

Gate 2 Submission: Supporting Technical Report Annex 12: Outline Option Evolution Plan

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from
**Southern
Water** 

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1. Executive Summary

The Outline Option Evolution Plan (OEP) has been prepared as part of an over-arching Future Needs Assessment (FNA), to better understand how each of the remaining Options following the Interim Update (B.2, B.4, B.5 and D.2) could be evolved to meet future water resource needs, and to provide a robust evidence base that supports the identification of a Selected Option and a Back-Up Option at Gate 2.

The Outline OEP incorporates a Future Needs Statement (FNS) that considers and sets out how the 1-in-200-year drought resilience need may evolve to a horizon of 2040. This includes:

1. Re-calculating the Supply Demand Balance deficit to reflect better information and understanding that has developed since the Interim Update
2. Considering the impact of moving to a 1-in-500-year drought resilience
3. Considering the implication of future Environmental Destination requirements (including Sustainability Reductions)
4. Setting out the WfLH response in the context of the wider regional need and WRSE response

The FNS concludes that the evolved WfLH SROs should be capable of producing raw water to meet a future need of 87 MI/d by 2040. A capacity envelope of 87 – 95MI/d is presented in the Outline OEP, with details setting out how each option can evolve to meet the upper end of this range (95MI/d), which provides a further factor of safety and tolerance for future unknowns.

A horizon of 2040 has been selected for the purposes of the FNS as beyond this date there are too many future uncertainties to be able to make an accurate prediction of future needs. The SRO is only one element within a much wider set of proposals and options to address the supply demand balance deficit, as part of the WRSE regional planning process.

Outline OEPs are then presented for each of the remaining options (B.2, B.4, B.5 and D.2). This shows that the only viable means of evolving Options B.2 and D.2 to meet a future need envelope of 87-95 MI/d would be to initially evolve them into Options B.5 and B.4 respectively, prior to evolving them further to meet the future need.

The Outline OEP for Option B.4 demonstrates that it is viable to evolve this option to meet the future need as follows:

1. Increasing the capacity of the transfer pipeline and associated pumping assets between Havant Thicket Reservoir and Otterbourne WSW from 75 MI/d to 87-95 MI/d
2. Increasing the capacity of the associated Water Recycling Plant (WRP) from 15 MI/d to 20 MI/d

The Outline OEP for Option B.5 demonstrates that it is viable to evolve this Option to meet the future need as follows:

1. Increasing the capacity of the transfer pipeline and associated pumping assets between the WRP and Otterbourne WSW from 75 MI/d to 95 MI/d
2. Increasing the capacity of the associated WRP from 75 MI/d to 87-95 MI/d
3. Increasing the capacity of the Environmental Buffer Lake at Otterbourne WSW from 75 MI to 95 MI

A technical evaluation is then presented for the evolved version of Options B.4 and B.5. This considers impacts of the evolved Options on the consenting risk and the conclusions of the Consenting Evaluation, deliverability and schedule, land availability, CAPEX, OPEX and carbon. To the extent achievable as part of a high-level outline assessment, it is concluded that from an environmental, planning and consenting, deliverability and land perspective, there is unlikely to be any substantial change to the conclusions and findings already presented as part of the Option Appraisal Process (Annex 5) at Interim Update.

From a CAPEX perspective, the evolved versions of both Options are considered likely to be c. 20% more expensive than the unevolved versions. In full operation, the OPEX and carbon impacts of the evolved versions of both Options are significantly more than the unevolved state however, this situation will only ever materialise in severe drought. In normal 'turnover' operation, the OPEX and carbon impacts associated with the evolved versions of Options B.4 and B.5 is not significantly more than in their unevolved states.

In terms of risk, it has been assumed that evolving these options does not drastically alter the current risk profile as defined within Section 7 Risk Management of the Annex 2, Water Recycling Technical and Annex 3, Havant Thicket Technical. From the technical assessments completed within this document, no additional significant risks have emerged, although this will be explored further post-Gate 2. Therefore, current identified risks for these solutions have not been duplicated within this document.

2. Introduction

As outlined in our Interim Update, the Options Appraisal Process (OAP) undertaken by Southern Water (SW) has been primarily based on a need to provide resilience to a 1-in-200-year drought event, consistent with requirements under 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 Supply Demand Balance (SDB) for the Western Area, such that to achieve the 1-in-200-year drought resilience the options will need to have higher deployable outputs. Section 3.1 explains the way in which each Option could evolve to deliver such higher deployable outputs, in line with the forecast need.

In addition to meeting the 1-in-200-year drought resilience requirements, 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 from 2040 onwards. These longer-term needs are being addressed through Water Resources South East's (WRSE) Regional Plan, and the Selected Option (SO) should be capable of playing its part within this wider, regional best value plan.

Further work was, therefore, required prior to identifying the Selected Option for reporting at Gate 2, to better understand the future need to be met, if and how each of the remaining Options following the Interim Update (B.2, B.4, B.5 and D.2) could be evolved to meet the increased DO requirement, and to provide a robust evidence base that supports the identification of a Selected Option and a Back-Up Option at Gate 2. This further work has included preparation of an Outline Option Evolution Plan (Outline OEP) for each Option, setting out the potential for each Option to evolve to meet the requirements of the identified future need. As part of this Future Need Assessment (FNA) work we have therefore prepared and considered:

1. The Future Needs Statement (FNS):
 - 1.1. the time horizon and need to be met by the Options
 - 1.2. how the on-going work of Water Resources South East's (WRSE) Regional Planning has been considered in the context of the further Options appraisal work undertaken prior to Gate 2, including Portsmouth Water's needs
2. Outline Option Evolution Plan:
 - 2.1. if and how each remaining Option could be evolved to meet the need described in the FNS
 - 2.2. how the capacity and sizing of each Option's components would need to change to deliver the required DO and providing a high-level consideration of how this may impact on matters such as Option footprint, CAPEX and OPEX, environmental matters and consenting and planning

This document presents an Outline OEP for each Option, detailing if and how the capacity and sizing of each Option's components would need to change to deliver the required DO and providing a high-level consideration of how this may impact on matters such as Option footprint, CAPEX and OPEX, environmental matters and consenting and planning.

Outline OEPs have not been prepared for the desalination family of solutions (A.1 and A.2) on the basis that these Options are not considered to be capable of consent in their current locations at the current time and are therefore no longer under consideration for the WfLH programme, as reported in the Interim Update. Similarly, Outline OEPs have not been prepared for any other Options (D.1, B.1 and B.3) that did not progress beyond the Interim Update.

3.Future Need Statement

3.1. Updated 1-in-200-year Supply Demand Balance

The Water Resources Management Plan 2019 sets out SW's response to the water supply challenge in the western region. The response consists of a strategic new supply source (SRO), new and increased bulk supplies from neighbouring water companies, demand management, and new strategic transfer pipelines across the region. A supply-demand balance (SDB) calculation was undertaken to define the effect that supply and demand interventions described in WRMP19 have on the supply-demand deficit. The calculation is used to inform the required deployable output of the SRO by calculating the residual deficit once all other elements of WRMP19 have been included. Further detail on the evolution and refinement of the SDB calculation can be found within Annex 4, Water Resources Modelling, of the Gate 2 submission and is summarised in the below table. This shows how the following key elements have impacted the size of the residual SDB:

- Improvements to the estimates of likely abstraction sustainability reductions
- Improvements to the calculation of future process losses and outages
- The removal of the Knapps Mill bulk supply scheme and reduction in the World's End supply scheme elements of WRMP19

Consequently, the revised residual deficit for the Hampshire Area is 83 MI/d as detailed in Table 2. This equates to 87 MI/d of raw water (i.e. required to be produced by the SRO), once process losses are included.

Table 1 - Revised Supply Demand Balance Deficit Calculation

		SUPPLY DEMAND DEFICIT (MI/d)			
		As originally consulted at WRMP19 submission	As stated at WfLH G1 Submission (Sept 20)	As stated at Interim Update (Sept 21)	Gate 2 FNA Revision (Dec 21)
Supply	Deployable Output	134.1	134.1	147.1	147.1 ¹
	Sustainability Reductions & Climate Change	-60.6	-60.6	-60.9	-68.9 ²
	Outage Allowance & Process Losses	-16.5	-5.3	-7.2	-7.5 ³
	Inter-company Transfers	4.7	4.7	4.7	4.7
	Baseline Supply	61.7	72.8	83.6	75.3 ⁴
Demand	Baseline Demand	218.0	218.0	218.0	218.0
Baseline Supply-Demand Deficit		156.4	145.2	134.4	142.7
WRMP19 Elements	Demand & Catchment Management	24.1	24.1	24.1	24.1
	Bulk Transfers	50.0	50.0	50.0	25.5 ⁵
	Supply Schemes	9.7	9.7	9.7	9.7
	Total WRMP19 Elements	83.8	83.8	83.8	59.3

	SUPPLY DEMAND DEFICIT (MI/d)			
	As originally consulted at WRMP19 submission	As stated at WfLH G1 Submission (Sept 20)	As stated at Interim Update (Sept 21)	Gate 2 FNA Revision (Dec 21)
RESIDUAL DEFICIT	72.5	61.3	50.5	83.4 ⁶

¹ Deployable Output = 147.1 MI/d. This figure was altered from G.1 following the inclusion of Wastewater Treatment Works discharges into the water resources model. This change provides more raw water in the modelled system and thus the calculated DO was increased.

²Sustainability Reductions and Climate Change = -68.9 MI/d. This figure has altered since IU submission following completion of the WINEP study at Tottiford and also on the Isle of Wight and there is now more certainty around implications of this. This shows that the main abstraction flows will be lost from the Tottiford site.

³Outage Allowance and Process Losses = -7.5 MI/d. Outage allowance was removed at G.1 submission with some returned following the FNA. There is now better understanding of how outage is applied across the system and this has been reflected in the revised figures which is consistent with the WRMP approach.

