review considered alternative options to meet the defined project objective with associated Arcadis generated cost estimates, and a market rate comparison against a selection of the contractor priced projects to assess the proposal against the headings of Best Option for Customers and Cost Efficiency.

In addition to the review of the financial submission, the PRT07.04 scope was also compared against the available definitions of 'Enhancement Expenditure' and 'Base Maintenance' offered by OFWAT to highlight where each definition is supported within the PRT07.04 scope. This provides the means to assess the proposal versus the criteria for enhancement expenditure.

2 Best Option for Customers

2.1 Summary of OFWAT draft determination response

OFWAT specifies the following within its assessment as justification for their expenditure adjustment:

“We have significant concerns that the investment is efficient. The company has provided no evidence they have considered alternative options or have undertaken a cost benefit analysis.

The company states that the single identified option provides the only practicable and economic solution. However, the company does not provide sufficient and convincing evidence to demonstrate that the proposed option is the most cost beneficial and best value for customers. The company does not provide a clear explanation of the optioneering process and the rationale for the selection of the option.”

The PRT07.04 proposal outlines the logic and supporting information as to why a single option has been considered for this project and explains how Portsmouth Water concluded that this is the most viable solution.

The following sections are intended to summarise the single option proposed by Portsmouth Water, identify potential alternatives, and compare the proposed option with the alternative option considered next best to test the logic applied by Portsmouth Water in their proposal.

2.2 Summary of proposed option

A summary of the option, referred to as Option 1, proposed by Portsmouth Water in PRT07.04 (Section 3) is provided below:

1. Replace existing fixed speed pump motors at nine service reservoir supply pump stations with variable speed drive (VSD) pump motors. Installation of pressure transducers within the downstream network of the service reservoirs to control the delivery speed of the new pump motors.
2. Install a facility for sampling individual service reservoir chambers at five service reservoir sites.
3. Construct one new pump station with VSD pumps with associated pressure transducer in the supply network.
4. Installation of a large diameter bypass pipe installed at one service reservoir to connect the incoming supply pipework to the downstream outlet pipework to allow bypass of the reservoir.

Items 1, 3 and 4 will **maintain continuity of supply** and **increase resilience of the water supply network** in the case of an unforeseen incident at one of the reservoir sites, such as concerns regarding structural integrity or water quality concerns.

Item 2 will enable Portsmouth Water to sample the water quality of individual compartments at multi-compartment reservoir sites, allowing them to meet the guidance issued by the Drinking Water Inspectorate (DWI). A letter of support from the DWI endorsing Portsmouth Waters proposal was included within their PTR07.04 submission.

2.3 Other viable options

The following sections identify alternative options available to Portsmouth Water which could deliver a comparative outcome in relation to the proposed Option 1.

Section 2.3.1 identifies the possible alternatives for maintaining continuity of supply and increasing resilience of the water supply network (Items 1, 3 and 4)

Section 2.3.2 discusses the limitations with respect to potential alternative options available for providing individual sampling points in multi-chamber service reservoirs (Item 2).

2.3.1 Maintaining continuity of supply & increase resilience of water supply network

A summary of the information reviewed as part of the option development process is presented in Table 1.

Table 1: Reference information provided by Portsmouth Water

Drawing Number	Title
49-13N	Schematic Reservoir Layout
80-115B	General Information of Reservoirs 25-02-14
80-118B	The company area supply map with principal mains

For each of the Service reservoirs within the PRT07.04 proposal, Arcadis have assessed if there is a clear alternative to the proposed scope based on the information in Table 1. The clear alternative looks to define a potentially viable solution based upon the detail at hand, and acknowledges that further studies, assessments, and feasibility reporting would be required to determine its potential validity.

There is a potential that these alternatives may be unfeasible upon further development, however, this offers the most conservative comparison to be made against Portsmouth Water's proposed option for each site.

Some of the schemes may have alternative options which could not be defined with the information available. These would likely require extensive additional assessments and surveys, such as assessments of treatment works' capacities, new service reservoir locations, and water quality management.

