Gate 2 Submission: Supporting Technical Report

Annex 13: Detailed Option Evolution Statement

6 December 2021

from Southern Water

Contents

1. Executive Summary

Detailed Option Evolution statements have been prepared in respect of the Selected Option and Back-Up Option, to articulate better what additional further work is necessary to undertake post Gate 2, in order to take forward the evolved versions of the Selected Option (B.4) and Back-Up Option (B.5).

This document should be read in conjunction with the Annex 10, Gate 3 Activity Plan, which provides further granularity to support the strategic positioning presented by this document.

This document builds upon the Outline OEPs for B.4 and B.5 (set out in Annex 12), which were prepared based on an assumed future need of 87 Ml/d as identified in the Future Needs Statement (FNS). The FNS concludes that the revised Supply Demand Balance (SDB) deficit that the Strategic Resource Option (SRO) needs to address equates to 87 Ml/d, and no further future needs are currently predicted to a horizon of 2040. A needs envelope of 87 – 95 Ml/d is presented in the Outline Option Evolution Plans (OEP), with details setting out how each option can evolve to meet the upper end of this range (95 Ml/d), which provides a further factor of safety and tolerance for future unknowns. The figure of 95 Ml/d was selected as it is also the maximum inflow that Otterbourne Water Supply Works (WSW) can treat and represents the maximum possible output of Option B.5 (limited by the feed of Final Effluent (FE) from Budds Farm (BF) and Peel Common (PC) Wastewater Treatment Works (WTW)).

The detailed evolution statements for the Selected and Back-Up Options, describe the activities Southern Water (SW) proposes to undertake in order to progress the evolved version of the Selected Option and to maintain the Back-Up Option as a suitable alternative, in case required. This includes describing additional work necessary to:

1. Better understand the evolution of both options in the context of Water Resource South East (WRSE) published results
2. Evolve consenting strategy
3. Evolve Direct Procurement for Customers (DPC) strategy
4. Add further detail to the schedule and delivery strategy
5. Resolve any emerging engineering challenges
6. Further refine cost impacts
7. Further refine carbon and environmental impacts and consider mitigation options
8. Identify and mitigate any additional risks.

2. Introduction & Context

The Options Appraisal Process (OAP) undertaken by SW has been primarily based on a need to provide resilience to a 1-in-200-year drought event, consistent with requirements under Water Resource Management Plan 2019 (WRMP19). The OAP work undertaken prior to the Interim Update identified Option B.4 as the Emerging Preferred Option (EPO) with Option B.5 as the Emerging Back-Up Option (EBO). Since the options were originally defined, more detailed work has been progressed and changes have arisen in the forecast final SDB for the Western Area, such that to achieve the 1-in-200-year drought resilience they will need to have higher Deployable Outputs (DO).

Additionally, there are major, longer-term pressures on the SDB, primarily achieving 1-in-500-year drought resilience by 2040 and then higher levels of environmental ambition beyond 2040.

The FNS (see Annex 12) considered these issues, identifying the DO that the SRO requires to satisfy the future need to a horizon of 2040, and the Outline OEP (Annex 12) explored how each option (D.2, B.2, B.5 & B.4) could evolve to deliver this DO.

The OAP has been tested and revalidated as described in Section 7 of Annex 5. The findings of the original Multi Criteria Decision Analysis (MCDA) Best Value rankings and Consent Evaluation were revisited in the context of potential additional impacts associated with the evolution of each option to meet the future need. This information was then used to re-evaluate the Legal and Policy Obligations as part of the Options Appraisal Revalidation.

The evolved Options have been evaluated in the context of the Adaptability Strategic Objective and the sensitivity review of the Consenting Evaluation and MCDA, as well as an updated assessment against Legal and Policy Obligations has been taken into account when revalidating the outcomes of the initial OAP (see Annex 5 for details).

Option B.4 was identified as the Selected Option with which to move forward at Gate 2 and Option B.5 identified as the Back-Up Option. Option B.5 will be progressed as the back-up solution as far as possible through 'piggy backing' on the primary solution development activities, given the underlying asset types are very similar. Gate 3 will likely be the latest gate where SW will reaffirm its commitment to the delivery of the Selected Option B.4 or to switch to the Selected Back-up Option B.5.