⁴Baseline Supply = 75.3 MI/d = 147.1-68.9-7.5+4.7

⁵Bulk Transfers = 25.5 MI/d. The change from 50 MI/d reflects the loss of Knapps Mill (20 MI/d) and anticipated reduction to World's End transfers.

⁶Residual Deficit = 83.4 MI/d = 142.7 (Baseline Supply-Demand Deficit) -59.3(Total WRMP19 Elements)

3.2. Additional Regional Needs

WRSE is finalising a draft Regional Plan on which it will consult in January 2022. This is an adaptive, best value plan, recognising the current large range of potential future environmental destinations for the region. The regional plan has been derived by considering the 2025 – 2100 planning horizon in three phases:

1. To 2040, during which a single scenario of a central, environmental destination is adopted and resilience to a 1-in-500-year drought is achieved
2. From 2040 to 2059, during which three environmental destination futures are considered
3. From 2060 to 2100, when longer term climate change and demand growth are considered the major uncertainties.

The Outline OEP, as part of the FNA, only considers future evolution to a horizon of 2040 as beyond this, there are too many future uncertainties to be able to make an accurate prediction of future needs. The SRO is only one element within a much wider set of proposals and options for infrastructure under consideration as part of the regional planning process which is considering these longer term planning horizons.

3.2.1. The Impact of Moving to 1-in-500-year Drought Resilience

The latest Water Resource Planning Guidelines¹ require water companies in England to plan to achieve, before 2040, a level of resilience in our supply system equivalent to a 0.2% (equivalent to a 1-in-500-year) annual chance of failure caused by drought. Failure is defined as implementing an emergency drought order such as the imposition of rota cuts or standpipes.

The more extreme drought scenario could increase the supply demand deficit due to less resource being available than in a 1-in-200-year severe drought event. However, the supply forecast used to calculate the updated, residual supply demand deficit (83MI/d), as set out in Section 3.1 above, incorporates future, likely sustainability reductions (see Sustainability Reductions and Climate Change line) which mean that they are not available in a severe drought and hence there is no further loss when considering an extreme drought. Details of the sustainability reductions under the different environmental destination scenarios are provided in Table 3 below.

The additional 1-in-500-year drought resilience need will be, to some extent, offset by the continuation of the water efficiency and leakage reduction programmes planned for the area. Whilst population and economic growth will increase the baseline demand for water, the forecast net impact is a reduction in demand of approximately 5MI/d from 2030 to 2040.

3.2.2. Portsmouth Water's Needs

Portsmouth Water (PW) provides a number of key components of the WRMP19 plan (notably 45 MI/d of planned or existing bulk transfers exported via the River Itchen Water Treatment Works/Gators Mill – this includes the planned 21MI/d potable water transfer) to meet Southern Water's needs in the Western Area. As such it is important to understand how their future needs may impact the long-term availability of these supplies or could influence the design of the SRO. In WRMP19 PW forecasts a supply demand deficit and is investing in the World's End borehole supply and some further DO resilience schemes.

However, latest WRSE modelling results indicate that PW does not have a water resource demand from the new Havant Thicket Winter Storage Reservoir until at least 2040. For the purposes of the FNA it is therefore assumed that to 2040, HT can be used to provide bulk supplies to SW, and this is the subject of separate and on-going Bulk Supply Agreement negotiations.

However, the move to extreme drought resilience and increased environmental ambition may mean that Portsmouth Water could forecast a deficit in the future, under certain scenarios.

3.2.3. Future Environmental Destination and Requirements

The Water Resource Planning Guideline states that regional groups and water companies should work with regulators and others to agree a long term destination for environmental improvement and sustainable abstraction. It says that this should include providing greater environmental protection for sensitive habits including chalk rivers, and that the ambition should also consider the role that climate change may have on reducing availability of flows to both supply and environmental needs. Achieving the environmental ambition should also align with regional planning environmental goals.

¹ Environment Agency Ofwat and Natural Resources Wales, 2021, Water Resources Planning Guideline Version 9: For publishing

The Environment Agency (EA) has proposed five environmental destination scenarios for 2050 based upon different levels of regulatory protection and intervention ranging from “Business as Usual” (BAU) to the most stringent protections being provided under their “Enhanced Scenario”. These are quantified in Table 3.

Water Companies are also able to define their own environmental ambition scenarios in discussion with the regional groups and the EA. We have proposed two scenarios referred to as our “central” and “alternative” scenarios, consistent with WRSE. These represent a plausible most likely outcome based on our emerging WINEP outcomes (“central scenario”) and a more conservative (“alternative”) scenario which provides greater protection for the River Itchen in particular, as well as taking into account the latest view on the Rivers Test and Itchen Common Standards Monitoring Guidance (CSMG) flow targets. Note that this work is still at development and discussion stage with the EA and WRSE as part of our live WINEP investigations and as of December 2021 has not all been published.

Central Environmental Destination Scenario

Our central scenario is broadly consistent with the reductions assumed in arriving at the residual deficit in Section 3.1 for the SRO solution. The scenario recognises the emerging outcomes of our current WINEP investigations into our abstraction impacts and “No Deterioration” risks, particularly for sources which impact upon the River Itchen and its associated tributaries and Wetlands. The key difference between the current modelling assumption for the SRO scheme (i.e. 69 MI/d allowance for most likely future sustainability and climate change reductions, to 2040) and our central scenario is that the latter considers that additional sustainability reductions are likely to be required after 2040 to achieve full flow compliance on the River Itchen, even if CSMG standards are not applied.

Alternative Environmental Destination Scenario

Our alternative scenario goes further than our central scenario to provide the greater level of environmental protection, including application of a stress test scenario to understand the supply-demand and investment challenges if all our abstractions impacting the River Itchen SSSI and SAC were to cease. This scenario also further considers “No Deterioration” risks to our Hampshire Kingsclere, Hampshire Rural and Isle of Wight Water Resource Zones.

Modelling to Date

So far, the supply-demand and investment modelling for WRSE has focused on evaluating the four future environmental destination scenarios:

- WRSE BAU+;
- WRSE Enhanced;
- Southern Water Central; and
- Southern Water Alternative.

The range of sustainability reductions considered by the SRO deficit modelling and the potential environmental destination scenarios is detailed in the following table.

Table 2 - Differences in the magnitude of possible future sustainability reductions for each Environmental Ambition Scenario

Scenario	Baseline Assumption for SRO deficit Modelling	Net difference to baseline assumption by Environmental Destination Scenario			
		WRSE BAU+	WRSE Enhanced	Southern Water Central	Southern Water Alternative
Magnitude	-69 MI/d	+33.1 MI/d	+18.9 MI/d	-13 MI/d	-36.1 MI/d
Comments	Current FNS assumption for SRO modelling, core assumptions are consistent with our Central scenario	Lowest environmental protection assumes no change to regulatory regime. Doesn't reflect full DO impact	Includes CSMG impacts but these are now superseded Doesn't reflect full DO impact	Full recognition of DO impacts, Accounts for emerging WINEP outcomes. Additional protection for the River Itchen post 2040.	Most Ambitious, no abstraction from River Itchen Catchment

As noted above, 69 MI/d of sustainability reductions is already incorporated in the baseline assumptions that contribute to the calculation of the residual deficit (83 MI/d). This is broadly consistent with our central scenario and any further reductions and their possible timings are currently uncertain and hence are considered as part of the adaptive planning approach within the WRSE regional plan development. This avoids over sizing assets in the short term for uncertain needs and for which alternative solutions can be more efficiently delivered in the future, as uncertainties reduce.

3.3. WRSE Regional Plan Alignment

The increase in drought resilience and longer-term potential future environmental destinations are driving SDB deficits far greater than those forecast at WRMP19. Using the regional plan to support holistic consideration of the challenges will ensure that both existing and future sources are used most efficiently across all companies, to form a best value plan.

The emerging WRSE regional plan, that is to be consulted on in January 2022, currently includes a WRP feed into Havant Thicket reservoir and a raw water transfer of up to nearly 90MI/d from the reservoir to Otterbourne WSW and onwards to the wider Hampshire Supply Area. The scheme is selected early in the planning horizon and is in line with our increased capacity, evolved Option B.4. The WRSE programme appraisal is being undertaken within the investment model which has adopted assumptions around the profile of deficits under the various scenarios to enable it to compare options and make selections. Similar assumptions have had to be made regarding some of the options to estimate their deployable outputs under normal and critical periods across the drought scenarios. The selected schemes will therefore subsequently require further modelling alongside the existing supplies within the water resources model to confirm actual utilisations as an integrated water supply system. Importantly, modelling will be required to confirm the size of the WRP required to feed Havant Thicket to enable it to provide the intended resource across the scenarios, and in consideration of the filling from Bedhampton Springs and utilisation of its storage capacity. We have undertaken this modelling as outlined in Annex 4 to size the WRP for option B4. This will need to

be refined, using the regional water resource model to replicate the combined SW and PWS needs and regional plan solution.

3.4. Future Need Statement – Conclusion

As outlined above in Table 3, the revised, residual Supply Demand Balance deficit of 83 MI/d (87 MI/d raw water, allowing for process losses) proposed for the evolved SRO, through the FNS work, already incorporates 69 MI/d of future abstraction sustainability reductions. The realisation, locations, timings and sizes of these reductions will be determined as investigations and appraisals are concluded. The overall assumed reduction is broadly consistent with Southern Water’s Central Scenario and as such incorporates those likely by 2040. These reductions will impact water availability in both severe and extreme droughts, thereby reducing the need of moving to 1-in-500-year drought resilience in this period. Beyond 2040, the WRSE adaptive plan considers a wide range of future deficits for which best value solutions will evolve as the uncertainties reduce.