There are some sites, that due to their geographic location, layout and topography of the distribution network, or treatment capacity limitations, have no clear alternative option. In these cases, the alternative would likely be to duplicate the entire system in that particular area, but this has been deemed unviable for the following reasons:

- A second system would remain redundant until brought into service which increases the risk of degradation / stagnation of water quality whilst not in use.
- The cost of such a system, by objective comparison of the scopes, would be significantly higher than areas where more reasonable alterations can be made.
- The investment in such a system would be difficult to justify against the benefits posed, as other projects within the Portsmouth Water programme would likely take precedence.

A total of 18 schemes were identified across 13 reservoir sites within the PTR07.04 proposal. Of those 18 schemes, 12 schemes across 8 separate reservoir sites were identified as having viable alternative options that could be considered as part of this assessment. A summary of these sites with the possible alternative options is presented in Table 2. A more comprehensive table, including background information considered and those with no viable alternative, is presented in Appendix A.

An overview of each of the alternative options, complete with details of the cost build-up are presented in Appendix B.

A summary of the cost estimation and comparison of each alternative option is in Section 2.4.

A summary of the cost estimates for the alternative option compared the PRT07.04 CAPEX estimate for the twelve sites is presented in Table 3.

The cost of sampling provision was removed from the existing proposal estimates as concluded previously, there are no viable alternative measures to this.

Table 3: Cost comparison between PRT07.04 CAPEX price and alternative options where available

Site	PRT07.04 pricing (without sampling)	Alternative option estimate	Variance to PRT07.04 price
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Of the 12 sites with alternative proposals produced, none of them identified a reduced cost alternate.

2.5 Commentary

In addition to the 12 schemes where alternative options were considered viable, as summarised in Table 3, there are 6 further schemes across 5 reservoir sites, where no viable alternative options were identified. Details of these sites are presented in Table 4.

Table 4: Summary of PTR07.04 schemes with no viable alternative options

Site	PRT07.04 Proposal pricing (without sampling)
██████	██████
██████	██████
██████	██████
██████	██████
██████	██████
██████	██████
██████	██████

If the total CAPEX costs for those sites where viable alternative options have been considered (refer to Table 3) are added to those sites where no alternative options were identified (refer to Table 4), then the total CAPEX cost (excluding sampling) is **£20,324,100**.

The total CAPEX of the PRT07.04 proposal before risk, contingency, and management overhead costs (excluding sampling) was £3,106,000. This represents cost difference of £17,268,100 in favour of the PTR07.04 proposal.

The comparison of estimated cost between the PRT07.04 proposal options and the identified next best alternative considered in this assessment strongly supports the conclusion of Portsmouth Water that the proposed PRT07.04 options are the most economically viable for both customers and the company.

The alternative solutions considered in this assessment usually requires laying of new water mains and the provision of new pumping stations, with the goal of supplying the customers downstream of each reservoir via an alternative route. The reason for this commonality among solutions is that the assets within the proposal are typically on the extremities of the network in isolated areas, with little alternative connections within the existing infrastructure. They also tend to be located at higher elevation than the supplying treatment works, thus requiring pumping.

██████ reservoirs are outliers to the above. This was due to their criticality within the supply network, their high level of interconnectivity with the surrounding infrastructure, and in the case of ██████ reservoir, it's large contribution to total available storage. The only potential means to create the redundancy in the network provided by the bypass proposal would be to construct new, equally sized tanks and the associated infrastructure mains connections to provide the same connectivity as the original supply tanks. The scale, cost, and impact of these works would be expected to be in the tens of millions of pounds and may not be feasible to operate within the network.

3 Need for enhancement investment

3.1 Definition of Base Expenditure and Enhancement Expenditure

OFWAT summarise the definition of ‘Base Expenditure’ and ‘Enhancement Expenditure’ in their document “Creating tomorrow, together: Our final methodology for PR24 – Appendix 9 – Setting expenditure allowances” (OFWAT, 2022). This summary is reproduced in Table 5.

