STRATEGIC REGIONAL WATER RESOURCE SOLUTIONS:
Poole Effluent Recycling and Transfers

Standard Gate Two Submission

NOVEMBER 2022

Submitted to: RAPID

Submitted by:

South West Water | Southern Water | Wessex Water YTL GROUP

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1 Executive summary

1.1 Introduction

This Gate 2 submission sets out the options appraisal, concept design, costs and benefits of the preferred solution for the Poole Effluent Recycling and Transfer SRO, reflecting the regions' and water companies' water resources management plans. The scheme was originally promoted as part of the West Country South SROs, to provide a resource for the Water Resources South East (WRSE) region and, in particular, Southern Water's Hampshire area. The scheme has not been selected in the WRSE emerging plan and subsequent investment runs, whereas it has been identified as forming part of the West Country Water Resources Group's (WCWRG) plan. Using the source in-region negates the need for long distance pipelines and preliminary treatment works and hence is a far more efficient use of the source than transferring the water to Southern Water. It has therefore been agreed with RAPID that the scheme progresses with a concept design of a best value solution to use the water in-region.

The scheme will divert final effluent from Wessex Water's (WSX) Poole sewage treatment works (STW) to the River Stour via a new pipeline, water recycling plant and a wetland. The additional water discharged to the river will then be re-abstracted at Longham lakes from where it will integrate with Bournemouth Water's (BW) existing supply system.