It is therefore proposed that the evolved SROs should be capable of producing 90 MI/d of raw water to meet a future need of 87 MI/d. It would therefore be capable of satisfying the Future Need as stated by SW modelling, as well as aligning to WRSE draft results, to a 2040 horizon.

4. Outline Option Evolution Plans

The Outline OEPs set out in this section provide a high-level view of how each remaining Option (B.2; D.2; B.5; and B.4) could evolve to meet the future need as described in the FNS (i.e. the delivery of 87-90 MI/d of raw water to Otterbourne Water Supply Works), and provides a high-level summary of the resulting evolved Option footprint, CAPEX, OPEX, sensitivity test of the Consenting Evaluation and any implications for the consenting strategy

However, an additional consideration which was used within development of the OEPs was that as all remaining options under consideration (D.2; B.4; B.2; B.5) will deliver raw water to Otterbourne WSW, which has a process capacity ceiling of 95 MI/d, specifying the SRO to accommodate up to 95 MI/d would also provide a factor of safety and tolerance for any future unknowns. The envelope used in consideration for the OEPs was established as 87-95 MI/d. Given the range of future needs described, the 'worst-case' scenario (i.e. 95 MI/d) at the upper end of the envelope, identified by the restrictions at Otterbourne WSW, has been used to estimate resulting impacts on CAPEX and in the context of the Consenting Evaluation Update and MCDA sensitivity test.

The Outline OEPs have been used to develop and present a more robust understanding of the potential to evolve each Option and the impacts (including costs and benefits) associated with doing so, which has been taken into account in the context of the evaluation of the evolved Options against the Adaptability Strategic Objective (see Section 5 of Annex 5, Option Appraisal Process) and as part of the testing and revalidation of the initial OAP findings.

4.1. Option B.2

4.1.1. Outline of Option Evolution

Option description

Option B.2 provides a new Water Recycling Plant (WRP) with a capacity of 61 MI/d and recycled water transfer to Otterbourne Water Supply Works (WSW), via a c. 35km 800mm diameter transfer pipeline. An Environmental Buffer Lake is proposed at Otterbourne Water Supply Works, providing a minimum of 24-hours attenuation storage for the incoming raw water. Final effluent (FE) will be delivered to the WRP from Budd's Farm Wastewater Treatment Works.

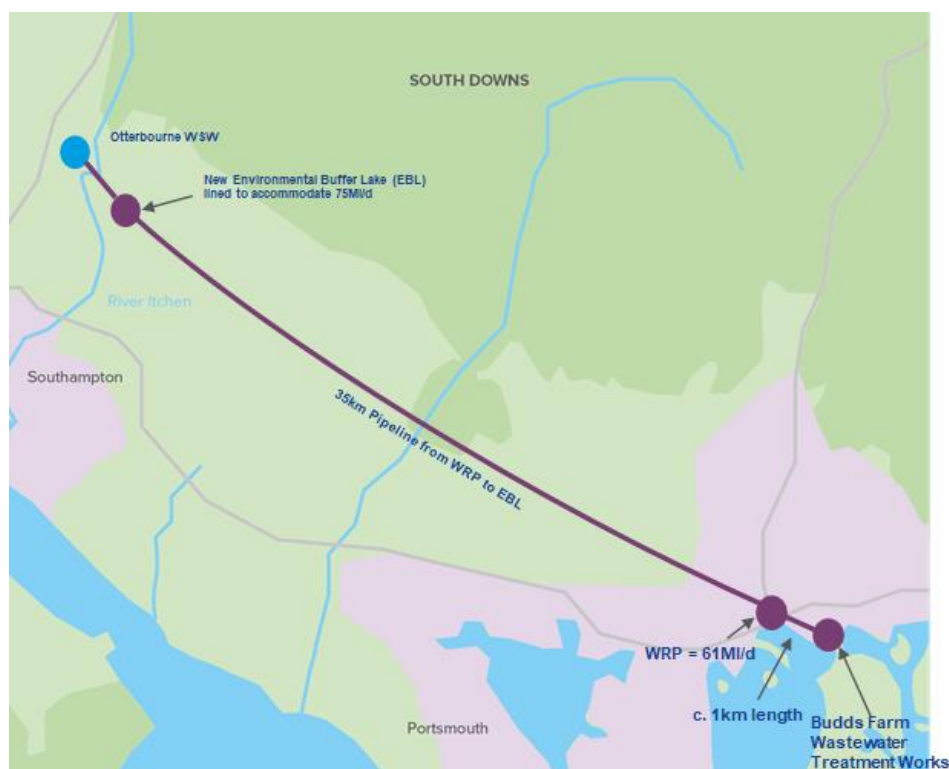


Figure 1 - Schematic of Option B.2

Potential to evolve Option B.2 to meet future need

The anticipated worst case potential future need, as defined in the FNS, requires the evolution of Option B.2 to deliver up to 95 MI/d of raw water to Otterbourne Water Supply Works (WSW), i.e. an additional 34 MI/d as compared its current planned capacity. Note that this is, in effect, the evolved version of Option B.5.

Potential additional raw water sources

To support the evolution of Option B.2 to accommodate the future need, the additional 34 MI/d raw water source could include:

1. Supplementing the supply of Otterbourne WSW with other regional raw water sources
2. Supplementing the supply of Otterbourne WSW via a bulk supply of water from another water company
3. Increasing the capacity of the proposed WRP to 95 MI/d

Supplementing the supply of Otterbourne WSW with another source

Although feasible from a technical perspective, it is considered highly unlikely that the diversion of another raw water source to feed Otterbourne WSW would be acceptable to environmental regulators and other stakeholders as a long-term solution, or from an HRA perspective. This was most recently explored and discussed with RAPID as part of the mitigation measures considered for the early fill of Havant Thicket and no alternative sources were identified. Furthermore, it is likely that any diversion of raw water from other sources would require relatively long-distance transfers to Havant Thicket and would not be viable to deliver within the necessary timeframe.

For these reasons it is not considered that supplementing the supply to Otterbourne WSW with another raw water source is viable or warrants further investigation.

Supplementing the supply of Otterbourne WSW via a Bulk Supply from another water company

The bulk transfer of water from another water company is considered technically viable however, no viable Options are identifiable that are considered capable of bringing into commission within the necessary timeframe. The Thames to Southern Transfer is planned to be in commission by 2039 and has the potential to deliver substantial volumes of raw water to the SW region. Other planned transfers such as the Knapps Mill source (20 MI/d from South West Water) are no longer possible due to other environmental considerations, as explained in the FNS.

Therefore, it is not considered that supplementing the supply of Otterbourne WSW by bulk supply from another water company can be achieved within the necessary timeframes. For these reasons it is not considered that augmenting the fill of Havant Thicket by bulk supply from another water company is viable or warrants further investigation

Increasing the capacity of the proposed WRP to 95 MI/d

Increasing the capacity of the planned 61 MI/d WRP associated with Option B.2 to accommodate a 95 MI/d WRP is considered technically viable. It would require an additional feed from Peel Common Wastewater Treatment Works (WTW) as insufficient FE is generated at Budd's Farm WTW, and this additional feed is already a component of Option B.5. As such, were Option B.2 to be evolved using a larger capacity WRP to achieve the requirements laid out in the FNS, it would effectively become an evolved version of Option B.5.

Option B.5 has its own Outline OEP and therefore, this should be referred to for details of the evolved version of Option B.5.

4.2. Option D.2

4.2.1. Outline of Option Evolution

Option description

Option D.2 provides a direct raw water transfer from Havant Thicket reservoir up to a peak capacity of 61 MI/d via a new proposed c. 35km 800mm pipeline to Otterbourne Water Supply Works (WSW). Raw water will be abstracted from the reservoir and lifted via a high-lift pumping station to Otterbourne WSW. Subject to the final pipeline route, topography and hydraulics, a further booster station and break tank may be necessary part way along the route. Option D.2 already includes a pipeline and pumping station sized to accommodate up to a 75 MI/d transfer.



Figure 2 - Schematic of Option D.2

Potential to evolve Option D.2 to meet future need

The anticipated worst case potential future need, as defined in the FNS, requires the evolution of Option D.2 to deliver up to 95 MI/d of raw water to Otterbourne Water Supply Works (WSW), i.e. an additional 44 MI/d as compared its current planned capacity ($51\text{MI/d} + 44\text{MI/d} = 95\text{MI/d}$).

Therefore, in order to meet the necessary future need requirement of 95 MI/d, Option D.2 would need to evolve to include an additional source 'top-up' to Havant Thicket reservoir, to ensure that it is sufficiently resilient to accommodate predicted future need. Modelling indicates that a 15-20 MI/d top up source would be required in order to meet the future need.

Potential 'top-up' sources

To support the evolution of Option D.2 to accommodate the future need, the additional 15-20 MI/d 'top-up' source to Havant Thicket would augment Bedhampton Springs (40 MI/d during winter) in filling the reservoir, ensuring adequate source inflow and preventing the reservoir from emptying prior to the drought event ending. Note that this is, in effect, the evolved version of Option B.4.

Possible 'top-up' sources providing a secondary source for filling Havant Thicket reservoir include:

1. Diverting other regional raw water sources to support Bedhampton Springs in filling the reservoir
2. The bulk supply of water from another water company
3. Augmenting the filling regime with recycled water

Diverting other regional raw water sources to fill Havant Thicket

Although feasible from a technical perspective, it is considered highly unlikely that the diversion of another raw water source to support the filling of Havant Thicket would be acceptable to environmental regulators and other stakeholders as a long-term solution, or from an HRA perspective. The viability of such a solution has been previously discussed with the EA and Natural England in the context of identifying a source in the short term to support the early fill of Havant Thicket, but not as a long-term solution. Furthermore, it is likely that any diversion of raw water from other sources would require relatively long-distance transfers to Havant Thicket.