Table 5: Definition of base expenditure and enhancement expenditure (OFWAT, 2022)

Expenditure type	Description
Base expenditure	<p>Base expenditure includes:</p> <ul style="list-style-type: none"> • routine, year-on-year costs, which companies incur in the normal running of their businesses to provide a base level of good service to customers and the environment; • expenditure on maintaining the long-term capability of assets; • expenditure to improve efficiency; and • expenditure to comply with current legal obligations. <p>Base expenditure covers wholesale and retail (residential and business) activities, and currently make up around 80% of all costs incurred by water companies.</p>
Enhancement expenditure	<p>Enhancement expenditure is generally where there is a permanent increase or step change in the current level of service to a new ‘base’ level and / or the provision to new customers of the current service level.</p> <p>Enhancement funding can be for environmental improvements required to meet new statutory obligations, improving service quality and resilience, and providing new solutions for water provision in drought conditions.</p>

3.2 Summary of OFWAT draft response

OFWAT specifies the following within its assessment as justification for their adjustment:

“The company does not provide sufficient and convincing evidence that there are no overlaps with base allowances and previously funded enhancement schemes. It is the company’s general duty to maintain its assets so that they are in a condition to deliver outputs as they were intended to meet and continue to be able meet its statutory obligations. Our base expenditure is for companies to deliver resilient services on a day-to-day basis”

OFWAT does acknowledge in their comments that the submission supports the criteria of enhancement expenditure through the submission of the Drinking Water Inspectorate (DWI) letter (PRT-2021-00001) and the maintenance of customer supplies during periods of service reservoir isolation.

3.3 Commentary

3.3.1 Overlaps with previously funded schemes

A review of the PR19 submission highlighted no proposals for projects at any of the reservoirs within the previous 5 -year Asset Management Plan period (AMP7).

PR19 was chosen as the comparator for this submission given the introduction of the 'Water Supply (Water Quality) Regulations 2016' and its subsequent Drinking Water Inspectorate guidance 'Guidance on the implementation of the Water Supply (Water Quality Regulations 2016 (as amended) in England and the Water Supply (Water Quality) Regulations (Wales) 2018' in the intervening period between the two submissions (PR19 and PR24).

Prior to the guidance being issued, there appears to be no specificity in relation to the required number or locations of sampling points required at service reservoirs to meet the regulations, and no requirement for Portsmouth Water to provide these.

A table of the previous proposals submitted by Portsmouth Water in PR19 is included below, and the relevant submissions are available on request to Portsmouth Water.

Table 6: Summary of PR19 projects reviewed for scope overlap

Line Component	Item	Base Cost	Uplifted Cost
SCHEME 1: VOC Monitors (12 Nos) Costs include operational Service Agreement (5-year cover). Acts as preventative measure to avoid oil pollution cascading into network and reservoir storage facilities.	MS001	£301,362	£369,093
SCHEME 3: Supplement flows into the Farlington Zone 1. Renew 20" main Quay Road /Eastern Way 730m. 2. Three new PRVs for Porchester SMA. 3. Flow Control Valve and Meter on Carmarthen Road. 4. Leigh Park PS upgraded for 3Mld, at head 31m (Costed in Scheme 07 or Add £45k) 5. Funtington valve connections to reconfigure. 6. Change status of distribution valves across network.	MS003	£1,064,399	£1,303,623
Scheme 6a – Hoads Hill to Gosport – Cross Connections 1. DN450 DI Manifold connections n under M27 J10 2. Kiln Road DN900-North Hill DN450 x-connection	MS006 (part)	£447,745	£548,375
SCHEME 7: Trunk Main Transfer - Nelson to Lovedean 1. Upgrade Leigh Park Booster to 8.6Mld (100 l/s) at 30m head. 2. Remove the NRV at Leigh Park Booster.	MS007	£205,422	£251,591
Total		£2,018,928	£2,472,682

3.3.2 Base expenditure versus enhancement expenditure

A comparison of the project scope presented in PRT07.04 versus the context highlighted in the expenditure definitions in Section 3.1 is reproduced in Table 7 (base expenditure) and Table 8 (enhancement

expenditure). This exercise allows a for simple review of the scope in relation to its definition within the OFWAT price review process.