This document identifies and describes further work to be undertaken post Gate 2, in order to progress the evolved version of the Selected Option and to maintain the Back-Up Option as a suitable alternative, in case required and mitigate any identified risks. The document is intended to be read in conjunction with the Annex 10, Gate 3 Activity Plan.

The majority of activities described within this document are necessary to deliver an SRO that meets the revised SDB and will therefore need to be undertaken as part of standard Gate 3 progression, whilst a small number of activities are intended to further explore and inform future needs and are considered additive. These additive activities are highlighted.

A Detailed Option Evolution statement is presented for each of Option B.4 and Option B.5.

3. Detailed Option Evolution Statements

3.1. Selected Option – Option B.4

3.1.1. Introduction

The Detailed Option Evolution statement for the Selected Option provides a summary of additional activities, underway or planned, in order to progress the evolved version of the Selected Option and to maintain the Back-Up Option as a suitable alternative, in case required and mitigate identified risks.

The Detailed Option Evolution work builds upon the Outline OEP (Annex 12). The majority, but not all, of the activities described will be developed between Gate 2 and 3. Some additional activities may be added, if required, whilst others may be deemed unnecessary or superseded as option and future needs understanding develops.

3.1.2. Option B.4 Evolution

The FNS identifies a needs envelope of 87-95 Ml/d of raw water feeding Otterbourne WSW. Option B.4 can accommodate this need through combined delivery of:

1. Enhancing the capacity of the pumped transfer between Havant Thicket Reservoir (HTR) and Otterbourne WSW from 75 Ml/d to 95 Ml/d. This could either be achieved by installing larger diameter transfer pipes and infrastructure or increasing the pressure at which the raw water is transferred. Either is technically viable, but for the purposes of the Outline OEP, a larger pipe solution (from 800 mm to 1000 mm) was considered, as a worst-case scenario. This will ultimately be a decision for the Competitively Appointed Provider (CAP) to make, subject to meeting required performance specifications - for further details, see ‘Engineering Strategy’.
2. Enhancing the capacity of the associated pumping assets (secondary lift station and break tank) from 75 Ml/d capacity to 95 Ml/d.
3. Enhancing the capacity of the Water Recycling Plant (WRP) associated with Option B.4 from 15 Ml/d to c.20 Ml/d*. It is assumed that the location of the WRP would not change, but the footprint of the plant would increase proportionally. Similarly, it is assumed that no change would be required to the existing outfall at Eastney. This assumption will need to be tested - for further details, see ‘Engineering Strategy’.

*WRP capacity will be optimised as part of Gate 3 activities. This will include establishing Portsmouth Water’s (PW) needs post 2040 and the extent to which the WRP requires flexibility to accommodate future needs.

3.1.3. Joint Needs Establishment with Portsmouth Water

Early indications from WRSE Supply Demand Deficit results (as at November 2021) indicate that Portsmouth Water (PW) does not have a supply deficit before 2039, which necessitates accessing a raw water feed from HTR. This is consistent with PW’s WRMP19 document.

However, further work is required post Gate 2 to confirm PW’s needs beyond 2040. Once these needs are understood, consideration will be given to whether the SRO should provide any specific level of adaptability to accommodate these needs. This could include designing in such a way to maximise future flexibility e.g. modularising process elements and leaving room for future expansion or including specific hard engineering elements (e.g. pipe stubs) to facilitate future connections to be made.

This activity is considered additive to other Gate 3 progression activities and is solely required to further the understanding of future needs.

3.1.4. Consenting Strategy

The consenting strategy for Option B.4 will continue to be developed, as appropriate, as the Option is further defined though on-going scheme development and stakeholder engagement prior to Gate 3. Priority attention will be given to the consenting approach for the interface works with HTR. This will be developed in collaboration with PW, with a particular focus on delivery schedule alignment. This may potentially require interim planning applications, permissions and permitted development for the specific interface works prior to Gate 3. A comprehensive understanding of this approach will assist in confirming the overall approach to consenting for Option B.4, with the current preferred approach being the Development Consent Order (DCO) consenting regime.

It is not anticipated that the evolution of Option B.4 to meet a future need of 87-95 Ml/d will materially impact the current preferred consenting route, primarily due to the fact that the evolved Option footprint or capacity is not materially different to the original Option. Similarly, there is no substantial change to the nature of the proposed assets, they're simply marginally larger in capacity and footprint.