For these reasons it is not considered that augmenting the fill of Havant Thicket by diverting other raw water sources is viable or warrants further investigation.

The bulk supply of water from another water company

The bulk transfer of water from another water company is considered technically viable however, no viable options are identifiable that are considered capable of bringing into commission within the necessary timeframe. The Thames to Southern Transfer is planned to be in commission by 2039 and has the potential to deliver substantial volumes of raw water to the SW region. Other planned transfers such as the Knapps Mill source (20 MI/d from South West Water) are no longer possible due to other environmental considerations, as explained in the FNS.

Therefore, it is not considered that augmenting the fill of Havant Thicket by bulk supply from another water company can be achieved within the necessary timeframes. For these reasons it is not considered that augmenting the fill of Havant Thicket by bulk supply from another water company is viable or warrants further investigation.

Augmenting Havant Thicket with recycled water

The augmentation of the fill of Havant Thicket using recycled water is considered technically viable and is being progressed as part of Option B.4 which is, in effect, already an evolution of Option D.2 as it includes an identical transfer arrangement (Havant Thicket-Otterbourne) to D.2 and only differs in respect of the inclusion of a 15 MI/d WRP.

Option B.4 has its own Outline OEP and therefore, this should be referred to for details of the evolved version of Option B.4.

4.3. Option B.5

4.3.1. Outline of Option Evolution

Option description

Option B.5 provides a new Water Recycling Plant (WRP) with a capacity of 75 MI/d and recycled water transfer to Otterbourne Water Supply Works (WSW), via a c. 35km 800mm diameter transfer pipeline. A 75MI Environmental Buffer Lake is proposed at Otterbourne Water Supply Works, providing a minimum of 24-hours attenuation storage for the incoming raw water.

FE will be delivered to the WRP from a combination of Budd's Farm and Peel Common Wastewater Treatment Works. The notable difference between this Option and Option B.2 is the higher capacity WRP (including a larger WRP footprint), necessitating an additional FE transfer from Peel Common via a 25km pipeline.

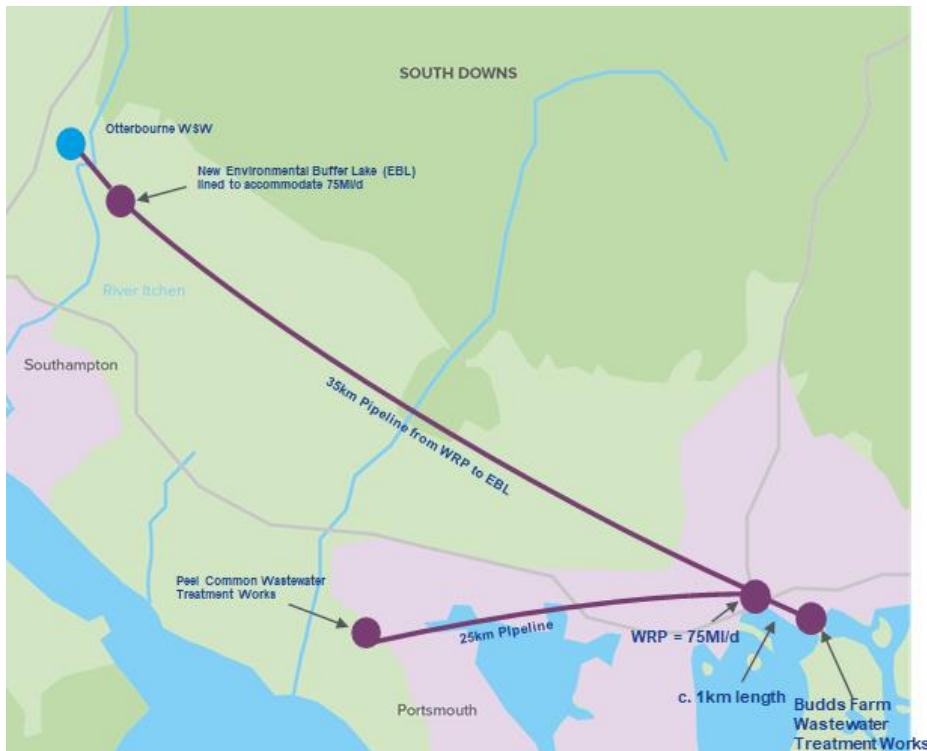


Figure 3 - Schematic of Option B.5

Potential to evolve Option B.5 to meet future need

The anticipated worst case potential future need, as defined in the FNS, requires the evolution of Option B.5 to deliver up to 95 MI/d of raw water to Otterbourne Water Supply Works (WSW), i.e. an additional 20 MI/d as compared its current planned capacity.

Potential additional raw water sources

To support the evolution of Option B.5 to accommodate the future need, the additional 20 MI/d raw water source could include:

1. Supplementing the supply of Otterbourne WSW with other regional raw water sources

2. Supplementing the supply of Otterbourne WSW via a bulk supply of water from another water company
3. Increasing the capacity of the proposed WRP to 95 MI/d

Supplementing the supply of Otterbourne WSW with another source

Although feasible from a technical perspective, it is considered highly unlikely that the diversion of another raw water source to feed Otterbourne WSW would be acceptable to environmental regulators and other stakeholders as a long-term solution, or from an HRA perspective. Furthermore, it is likely that any diversion of raw water from other sources would require relatively long-distance transfers to Havant Thicket and would not be viable to deliver within the necessary timeframe.

For these reasons it is not considered that supplementing the supply to Otterbourne WSW by with another raw water source is viable or warrants further investigation.

Supplementing the supply of Otterbourne WSW via a Bulk Supply from another water company

The bulk transfer of water from another water company is considered technically viable however, no viable options are identifiable that are considered capable of bringing into commission within the necessary timeframe. The Thames to Southern Transfer is planned to be in commission by 2039 and has the potential to deliver substantial volumes of raw water to the SW region. Other planned transfers such as the Knapps Mill source (20 MI/d from South West Water) are no longer possible due to other environmental considerations, as explained in the FNS

Therefore, it is not considered that supplementing the supply of Otterbourne WSW by bulk supply from another water company can be achieved within the necessary timeframes. For these reasons it is not considered that augmenting the fill of Havant Thicket by bulk supply from another water company is viable or warrants further investigation.

Increasing the capacity of the proposed WRP to 95 MI/d

Option B.5 can accommodate this need through:

1. Enhancing the capacity of the pumped transfer between the WRP and Otterbourne WSW from 75 MI/d to 95 MI/d. This plant would continue be fed by Peel Common and Budd's Farm and would use all available Final Effluent. 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 800mm to 1000mm) has been considered, as representing a worst case scenario.
2. Enhancing the capacity of the WRP associated with Option B.5 from 75 MI/d to 95 MI/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.
3. Increasing the volume of the Environmental Buffer Lake (EBL) from 75MI to 95 MI, in order to maintain 24-hours of buffering. For the purposes of this review, it is assumed that this can be located at Otterbourne WSW, simply by extending the proposed 75MI EBL. However, it is possible that space constraints may necessitate the development of a separate small footprint 20MI EBL.

All three upgrades would be required to satisfy the forecast future need requirement of up to 95 MI/d.

4.3.2. Technical Evaluation

The potential impact of the evolution of Option B.5 to accommodate the future need in the way described above is considered by subject area below.

Consenting Evaluation Update A sensitivity review of the previous Consenting Evaluation for Option B.5 has been undertaken, based on the evolved Option as described above and the works needed to facilitate the future needs. As part of this an assessment has been made to determine if the original RAG scores for Option B.5 have changed (see Annex 5, Option Appraisal Process, for original scoring).

The following table presents the Consenting Evaluation criteria e.g. air quality, biodiversity, the phase of scheme e.g. construction or operation (where relevant), for Option B.5, the original RAG scores presented in the Interim Update; the RAG scores predicted for the evolved Option; and the justification for any change or no change in the RAG scoring.

RAG definitions are detailed as follows.

Table 3 - RAG Scores and Definitions

Score	Definition
Substantial adverse	Potential for substantial consenting risks that are likely to be very challenging to overcome/mitigate. Impacts are likely to be unacceptable and will fail to meet required legal/policy tests based on current information.
Large adverse	Potential for major consenting risks. Impacts are likely to require significant mitigation but are potentially acceptable from legal/policy perspective. A case may need to be made e.g. balance of benefits against impacts but could be justified.
Moderate adverse	Potential for moderate consenting risks that will require the development of bespoke mitigation to address, but likely to be achievable and acceptable in policy terms i.e. policy compliance can be achieved.
Minor adverse	Potential for minor consenting risks that will require application of standard best practice.
Positive Impact	Potential for positive performance against policy.
No impact	Does not require appraisal and can be scoped out as not relevant to the Option e.g. no receptors within policy wording that could be affected.

The following table details each of the criteria considered in the consenting evaluation for Option B.5, the previous RAG score, the predicted future needs RAG score and justification for the future needs RAG score.