Table 7: Comparison of base expenditure definition versus proposal scope

Base Expenditure

Context	Commentary	Definition Supported
<i>Routine, year-on-year costs, which companies incur in the normal running of their businesses to provide a base level of good service to customers and the environment;</i>	<p>The expenditure proposed is a one-off, single capital expenditure which markedly improves the service offered to customers.</p> <p>The base level of service has been provided for several years and is currently met by the assets within the scope, as evidenced by the exceedance of the ODI interruptions to supply target.</p> <p>The proposal improves resilience of the asset base against the risk of water quality incident within the service reservoirs.</p>	No
<i>Expenditure on maintaining the long-term capability of assets;</i>	<p>The long-term capability of the asset is not in question within the proposal.</p> <p>The objective of the scope is not to maintain or improve overall asset health and longevity which would fall within the base maintenance allowances.</p>	No
<i>Expenditure to improve efficiency;</i>	<p>The proposal is not intended as an efficiency improvement, however, the inclusion of VSDs on the pump stations may support a more efficient water supply network.</p>	No
<i>Expenditure to comply with current legal obligations</i>	<p>The proposal includes an element of compliance with legal obligations, i.e. the Water Supply (Water Quality) Regulations 2016.</p> <p>The proposal has also garnered support from the DWI to meet its guidance published in 2018.</p>	<p>Part – Only for the sampling point requirements.</p> <p>Variable Drive installation does not support this context within base maintenance expenditure.</p>

Table 8: Comparison of enhancement expenditure versus proposal scope

Enhancement Expenditure

Context	Commentary	Definition Supported
<i>Permanent increase, or 'step-change', in current level of service to a new 'base' level.</i>	Whilst not a step-change in the level of service provided to customers day to day, there is a significant change in the resilience of this service to customers.	Part – The base level of service is raised.
<i>Enhancement funding can be for environmental improvements required to meet new statutory obligations, improving service quality and resilience, and providing new solutions for water provision in drought conditions.</i>	The proposals include the requirements set out under The Water Supply (Water Quality) Regulations 2016 for sampling points. The proposal as a whole substantially improves the service quality and resilience of Portsmouth Waters distribution network.	Yes

The scope of PRT07.04 proposal lends itself to enhancement expenditure under the definitions given by OFWAT summarised in Section 3.1.

The proposal improves the resilience of Portsmouth Water's service offered to existing customers through the enhancement of multiple pump assets, installation of new service reservoir bypass infrastructure, and improved network monitoring within the distribution network. The additional sampling capability raises the standard of their service reservoir assets to meet the DWI guidance document released in 2018, ensuring they meet the statutory obligations set out in the Water Supply (Water Quality) Regulations 2016.

The proposal has little correlation with the explanation provided by OFWAT for base maintenance highlighted within Table 7. The focus of base maintenance expenditure is to ensure that the existing asset base of Portsmouth Water is adequately maintained to provide the current level of service to customers, typically through repeat CAPEX on the existing asset base directed at maintaining its long-term capability.

The scope of PRT07.04 proposal is focussed on improving the asset base with additional capability and improved resilience, via a single CAPEX delivery, therefore being more correlated with enhancement expenditure (Table 8).

4 Cost Efficiency

4.1 Summary of OFWAT draft determination response

OFWAT provide the following challenges to the cost efficiency of the service reservoirs proposal:

- 1) *"The company states that it has received third party assurance. However, there is no evidence of this or how this assurance applies to this enhancement case"*
- 2) *"The company states that third party engineering contractors have been used to generate cost estimates. However, the company does not provide evidence of the working of these contractors"*

A response to each of these challenges is provided in the following sections.

4.2 Third party assurance

No third-party assurance information was provided as part of this review.

4.3 Third party contractor pricing

The cost estimate within the PRT07.04 proposal is based on third party contractor pricing completed by Trant Engineering, a framework contractor for Portsmouth water.

The pricing information is contained in the following documents:

- Excel file “SW1044 PW PR24 Chapter 3 Tenderbook_Issue01_rev02”
- Scope document “Trant estimating sheet Rev_1Oct22_drop3”.