3.1.5. Procurement Strategy

It is not anticipated that there will be any change to the current proposed procurement strategy (i.e. current position assumes a DPC procurement route).

A DPC eligibility criteria assessment has already been undertaken for Option B.4, and a sensitivity assessment will be undertaken of these findings in the context of the evolution of Option B.4 to meet future needs. This will be undertaken during Q1 of 2022.

Further market engagement is proposed between January and April 2022 to better appraise potential tender participants of the status and development of the Water for Life Hampshire (WfLH) programme. As part of this round of engagement, participants will be appraised of the Selected Option and its proposed evolution to meet future needs and invited to comment. This insight and feedback will be considered in the development of the Selected Option to Gate 3.

3.1.6. Deliverability and Schedule

The phasing and schedule for the delivery of an evolved version of Option B.4 is not currently anticipated to materially change the current in-service delivery date of Q1 2030. Delivery schedules will be developed in more detail and further sensitivity testing undertaken to confirm delivery date and critical path activities. This will be undertaken during Q1-2 2022.

It is not currently envisaged that the delivery of an evolved version of Option B.4 will be phased as it is identical in concept to the unevolved version, with a project need which has already been consulted upon in the public domain. In the event that an emerging need materialises post 2040, it is anticipated that it will be too late for these needs to radically influence this SRO, beyond simple measures to maximise future flexibility as described in section 3.1.3. In this event, any further development work beyond simple future proofing measures will not be commenced until agreement is sought for this from Regulatory Alliance for Progressing Infrastructure Development (RAPID) and Ofwat to support this approach. These activities, should they materialise, will be additive to other Gate 3 progression activities and solely required to further the understanding of future needs.

3.1.7. Engineering Strategy

Modelling

The Outline OEP for the Selected Option identifies the need for the SRO to be capable of delivering between 87 and 95 Ml/d to Otterbourne WSW. Further work will be undertaken to refine this future need in order that engineering design can progress with certainty. This will include:

- Further refinement to the SDB deficit quantum.
- Further modelling refinements, in conjunction with PW.
- Understanding PW's post 2040 needs (see Joint Needs Establishment with PW section), to establish any opportunity to include simple measures that support future proofing the SRO (see section 3.1.3).
- Confirming the necessary capacity for the associated WRP (i.e. refining the 20 Ml/d capacity). For the purposes of scheme development to Gate 3 it is considered that progressing based on an envelope of 15 – 20 Ml/d will not hinder design development for the WRP. However, the refinement of WRP capacity will be prioritised.

It is anticipated that this work will be completed prior to Gate 3.

Engineering Design Development

Further work will be undertaken to optimise enhancing pipeline transfer capacity between Havant Thicket (HT) and Otterbourne WSW. This will be an asset strategy assessment establishing how capacity may be provided through installing a larger pipeline or increased using higher pipeline pressure. Frequency of pipeline usage will be established, enabling a pumping Whole Life Cost (WLC) to be compared with higher construction costs and other impacts associated with installing a larger pipeline. The outcomes of this study will be used to prepare the performance specifications; the ultimate decision around installing larger diameter pipes or applying higher pipeline pressures may be a decision for the CAP to make.

If a larger pipeline is installed (as opposed to increasing pipeline pressures), further work will be undertaken to establish any construction pinch-points potentially arising as a result of installing a larger pipeline, refining routings to mitigate these. Pumping station and break tank capacities, location and footprint will also be reviewed as pipeline design and hydraulic profiles are refined.

Design development work associated with the WRP will be progressed based on an envelope of 15 – 20 Ml/d until such time that the WRP capacity is refined (see modelling section). It is not considered that progressing on this basis will hinder design development, although layouts will be refined as soon as WRP capacity is confirmed.

A review will also be undertaken to confirm that the existing outfall at Eastney is suitable, and no further works are required in the event that the WRP capacity is increased from 15 Ml/d to 20 Ml/d.

These design development activities will be undertaken as part of general option development activities to Gate 3.

3.1.8. Cost Estimation

The cost estimation of evolving Option B.4 to meet future needs will be further refined, and as part of general option development activities to Gate 3.

3.2. Back-up Option – Option B.5

3.2.1. Introduction

The Detailed Option Evolution statement for the Back-Up Option provides a detailed summary of additional activities, underway or planned, in order to progress the evolved version of the Back-Up Option as a suitable alternative, in the event that the Selected Option cannot be progressed.