Table 4 - Future Needs v Option B.5

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
Air Quality and Emissions	Construction	Minor	Minor	Accommodating future needs may require additional construction vehicles compared with the current B.5 Option. This is due to larger pipework being needed, a larger WRP or potentially a larger or second EBL. There would continue to be a requirement for relevant traffic and air quality assessments to be undertaken and the level of consenting risk would remain unchanged during construction. During operation there would be no changes that would result in emissions to air and so the
	Operation	No impact	No impact	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				level of consenting risk would remain the same.
Biodiversity - Terrestrial Habitats Regulations Assessment	Construction	Major	Major	The proposed change to the WRP footprint would not change the HRA screening findings for Option B.5. In addition, the HRA assessment was based on an assumed maximum working corridor width (30m) rather than assessing a specific pipeline diameter, therefore, the findings for this matter are considered to remain valid during construction.
	Operation	Major	Major	<p>The watercourse crossings required to construct the pipelines to connect to Otterbourne have the potential to affect priority chalk stream habitats and SACs and this was a factor in assigning the major consenting risk for this Option during construction. The pipeline route connections remain unchanged and therefore this level of consenting risk would remain during construction.</p> <p>The previous evaluation also identified major consenting risks associated with the construction and operation of the EBL. The 1-in-500-year scenario would require potentially a larger EBL or a secondary EBL and therefore these issues would remain during construction and operation.</p> <p>A key risk associated with the EBL was the potential impact of emergency discharge on the River Itchen SAC during operation. It was considered likely however that mitigation, supported by further design/modelling and evidencing, would allow significant adverse effects to the River Itchen SAC to be avoided. Since the interim gate, further consideration has been given to the ability to design out this risk and therefore a number of Options are under consideration. These require further analysis but there is considered potential for this impact to be avoided. Furthermore, there is a parallel exercise in progress as part of the scheme development work to identify potential alternative locations for the EBL. Therefore, the level of consenting risk would not change although further work is required in the event of this Option being taken forwards to resolve this issue as it is the main consenting risk for this Option.</p>
Biodiversity - Terrestrial	Construction	Major	Major	Construction working widths to build the pipeline would not need to change to accommodate future needs. Therefore, construction land take for the pipeline would be similar to the current B.5 Option.
	Operation	Major	Major	
Biodiversity - Marine Habitats Regulations Assessment	Construction	Moderate	Moderate	Refer to the narrative above for the EBL. Accommodating future needs would not change the results and analysis scores for
	Operation	Moderate	Moderate	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				<p>Option B.5 as pollution and disturbance risks would remain the same during construction.</p> <p>It is noted however that a larger WRP may generate a greater level of impact (e.g. longer construction period, closer proximity to the marine areas of the Chichester and Langstone Harbour SPA/Ramsar) etc when assessed during the project level HRA, however, this would not be enough to change the consenting risk from moderate to major during construction or operation.</p> <p>The BAU flow would remain unchanged from the 1-in-200-year year scenario and therefore there is no anticipated change to the discharge from the Eastney LSO during operation.</p> <p>In terms of the maximum design flow, it is assumed that a 95 MI/d WRP is likely to be no worse than a 75 MI/d WRP (as previously modelled) however this would need to be confirmed through further modelling. On the basis of the current information there would be no change to the consenting risk during operation.</p>
Biodiversity - Marine	Construction	Moderate	Moderate	<p>Accommodating future needs would not change the previous results and analysis scores during construction or operation for Option B.5 as pollution and disturbance risks would remain the same. The above results for marine HRA re BAU and maximum design flows also apply here.</p>
	Operation	Moderate	Moderate	
Carbon	Whole life	Moderate	Moderate	<p>Whilst there would be changes to the previous average and maximum operating scenario whole life carbon results (potential increases) they are not considered likely to be sufficiently different to change the level of consenting risk.</p>
Coastal Change	Construction	No impact	No impact	<p>Accommodating future needs would not change the consenting evaluation during construction or operation. The Option would still fall outside of the CCMA.</p>
	Operation	No impact	No impact	
Geology and Soils	Construction	Moderate	Moderate	<p>Land take would remain the same to construct the pipeline and the risks to the WRP and potential contamination would remain during construction. Risks resulting from the location of the potential new EBL would need to be explored further although this would not change the level of consenting risk.</p>
	Operation	No impact	No impact	
Historic Environment - Terrestrial	Construction	Moderate	Moderate	<p>Accommodating future needs would not change the consenting evaluation during construction or operation.</p> <p>Although potentially more construction traffic may be needed and the WRP footprint would be slightly larger, on balance the level of consenting risk would remain the same and there would be a continued need for further cultural heritage assessment to ensure that the</p>
	Operation	Minor	Minor	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				<p>level of archaeological risks and the impacts to built heritage are assessed and mitigated. The pipeline working width would also remain the same and therefore effects during construction would not change.</p> <p>The location of a larger or a secondary EBL may potentially affect heritage assets during construction and operation, however, it is assumed they would be sensitively located to avoid direct effects on heritage assets and minimise indirect effects. On balance the level of consenting risk would remain the same and there would be a continued need for further cultural heritage assessment to ensure that the level of archaeological risks and the impacts to built heritage are assessed and mitigated. It should be possible to manage these risks through the ongoing scheme development work and the risks are considered no greater for the future needs scenario.</p>
Historic Environment - Marine	Construction	No impact	No impact	There would be no new marine infrastructure works to accommodate future needs as per the current B.5 Option. Therefore, there would be no change to the consenting evaluation during construction or operation.
	Operation	No impact	No impact	
Landscape and Visual Amenity	Construction	Major	Major	<p>Accommodating future needs would not affect the land take to construct the pipeline although the WRP footprint would be slightly larger. The WRP would be located in an industrial context and the proposed site parcel is reasonably well screened by boundary vegetation. The pipeline routes for Option B.5 would directly affect the South Downs National Park and the routes and working widths of the pipelines would be the same for the future needs scenario. Therefore, the level of consenting risk during construction would remain as Major owing to the risks to the National Park. In addition, additional construction traffic and a longer construction period may be needed to accommodate future needs although again this is unlikely to affect the level of consenting risk.</p> <p>The location of the potential second EBL would need to be explored further as a second EBL has the potential to have greater level of impact on visual amenity and landscape character, and potentially on the South Downs National Park, depending on location and proximity to receptors during construction and operation. Although it is assumed any potential EBL required would be sited outside the National Park and this should be the focus of the ongoing scheme development if Option B.5 is selected. The presence of an additional EBL (assumed to be outside the National Park) is unlikely to change the major construction and moderate operation scores recorded for the current B.5 Option.</p>
	Operation	Moderate	Moderate	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated and the WRP / EBL constructed. There would also continue to be a need for Break Pressure Tanks and Secondary Pumping Stations and therefore a need to ensure appropriate mitigation to avoid significant adverse effects on landscape and visual receptors during operation.
Major Accidents and Disasters	Construction	Minor	Minor	There would be no change to the results and analysis of Option B.5 during construction or operation. Major accidents and disasters would be considered as part of the EIA at a future stage and does not pose a consenting risk.
	Operation	Minor	Minor	
Noise and Vibration	Construction	Minor	Minor	Accommodating future needs would not change the consenting evaluation. Although additional construction vehicles may be needed, the construction programme extended and a potential second EBL required this is unlikely to change the level of consenting risk and traffic and noise modelling will be required to ensure appropriate mitigation is developed during construction and operation.
	Operation	Minor	Minor	
Resource and Waste Management	Construction	Minor	Minor	Accommodating future needs would not change the consenting evaluation. The issues associated with the potential contamination issues at the WRP parcel would remain and the pipeline corridors also remain the same.
	Operation	No impact	No impact	Accommodating future needs would not change the consenting evaluation during construction. The issues associated with the potential contamination issues at the WRP parcel would remain and the pipeline corridors also remain the same. There may be additional contamination or waste issues associated with construction of a second EBL but they would not change the level of consenting risk.
				During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated and the WRP / EBL constructed.
Socio-Economic	Construction	Moderate	Moderate	Accommodating future needs would not change the consenting evaluation during construction or operation. Moderate risks during construction would remain consistent with the previous evaluation although there may be greater longer-term benefits associated with delivering greater future resilience.
	Operation	Minor	Minor	
Traffic and Transport	Construction	Moderate	Moderate	Accommodating future needs would not change the consenting evaluation. In road working would still be needed which could cause disruption to the local highway network during construction. The larger pipework and potential second EBL may generate additional
	Operation	Minor	Minor	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				<p>traffic movements on local roads, however, this is not deemed to change the level of consenting risk during construction.</p> <p>During operation there would be no change to operational traffic movements to change the level of consenting risk.</p>
Water Quality and Resources	Construction	Moderate	Moderate	<p>Accommodating future needs is unlikely to affect the conclusions of the Outline WFD compliance assessment undertaken for Option B.5 during construction or operation.</p> <p>The BAU flow remains unchanged from the 1-in-200-year scenario, therefore under normal operation there is no anticipated change to the discharges from Eastney LSO during operation.</p> <p>In terms of the maximum design flow, it is assumed that a 95 MI/d WRP is likely to be no worse than a 75 MI/d WRP (as previously modelled) however this would need to be confirmed through further modelling. However, a 95 MI/d scenario may deliver a slightly greater improvement in total nitrogen concentrations in comparison to the 75 MI/d scenario.</p> <p>Whilst a larger, or second EBL would generate an additional volume of water requiring discharge during an emergency, it is considered likely that mitigation and control measures would ensure no deterioration in status at a water body scale.</p> <p>On the basis of the current information there would be no change to the consenting risk during operation.</p>
	Operation	Moderate	Moderate	
Flood Risk	Construction	Moderate	Moderate	<p>There would be no change to the consenting evaluation during construction or operation. The same areas of flood zones 2 and 3 and the working width / pipeline spread would remain the same. The location of the potential new EBL would need to be explored further and appropriately sited to avoid being located within a flood zone.</p>
	Operation	No impact	No impact	
Interface with Future Development and Planning	Construction	Moderate	Moderate	<p>The key planning risks would remain the same if accommodating future needs - interfaces with the SLP Pipeline and AQUIND DCOs. The location of the second EBL would need to be explored further and where possible sited to avoid major development although this would not change the level of consenting risk during construction and operation.</p>
	Operation	No impact	No impact	
Land Use – Open Space, Green Infrastructure, and Special Category Land	Construction	Moderate	Moderate	<p>Common Land and CRoW land would be intersected by the proposed pipeline as per the current Option B.5 during construction. Although a larger footprint would be needed for the WRP this would not change the consenting evaluation during construction. The location of the second EBL would need to be</p>
	Operation	No impact	No impact	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				explored further, however, is assumed open space, green infrastructure and special category land would be avoided through sensitive siting. During operation there would be no change to the consenting risk as the pipeline would be buried and the land reinstated.
Green Belt	Construction	No impact	No impact	There would be no change during construction or operation as Green Belt would continue to be unaffected.
	Operation	No Impact	No impact	
Cost		Moderate	Moderate	The costs would be higher but not sufficiently different to change the results and analysis. The CAPEX and the OPEX costs for Option B.4 would be lower than for Option B.5. Costs would be higher for Option B.5 as the size of the WRP would increase by 25% when compared with Option B.4. Therefore, there would be a larger differential between Options B.4 and B.5.
Technology and regulatory approvals		Minor	Minor	Not sufficiently different to change the consenting evaluation.
Constructability		Moderate	Moderate	The pipe size would be larger but the working area likely to be similar. The method of trenchless crossings may change due to the diameter of the pipeline and there may potentially be a slightly longer programme due to the rate of pipeline laying but this is not considered to increase the level of consenting risk.
Resilience		Minor	Minor	There would be no change to the consenting evaluation which used the results of the resilience assessment.