These documents are available within Appendix C and D respectively.

As part of this assessment, Arcadis carried out a review of the Trant pricing information and confirm that an itemised pricing schedule has been produced for each scheme along with a summary of the assumptions and exclusions accounted for as part of that pricing exercise.

The estimates are broken down into physical works, including Civil, Mechanical and Electrical, and Instrumentation, Control and Automation (ICA) works. Management and enabling works costs were applied as a percentage of the physical costs.

To benchmark the Trant prices included within the PTR07.04 proposal, Arcadis has developed an alternative estimate, based on the itemised breakdown provided by Trant and priced using 2024 market rates taken from market suppliers RS Group (<https://www.rsgroup.com>) for equipment, and the minimum labour rates from the Electrotechnical Joint Industry Board (<https://www.jib.org.uk/>). A summary of the cost comparison for the 4 sites selected is presented in Table 9.

Table 9: Comparison of a selection of Trant VSD prices versus available market rates.

Site	Trant Estimate	Market Rate total	Difference versus PRT07.04 price
██████████	██████████	██████████	██████████
██████████	██████████	██████████	██████████
██████████	██████████	██████████	██████████
██████████	██████████	██████████	██████████
██████████	██████████	██████████	██████████

Notes:

1. The prices used for the VSD market rates were collected from an external supplier, and where multiple drives of the correct size were available a representative median value was selected from the prices available.
2. No program information was available within the pricing, so assumptions for each installation have been included for.

The low total variance between the available market rate estimates and Trant estimating document indicates that the Trant estimations are in line with expected market prices. As a percentage, the Trant estimate is within 3.3% of the estimate using market rates and project assumptions.

We note that there is some variance within the projects based on the variable sizes of the VSDs. The Trant estimate appears to underestimate the market cost of the drives for [REDACTED] and overestimate the market rate for the [REDACTED] drives. This may be due to the size of the Racton drives being significantly larger than the other sites at 220kw, versus 5.5kw at [REDACTED] [REDACTED] for example.

The variance within the selection of projects gives confidence in the accuracy of their estimate and suggests that the estimates are in line with anticipated market costs for this work.

5 Summary

Following an independent review of the PRT07.04 proposal, supporting information and OFWATs draft determination, we conclude the following:

- PRT07.04 outlines a single solution for the need to provide sampling points at service reservoirs within Portsmouth Water’s potable water network (to ensure compliance with DWI regulations), as well as the provision of reservoir bypass facility to improve network resilience if a reservoir is taken out of supply.

Following a review of the Portsmouth Water network, the detailing of the next best alternative, and the cost estimation of these options, it can be concluded that **the proposed single solution option put forward by the PRT07.04 proposal is the most economically viable and suited to meet the needs of the organisation.**

- When considering previously submitted enhancement schemes within the PR19 submission and the definitions provided by OFWAT for Enhancement and Base Maintenance expenditures, the review showed that **the proposal aligned with the available definition of Enhancement Expenditure.** There is very little correlation with the definition of Base Maintenance, as highlighted within Table 7, whilst the scope supported strongly the context provided for Enhancement expenditure.
- One challenge from OFWAT regarding the cost efficiency of the proposal is that no evidence of the contractor pricing estimates was provided with the initial submission. This document was provided for review as part of this assessment and shows clearly the methodology undertaken for pricing the work by the framework contractor and should be supplied to OFWAT as part of any formal response. As part of this assessment a selection four schemes were independently priced, using market rates to enable a price comparison and proved that **the PRT07.04 prices included in the proposal were a robust estimate for works of this type and at this stage in the project lifecycle.**

Appendix A

Service Reservoir Options Table

Appendix B

Alternative Options Plan and Estimates

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Portsmouth Water proposal pricing scope

Appendix E

Portsmouth Water framework mains laying rates

A table with a grid header on the left and a large black redaction covering the main data area.A table with a grid header on the left and a large black redaction covering the main data area.

Portsmouth Water framework mains laying rates



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