The Detailed Option Evolution work builds upon the Outline OEP (Annex 12). The majority, but not all, of the activities described will be developed between Gate 2 and 3. Some additional activities may be added, if required, whilst others may be deemed unnecessary or superseded as option and future needs understanding develops.

3.2.2. Option B.5 Evolution

The FNS identifies the need for 87-95 Ml/d of raw water feeding Otterbourne WSW. Option B.5 can accommodate this need through combined delivery of:

1. Enhancing the capacity of the pumped transfer between the WRP and Otterbourne WSW from 75 Ml/d to 95 Ml/d. This could either be achieved installing larger diameter transfer pipes and infrastructure or increasing the pressure at which the raw water is transferred. Either is technically viable, but for the purposes of this review, a larger pipe solution (from 800 mm to 1000 mm) has been considered. This will ultimately be a decision for the CAP to make, subject to meeting required performance specifications - for further details, see 'Engineering Strategy'.
2. Enhancing the capacity of the WRP associated with Option B.5 from 75 Ml/d to 95 Ml/d. It is assumed that the location of the WRP would not change, but the footprint of the plant would increase proportionally and additional flow buffering (tanks) would be required. Similarly, it is assumed that no change would be required to the existing outfall at Eastney. This assumption will need to be tested - for further details, see 'Engineering Strategy'.
3. Increasing the volume of the Environmental Buffer Lake (EBL) from 75 Ml to 95 Ml, in order to maintain 24-hours of buffering. For the assessment It was assumed that this would be located at Otterbourne WSW, simply by extending the proposed 75 Ml EBL however, it's possible that space constraints may necessitate the development of either a secondary small EBL or the relocation of the larger EBL. This assumption will need to be tested - for further details, see 'Engineering Strategy'.

3.2.3. Consenting and Environmental Strategy

The DCO regime is the current preferred consenting route for Option B.5 and the consenting strategy will continue to be developed, as appropriate, as the scheme is further defined though on-going scheme development and stakeholder engagement prior to Gate 3.

It is not anticipated that the evolution of Option B.5 to meet the 87-95 Ml/d future need will materially impact the current preferred consenting route, primarily due to the fact that the evolved Option footprint or capacity is not materially different to the original proposed Option. Similarly, there is no substantial change to the nature of the proposed assets, they're simply slightly larger in capacity and footprint.

As identified in the Engineering Strategy section of this document, urgent work is required to develop the EBL design to eliminate or mitigate the Habitats Regulation Assessment (HRA) driven risk associated with overflows from the EBL to environmentally sensitive receiving waters. This is a critical activity that will be undertaken during Q1 of 2022.

3.2.4. Procurement Strategy

It is not anticipated that there will be any change to the current proposed procurement strategy (i.e. current position assumes a DPC procurement route). It is not currently envisaged that the Back-Up Option will be presented as part of the further market engagement proposed between January and April 2022, and therefore no further developmental activities are planned.

3.2.5. Engineering Strategy

Environmental Buffer Lake (EBL)

Further work will be undertaken to identify the preferred location for the EBL extension at Otterbourne WSW (capacity sufficient to provide 24-hours storage). Spatial constraints may necessitate the development of more than one EBL, and this will be confirmed as a priority action during Q1/2 of 2022. Further work will also be undertaken to develop the EBL design(s) in order to eliminate or mitigate the HRA driven risk associated with overflows from the EBL to environmentally sensitive receiving waters.

Water Recycling Plant (WRP)

Further design development will be required to confirm necessary WRP capacity and high-level footprint at Site 72. This will be a high-level assessment to confirm that the larger process units associated with the 87-95 Ml/d plant can be accommodated at this location. This design development activity will be undertaken prior to Non-Statutory Consultation.

A review will also be undertaken to confirm that the existing outfall at Eastney is suitable, and no further works are required in the event that the WRP capacity is increased from 75 Ml/d to 87-95 Ml/d.

Pipelines

The design of the proposed pipeline between PC and the common route corridor requires some development to ensure that it is developed to the same level of maturity as other pipeline corridors being developed prior to Non-Statutory Consultation.

This design development activity will be undertaken as part of general option development activities and prior to Non-Statutory Consultation.

3.2.6. Cost Estimation

The cost estimation of evolving Option B.5 to meet future needs will be further refined, and as part of general option development activities to Gate 3.