The sensitivity test of the Consenting Evaluation concluded that in respect of the evolution of Option B.5 to meet the future 95 Ml/d need, the level of consenting risk would remain the same. Whilst it is recognised Option B.5 would require some larger infrastructure, the original evaluation was based on reasonable worst-case parameters and was precautionary and so these modifications are not considered to change the consenting evaluation.

For Option B.5 there is the potential requirement for a larger EBL, or a secondary EBL associated with meeting future needs. The previous consenting evaluation identified that there were major HRA risks associated with construction and the operation of the EBL. Further work has been undertaken since the Interim Update to consider Options to resolve these matters and it is considered that they should be capable of being addressed with further work, and therefore that the overall level of consenting risk associated with HRA would not change for the evolved Option, despite the increase in size of infrastructure.

Planning and consenting strategy impact

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 through 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 significantly 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.

Deliverability and schedule impacts

It is not anticipated that the evolution of Option B.5 to meet the 87-95 MI/d future need will materially change the forecast in-service delivery date of Q4 2030. This is primarily due to the fact that from a design and construction perspective, the delivery of an 87-95 MI/d WRP is not significantly more onerous than that of a 75 MI/d and therefore, it is reasonable to assume that there will be no prolongation in deliverability schedule. Similarly, it is reasonable to assume that the installation of a 1000mm pipeline will take, in approximate terms, the same length of time as an 800mm pipeline.

The design and construction of either of the evolved or unevolved versions of Option B.5 are major undertakings however, the scale of the challenge of delivering a 95 MI/d vs 75 MI/d SRO is not considered proportionally different, and it considered reasonable to assume that it is achievable within a similar timeframe.

Land availability

The existing preferred location for the WRP associated with Option B.5 is considered sufficiently large to accommodate any footprint increase associated with a future need evolution. An increase in the capacity of the WRP to accommodate a 95 MI/d output would result in a proportionally larger footprint (c. 20%), but sufficient room exists at the previously identified preferred site to accommodate this.

An increase in transfer pipeline diameter from c.800mm to 1000mm would necessitate a marginally wider working area during construction. As noted, the impact of increasing the pipeline diameter could be ameliorated through installing higher specification pipes and operating at a higher pressure.

It has not been possible, as part of the FNA, to determine whether sufficient room exists at Otterbourne WSW to increase the volume of the Environmental Buffer Lake (EBL) from 75MI to 95 MI, in order to maintain 24-hours of buffering. Space constraints may necessitate the development of a separate small footprint 20MI EBL, and further work would need to be undertaken post Gate 2 to ascertain this.

CAPEX impact

Analysis by Southern Water's Cost Intelligence Team (CIT), based on the work done for the un-evolved B5, has been undertaken of the CAPEX increase that would arise in the event of evolving Option B.5 to meet the future need. This is summarised in the following table.

Table 5 - CAPEX forecast for evolved Option B.5

Option B.5 (original CAPEX)	Option B.5 (evolved to meet future need, revised CAPEX)	Percentage CAPEX increase
£561,698,503 (Exc. CeraMac)	£675,346,490 (Exc. CeraMac)	+20.2%
£640,425,809 (Inc. CeraMac)	£754,073,796 Inc. CeraMac)	+17.8%

Note that the CAPEX increase associated with meeting the future need has been calculated at a non-granular level and is provided for indicative and comparative purposes only. The Otterbourne CeraMac Pre-Disinfect cost is as per Section 10 of Annex 2, Water Recycling Technical, at 50% of £157,454,611 at £78,727,305.

OPEX impact

Similar to the CAPEX increase, the additional OPEX impact of meeting the future need was assessed by the CIT and is not considered significant from a WLC perspective. This is due to the fact that the maximum operational demand (i.e. requiring 95 Ml/d to be delivered to Otterbourne WSW), is predicted to only arise in the event of severe drought (1-in-200-year or worse).

When operating at the maximum flow envelope, the OPEX demand of an evolved version of Option B.5 would be c. 20-30% higher than originally forecast. However, in a typical year when the plant is operated in a 'turnover' capacity for O&M purposes, no material OPEX increase is forecast for the minimum flow.

Carbon impact

The additional Carbon impact of Option B.5 meeting the future need has been assumed, from an embodied Carbon perspective, to mirror that of the CAPEX increase (i.e. c. 20% increase). From an operational perspective it is not forecast that there would be any significant increase in whole life terms, reflecting the minimal amount of time at which the plant is functioning at anything other than 'turnover'.

4.4. Option B.4

4.4.1. Outline of Option Evolution

Option description

Option B.4 consists of exactly the same infrastructure as Option D.2, plus a WRP producing 15 MI/d located near Budds Farm Wastewater Treatment Works (WTW), with associated transfer pipelines between Budds Farm WTW, the WRP and Havant Thicket reservoir. An overall transfer capacity of 75 MI/d is provided.



Figure 4 - Schematic of Option B.4

Potential to evolve Option B.4 to meet future need

The anticipated worst case potential future need, as defined in the FNS, requires the evolution of Option B.4 to deliver up to 95 MI/d of raw water to Otterbourne Water Supply Works (WSW), i.e. an additional 20 MI/d as compared its current planned capacity.

Potential additional raw water sources

To support the evolution of Option B.4 to accommodate the future need, the additional 20 MI/d raw water source could include:

1. Supplementing the supply of Otterbourne WSW with other regional raw water sources
2. Supplementing the supply of Otterbourne WSW via a bulk supply of water from another water company
3. Increasing the capacity of the proposed WRP to 95 MI/d

Supplementing the supply of Otterbourne WSW with another source

Although feasible from a technical perspective, it is considered highly unlikely that the diversion of another raw water source to feed Otterbourne WSW would be acceptable to environmental regulators and other stakeholders as a long-term solution, or from an HRA perspective. Furthermore, it is likely that any diversion of raw water from other sources would require relatively long-distance transfers to Havant Thicket and would not be viable to deliver within the necessary timeframe.

For these reasons it is not considered that supplementing the supply to Otterbourne WSW by with another raw water source is viable or warrants further investigation.

Supplementing the supply of Otterbourne WSW via a Bulk Supply from another water company

The bulk transfer of water from another water company is considered technically viable however, no viable Options are identifiable that are considered capable of bringing into commission within the necessary timeframe. The Thames to Southern Transfer is planned to be in commission by 2039 and has the potential to deliver substantial volumes of raw water to the SW region. Other planned transfers such as the Knapps Mill source (20 MI/d from South West Water) are no longer possible due to other environmental considerations, as explained in the FNS.

Therefore, it is not considered that supplementing the supply of Otterbourne WSW by bulk supply from another water company can be achieved within the necessary timeframes. For these reasons it is not considered that supplementing the supply of Otterbourne WSW by bulk supply from another water company is viable or warrants further investigation.

Increasing the capacity of the proposed WRP to 95 MI/d

The Future Needs Statement identifies the need for 95 MI/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 and Otterbourne WSW from 75 MI/d to 95 MI/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 800mm to 1000mm) has been considered, as representing a worst-case scenario.
2. Enhancing the capacity of the associated pumping assets (secondary lift station and break tank) from 75 MI/d capacity to 95 MI/d
3. Enhancing the capacity of the WRP associated with Option B.4 from 15 MI/d to 20 MI/d. It is assumed for the purposes of this review 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.

4.4.2. Technical Evaluation

The potential impact of the evolution of Option B.4 to accommodate the future need is described by subject area below.

Consenting Evaluation Update

A sensitivity review of the Consenting Evaluation for Option B.4 has been undertaken, based on the evolved Option as described above and the works needed to facilitate the evolved Option. As part of this an assessment has been made to determine if the original RAG scores for Option B.4 have changed.

The following table presents the Consenting Evaluation criteria e.g. air quality, biodiversity, the phase of scheme e.g. construction or operation (where relevant), for Option B.4, the original RAG scores presented in the 2021 report; the RAG scores predicted for the evolved Option; and the justification for any change or no change in the RAG scoring.

RAG definitions are provided as follows.

Table 6 - RAG Scores and Definitions

Score	Definition
Substantial adverse	Potential for substantial consenting risks that are likely to be very challenging to overcome/mitigate. Impacts are likely to be unacceptable and will fail to meet required legal/policy tests based on current information.
Large adverse	Potential for major consenting risks. Impacts are likely to require significant mitigation but are potentially acceptable from legal/policy perspective. A case may need to be made e.g. balance of benefits against impacts but could be justified.
Moderate adverse	Potential for moderate consenting risks that will require the development of bespoke mitigation to address, but likely to be achievable and acceptable in policy terms i.e. policy compliance can be achieved.
Minor adverse	Potential for minor consenting risks that will require application of standard best practice.
Positive Impact	Potential for positive performance against policy.
No impact	Does not require appraisal and can be scoped out as not relevant to the Option e.g. no receptors within policy wording that could be affected.

The following table details each of the criteria considered in the consenting evaluation for Option B.4, the previous RAG score, the predicted future needs RAG score and justification for the future needs RAG score.

Table 7 - Future Needs v Option B.4

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
Air Quality and Emissions	Construction	Minor	Minor	Accommodating future needs may require additional construction vehicles compared with the current B.4 Option. This is due to larger pipework being needed. There would continue to be a requirement for relevant traffic and air quality assessments to be undertaken and the level of consenting risk would remain unchanged during construction. During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated, the WRP constructed and the Eastney outfall unchanged.
	Operation	No impact	No impact	
Biodiversity - Terrestrial Habitats Regulations Assessment	Construction	Major	Major	The proposed change to the WRP footprint would not change the Habitats Regulations Assessment (HRA) screening findings for Option B.4. In addition, the HRA assessment was based on an assumed maximum working corridor width (30m) rather than assessing a specific pipeline diameter, therefore, the
	Operation	Moderate	Moderate	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				<p>findings for this matter are considered to remain valid during construction.</p> <p>The watercourse crossings required to construct the pipelines to connect to Otterbourne have the potential to affect priority chalk stream habitats and SACs and this was a factor in assigning the major consenting risk for this Option during construction. The pipeline route connections remain unchanged and therefore this level of consenting risk would remain during construction.</p> <p>During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated and the WRP constructed. However, a moderate consenting risk was identified during operation owing to the need for appropriate restoration of the watercourse crossings and this would remain.</p>
Biodiversity - Terrestrial	Construction	Major	Major	<p>Construction working widths to build the pipeline would not need to change to accommodate future needs. Although a slightly larger WRP footprint would be needed, construction land take would be similar to the current B.4 Option. Although, the construction programme may be longer the predicted risks would be similar. There would be no change to the consenting risk for B.4 during construction.</p> <p>During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated, the WRP constructed and the Eastney outfall unchanged.</p>
	Operation	Minor	Minor	
Biodiversity - Marine Habitats Regulations Assessment	Construction	Moderate	Moderate	<p>Accommodating future needs would not change the results and analysis scores for B.4 as pollution and disturbance risks would remain the same during construction.</p> <p>It is noted however that a larger WRP may generate a greater level of impact (e.g. longer construction period, closer proximity to the marine areas of the Chichester and Langstone Harbour SPA/Ramsar) etc when assessed during the project level HRA, however, this would not be enough to change the consenting risk from moderate to major during construction or operation.</p> <p>The BAU flow remains unchanged from the 1-in-200-year scenario, therefore under normal operation there is no anticipated change to the</p>
	Operation	Moderate	Moderate	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				discharges from the Eastney LSO therefore risks during operation would not change. In terms of the maximum design flow, it is assumed that a 20 MI/d WRP is likely to be comparable to a 15 MI/d WRP (i.e. as previously modelled/assessed), however this would need to be confirmed through modelling. It is likely therefore that the conclusions of the HRA remain valid for the 1-in-500-year scenario and the level of consenting risk would not change for construction or operation.
Biodiversity - Marine	Construction	Moderate	Moderate	Accommodating future needs would not change the previous results and analysis scores during construction or operation for Option B.4 as pollution and disturbance risks would remain the same. The above results for marine HRA re BAU and maximum design flows also apply here.
	Operation	Moderate	Moderate	
Carbon	Whole life	Moderate	Moderate	Whilst there would be changes to the previous average and maximum operating scenario whole life carbon results (potential increases) they are not considered likely to be sufficiently different to change the level of consenting risk.
Coastal Change	Construction	No impact	No impact	Accommodating future needs would not change the consenting evaluation during construction or operation. The Option would still fall outside of the Coastal Change Management Area (CCMA).
	Operation	No impact	No impact	
Geology and Soils	Construction	Moderate	Moderate	There would be no change to the consenting evaluation during construction or operation. The land take would remain the same to construct the pipeline and the risks to the WRP and potential contamination would remain although would cover a slightly larger footprint.
	Operation	None	None	
Historic Environment - Terrestrial	Construction	Moderate	Moderate	Accommodating future needs would not change the consenting evaluation during construction or operation. Although potentially more construction traffic may be needed and the WRP footprint would be slightly larger, on balance the level of consenting risk would remain the same and there would be a continued need for further cultural heritage assessment to ensure that the level of archaeological risks and the impacts to built heritage are assessed and mitigated. The pipeline working width would also remain the same and therefore effects during construction would not change.
	Operation	Minor	Minor	
Historic Environment - Marine	Construction	No impact	No impact	There would be no new marine infrastructure works to accommodate future needs as per the current B.4 Option. Therefore, there would be
	Operation	No impact	No impact	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				no change to the consenting evaluation during construction or operation.
Landscape and Visual Amenity	Construction	Major	Major	Accommodating future needs would not affect the land take to construct the pipeline although the WRP footprint would be slightly larger. The WRP would be located in an industrial context and the proposed site parcel is reasonably well screened by boundary vegetation. The pipeline routes for Option B.4 would directly affect the South Downs National Park and the routes and working widths of the pipelines would be the same for the future needs scenario. Therefore, the level of consenting risk during construction would remain as Major owing to the risks to the National Park. During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated, the WRP constructed and the Eastney outfall unchanged. There would also continue to be a need for Break Pressure Tanks and Secondary Pumping Stations and therefore a need to ensure appropriate mitigation to avoid significant adverse effects on landscape and visual receptors.
	Operation	Moderate	Moderate	
Major Accidents and Disasters	Construction	Minor	Minor	There would be no change to the results and analysis of Option B.4 during construction or operation. Major accidents and disasters would be considered as part of the Environmental Impact Assessment (EIA) at a future stage and does not pose a consenting risk.
	Operation	Minor	Minor	
Noise and Vibration	Construction	Minor	Minor	Accommodating future needs would not change the results and analysis during construction. Although additional construction vehicles may be needed, the programme extended, and alternative trenchless methods adopted this is unlikely to change the level of consenting risk and traffic and noise modelling will be required to ensure appropriate mitigation is developed. During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated, the WRP constructed and the Eastney outfall unchanged.
	Operation	Minor	Minor	
Resource and Waste Management	Construction	Minor	Minor	Accommodating future needs would not change the consenting evaluation during construction. The issues associated with the potential contamination issues at the WRP parcel would remain and the pipeline corridors also remain the same.
	Operation	No impact	No impact	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated, the WRP constructed and the Eastney outfall unchanged.
Socio-Economic	Construction	Moderate	Moderate	Accommodating future needs would not change the consenting evaluation during construction
	Operation	Minor	Minor	During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated, the WRP constructed and the Eastney outfall unchanged. Although there may be greater longer-term benefits associated with delivering greater future resilience.
Traffic and Transport	Construction	Moderate	Moderate	Accommodating future needs would not change the consenting evaluation during construction. In road working would still be needed which could cause disruption to the local highway network. The larger pipework may generate additional traffic movements on local roads to construct the pipeline however this is not deemed to change the level of consenting risk.
	Operation	Minor	Minor	During operation there would be no change to the consenting risk as the pipeline would be buried, land reinstated and the WRP constructed. There would be no change to operational traffic movements to change the level of consenting risk.
Water Quality and Resources	Construction	Moderate	Moderate	Accommodating future needs is unlikely to affect the conclusions of the Outline WFD compliance assessment undertaken for Option B.4 during construction or operation.
	Operation	Moderate	Moderate	The BAU flow remains unchanged from the 1-in-200-year scenario, therefore under normal operation there is no anticipated change to the discharges from Eastney LSO as assessed in the WFD during operation. However, a 20 MI/d scenario may deliver a slightly greater improvement in total nitrogen concentrations in comparison to a 15 MI/d scenario (modelling has indicated that greater WRP maximum design flows deliver slightly better water quality improvements at Eastney LSO as not all the total nitrogen is discharged back into the marine environment).
Flood Risk	Construction	Moderate	Moderate	There would be no change to the consenting evaluation. The same areas of flood zones 2 and 3 would be affected and the working width / pipeline spread would remain the same
	Operation	No impact	No impact	

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				<p>during construction. Although the WRP would be slightly larger, this would not change the level of consenting risk during construction as the site is not within flood zones 2 and 3.</p> <p>During operation there would be no change to the consenting risk as the pipeline would be buried and land reinstated.</p>
Interface with Future Development and Planning	Construction	Moderate	Moderate	<p>The key planning risks would remain the same if accommodating future needs during construction and operation as there would continue to be interfaces with the Southampton to London Pipeline (SLP) and AQUIND DCOs, as well as other planning allocations and applications that will need to be kept under review as the scheme develops.</p>
	Operation	No impact	No impact	
Land Use – Open Space, Green Infrastructure and Special Category Land	Construction	Moderate	Moderate	<p>Common Land and Countryside and Rights of Way Open Access (CRoW) land would be intersected by the proposed pipeline as per the current Option B.4 during construction.</p> <p>Although a larger footprint would be needed for the WRP this would not change the consenting evaluation during construction.</p> <p>During operation there would be no change to the consenting risk as the pipeline would be buried and the land reinstated.</p>
	Operation	No impact	No impact	
Green Belt	Construction	No impact	No impact	<p>There would be no change during construction or operation as Green Belt would continue to be unaffected.</p>
	Operation	No impact	No impact	
Cost		Moderate	Moderate	<p>The costs would be higher but not sufficiently different to change the results and analysis. The CAPEX and the OPEX costs for Option B.4 would be lower than for Option B.5. Costs would be higher for Option B.5 as the size of the WRP would increase by 25% when compared with Option B.4. Therefore, there would be a larger differential between Options B.4 and B.5.</p>
Technology and regulatory approvals		Minor	Minor	<p>Planning permission for the Havant Thicket Reservoir (HTR) was granted on 15th October. The six-week Judicial review period will end on 26th November. At the time of preparing the previous consenting evaluation, consent had not been granted and therefore this aspect of planning risk has reduced. However, there continue to be issues relating to phasing and programme interfaces in relation to Option B.4 and the construction of the Havant Thicket reservoir that require resolution and need to be considered further post Gate 2 and managed accordingly. These issues primarily relate to the construction of the inlet and outlet pipes</p>

Evaluation Criteria	Phase of Scheme	Previous Consenting RAG (Sept 2021)	Future Needs Consenting RAG (Nov 2021)	Justification
				from the WRP to the reservoir and integration with the existing Havant Thicket programme and the change in use of the Havant Thicket reservoir compared to that currently consented. For the first issue there are currently various Options under consideration that require evaluating from a consenting, funding and technical deliverability perspective to manage this risk. It is considered that this risk can be managed but requires further work post Gate 2 and continued engagement with Portsmouth Water. For the second issue, this will require further consideration as part of the future consent application for Option B.4. Therefore, the overall consenting risk is not considered to change.
Constructability		Moderate	Moderate	The pipe size would be larger but the working area likely to be similar. The method of trenchless crossings may change due to the diameter of the pipeline and there may potentially be a slightly longer programme due to the rate of pipeline laying but this is not considered to increase the level of consenting risk.
Resilience		Minor	Minor	There would be no change to the consenting evaluation and the previous resilience assessment.

This sensitivity test of the Consenting Evaluation concluded that in respect of the evolution of Option B.4 to meet the future 95 Ml/d need, the level of consenting risk would remain the same. Whilst it is recognised Option B.4 would require some larger infrastructure, the original evaluation was based on reasonable worst-case parameters and was precautionary and so these modifications are not considered to change the consenting evaluation.

For Option B.4 the key difference since the production of the original Consenting Evaluation is that the Havant Thicket reservoir has secured its planning permissions. This therefore improves confidence about the likely delivery of this scheme. However, it has become apparent since the original Consenting Evaluation that there are a number of programming challenges in respect of the detailed design and construction of the Havant Thicket reservoir and Option B.4 that require resolution if both are to be successfully delivered. Whilst this has not affected the Consenting Evaluation sensitivity test, this issue does need appropriately managing, and SW has ensured that it is reflected on the project risk register and has identified mitigating actions to implement accordingly.

Planning and Consenting Strategy Impact

The consenting strategy for Option B.4 will continue to be developed, as appropriate, as the scheme is further defined through on-going scheme development and stakeholder engagement prior to Gate 3. Priority attention will be given to the consenting approach to the interface works with Havant Thicket Reservoir. This will be developed in collaboration with Portsmouth Water, with a particular focus on delivery schedule alignment. This may potentially require enabling planning applications, planning permissions and/or permitted development for the specific interface works required prior to Gate 3. A comprehensive

understanding of this approach will further inform the overall approach to consenting for Option B.4, with the current strongly preferred approach being the DCO consenting regime.

It is not anticipated that the evolution of Option B.4 to meet the 87-95 MI/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 significantly different to the original proposed Option. Similarly, there is no substantial change to the nature of the proposed assets, they're simply marginally larger in capacity and footprint (this difference is proportionally less for Option B.4).

Deliverability and Schedule Impacts

It is not anticipated that the evolution of Option B.4 to meet the 87-95 MI/d future need will materially change the forecast in-service delivery date of Q1 2030. This is primarily due to the fact that from a design and construction perspective, the delivery of a 20 MI/d WRP is not significantly more onerous than that of a 15 MI/d WRP and therefore, it is reasonable to assume that there will be no prolongation in deliverability schedule. Similarly, it is reasonable to assume that the installation of a 1000mm pipeline will take, in approximate terms, the same length of time as an 800mm pipeline.

The design and construction of either of the evolved or unevolved versions of Option B.4 are major undertakings however, the scale of the challenge of delivering a 95 MI/d vs 75 MI/d SRO is not considered proportionally different, and it is considered reasonable to assume that it is achievable within a similar timeframe.

Land availability

The existing preferred locations for the assets associated with Option B.4 are considered sufficiently large to accommodate any footprint increase associated with the evolved Option. An increase in the capacity of the WRP to accommodate a 20 MI/d output would result in a proportionally larger footprint (c. 40%), but sufficient space exists at the preferred site to accommodate this (note that this is the same preferred site as identified to locate the much larger 75 MI/d WRP associated with Option B.5 and therefore, it is reasonable to assume that a 20 MI/d WRP plant can be accommodated here).

An increase in transfer pipeline diameter from c.800mm to 1000mm would necessitate a marginally wider working area during construction, whilst the footprint of associated pumping stations and break tanks may also marginally increase (to be confirmed following further work post Gate 2). As noted, the impact of increasing the pipeline diameter could be ameliorated through installing higher specification pipes and operating at a higher pressure.

Portsmouth Water Impact

Any increased impact on Portsmouth Water arising from the evolution of Option B.4 to a 95 MI/d capacity is likely to arise as a result of increasing the capacity of the WRP discharging recycled water to Havant Thicket. The WRP plays an important role in supporting Bedhampton and Havant Springs in filling the reservoir, and during a Hands off Flow (HoF) event impacting on the capacity of the Springs to fill Havant Thicket, it's possible that the balance of raw water in the reservoir could change. During a HoF event, Spring derived raw water fill could cease whilst raw water discharge from the WRP would be maintained, changing the balance of raw water blend in the reservoir.

This has potential implications in respect of Portsmouth Water's operations (particularly downstream treatment) however, given the relatively small capacity of the WRP (20 MI/d) by comparison with the working volume of the reservoir (8,700MI), it is not considered a significant risk. Nevertheless, further work will be undertaken post Gate 2 to better understand the potential implications of this risk.

CAPEX Impact

Analysis by Southern Water’s Cost Intelligence Team (CIT), based on the work done for the un-evolved B.4, has been undertaken for the CAPEX increase that would arise in the event of evolving Option B.4 to meet the future need. This is summarised in the following table.

Table 8 - CAPEX forecast for evolved Option B.4

Option B.4 (original CAPEX)	Option B.4 (evolved to meet future need, revised CAPEX)	Percentage CAPEX increase
£451,295,961 (Exc CeraMac)	£538,849,118 (Exc CeraMac)	+19.4%
£530,023,267 (inc CeraMac)	£617,576,423 (Inc CeraMac)	+16.5%

Note that the CAPEX increase associated with meeting the future need has been calculated at a non-granular level and is provided for indicative and comparative purposes only. The Otterbourne CeraMac Pre-Disinfect cost is as per Section 10 of Annex 2, Water Recycling Technical, at 50% of £157,454,611 at £78,727,305.

OPEX Impact

Similar to the CAPEX increase, the additional OPEX impact of meeting the future need was assessed by the CIT and is insignificant from a WLC perspective. This is due to the fact that the capacity increase for the associated WRP (c. 10 MI/d) is relatively small and furthermore, this asset is only ‘topping up’ Havant Thicket reservoir when in use. The maximum operational demand (i.e. requiring 95 MI/d to be delivered to Otterbourne WSW), is also predicted to only arise in the event of severe drought (1-in-200-year or worse).

When operating at the maximum flow envelope, the OPEX demand of an evolved version of Option B.4 would be c. 40% higher than originally forecast however, in a typical year when the plant is operated in a ‘turnover’ capacity for O&M purposes, no material OPEX increase is forecast on the minimum flow.

Carbon Impact

The additional Carbon impact of Option B.4 meeting the future need is assumed, from an embodied Carbon perspective, to mirror that of the CAPEX increase (i.e. c. 20% increase). From an operational perspective it is not forecast that there would be any significant increase in whole life terms, reflecting the minimal amount of time at which the plant is functioning at anything other than ‘turnover’.

Outline Option Evolution Next Steps

The FNA is important in the context of preparing and consulting on Water Resource Management Plan 2024 (WRMP24), as well as providing a more robust basis on which to test the outcomes of the initial OAP.

The Outline OEPs provide a robust body of evidence to support the identification of a Selected Option for reporting at Gate 2. A high-level summary of how the Outline OEPs fit within the OAP and identification of a Selected Option is detailed in the following table. Further detail on this is provided in Annex 5, Options Appraisal Process, of the Gate 2 submission.

Table 9 - Outline Option Evolution Plan and next steps

	Document	Purpose
<p>FUTURE NEEDS ASSESSMENT</p>	<p>Outline Option Evolution Plan (Annex 12)</p>	<ul style="list-style-type: none"> i. Future Needs Statement setting out how the regional need in West Hampshire evolves between 2030 and 2040 and how this impact is realised in terms of future water demand ii. Outline Option Evolution Plan providing consideration of how Options B.2, B.4, B.5 and D.2 can be evolved to meet the identified future need, providing a high-level summary of resulting Option footprint, CAPEX, OPEX, environmental, consenting and planning impacts iii. Developing sufficient robustness of understanding to allow the testing and revalidation of the initial OAP findings
	<p>Option Appraisal Process (Annex 5)</p>	<ul style="list-style-type: none"> i. Setting out the methodology for the OAP ii. Setting out the findings of the initial OAP iii. Revalidating and testing the findings of the initial OAP iv. Establishing Selected Option and Back-Up Option to report at Gate 2, and with which to progress post Gate 2
	<p>Detailed Option Evolution Plan (Annex 13)</p>	<p>Detailed Option Evolution Plans have been prepared for the Selected Option and Back-Up Option, which include information from the Outline OEP for the relevant Options and additionally detail activities to be undertaken to progress Option evolution and mitigate identified risks.</p>