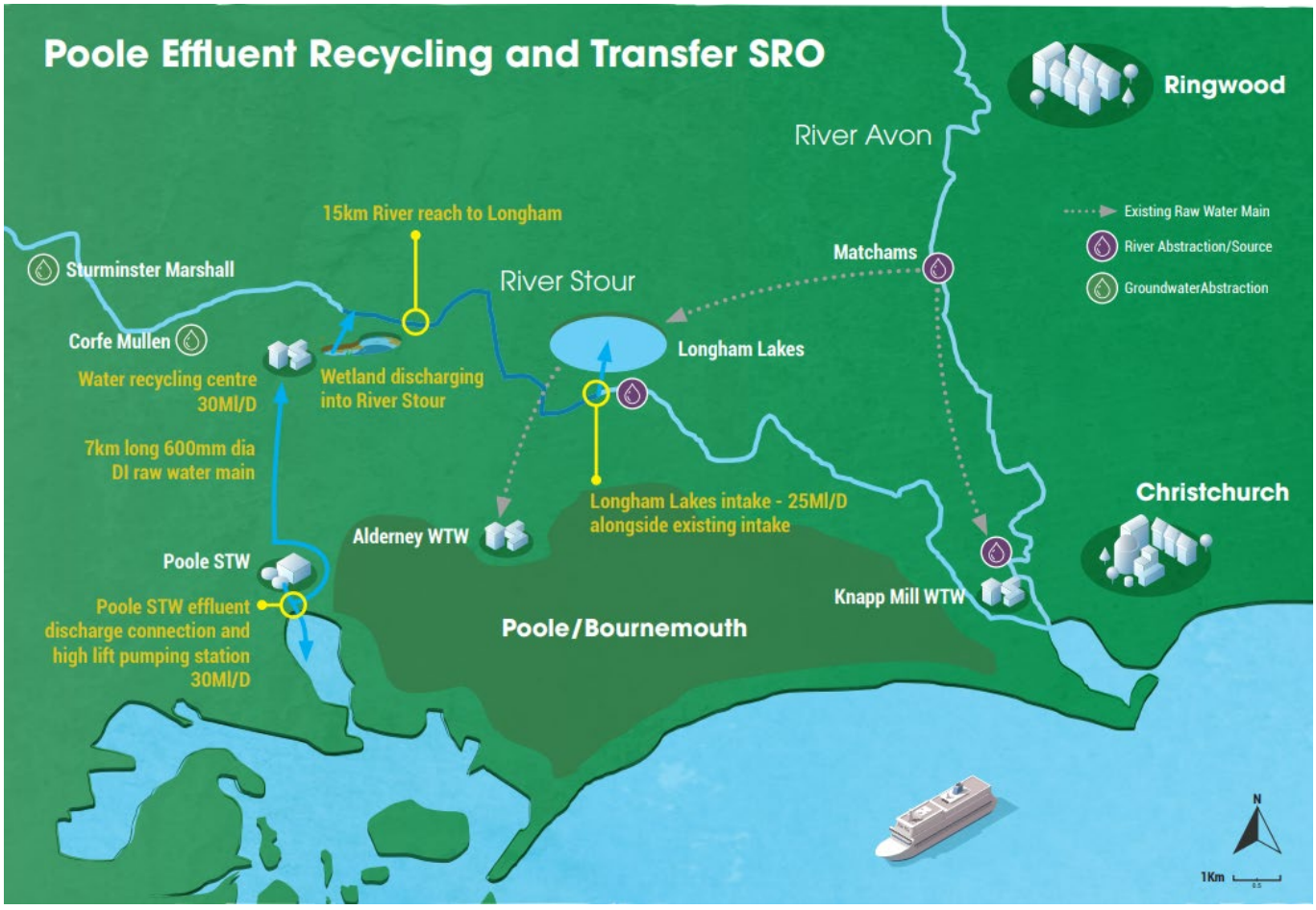


Figure 1 SRO Overview

The solution provides multiple environmental benefits in addition to providing a drought resilient water resource. The discharge will improve flows along approximately 15km of the River Stour when natural flows are low in dry summers, facilitate a reduction in abstraction from the River Avon and divert effluent from entering Poole harbour.

Both BW and WSX have forecast a need for the new source in their draft Water Resources Management Plans (dWRMPs) to mitigate likely sustainability reductions to existing abstractions. After treatment at Alderney water treatment works (WTW) the water can be shared with WSX via existing and upgraded interconnections between the two water companies.

1.2 Gate 2 key activities

Following RAPID's final decision on the gate 1 submissions for the West Country South sources and transfers solution and the West Country South - Southern Water transfer solution, it was agreed that this scheme progressed to Gate 2.

To make best use of the limited gate 2 funding available for the SRO, work has focussed on addressing the key uncertainties remaining from gate 1 regarding the scheme's feasibility, determining the best value scope and producing and appraising an updated concept design. Gate 1 established that the Poole effluent source could be of potential value. However, its further development as a water supply scheme should be done efficiently and in consideration of where the source could deliver greatest value. Designing multiple options was not affordable within the budget and was not appropriate in the light of the original proposal not being selected as part of the WRSE emerging regional plan. Therefore, the gate 2 work was split into two phases: an initial phase of work to determine the best use of the source and the second phase to develop and appraise options for the associated scheme components.

Key aspects of the gate 2 work have been to;

- Confirm the source reliable deployable output in up to a 1:500 year drought
- Engage with the Environment Agency and Natural England regarding the environmental constraints to discharging the recycled water into the River Stour
- Hydrological modelling of the River Stour to determine the benefits and any disbenefits the discharge could have downstream
- Develop the water quality monitoring requirements necessary to undertake a water quality risk assessment
- Develop and appraise the concept design of an in-region option.

1.3 Options appraisal

Since the SRO was promoted at PR19, the future water resource position in the West Country region has changed dramatically, such that large deficits may arise due to the emergence of a range of potential environmental pressures on current abstractions. Consideration of whether the scheme forms part of the emerging plans for either or both the WRSE and WCWR regions and whether it is likely to feature in final plans and at what time horizon was important in determining the final option scope to be developed to gate 2. This comprised phase 1 of the gate 2 work.

The benefits of the alternative uses have been determined from the regional plans, reflecting the needs to which they could contribute. The determination of the most appropriate option to take forward to gate 2 has therefore been made by considering the following:

- Which of the emerging regional plans does the scheme feature in, when and under what scenarios?
- What is the net benefit of incorporating the scheme in the regional plan, relative to the next best alternative?
- Comparison of the options costs, carbon and environmental impacts.
- The potential water resource benefit.

The phase 2 appraisal then determined the most appropriate location and scope of the best value scheme components.

The overall aim of gate 2 is to reach a position where a decision can be made on whether to progress the scheme so that it is construction ready in the period 2025-2030, which was one of the main drivers for the gated process in response to the National Infrastructure Commission's report in 2018.

RAPID's guidance for gate 2 includes three overarching objectives:

- The solution design at gate 2 should aim to eliminate sub-optimal options and only carry forward viable options
- Proposals should be aligned with any available strategic water resources plans (e.g. the emerging regional plans)
- Solutions should meet criteria that test the need for accelerated development and regulatory oversight and support.

Each of these objectives is covered in the sub-sections below.

1.3.1 Only taking forward viable options

Based on the gate 1 studies and the additional work carried out in gate 2, both the SRO option to take the water to Southern Water's Testwood site and the in-region option are considered to be viable, although not best value.

1.3.2 Alignment with available strategic water resources plans

As described above the emerging regional water resources plans confirm that the scheme is:

- not required in the WRSE region. The scheme was offered in to WRSE's investment modelling. The outcome was that it does not feature in their emerging plan to 2040, nor in the adaptive plan to 2060. Stress testing of their plan does not change this result. Further development of WRSE's plan to a 'best value' plan continues to exclude the use of this scheme.
- of benefit to the WCWRG region. The WCWRG emerging plan indicates that, due the potential scale of the environmental destination reductions, there is a need to continue to develop several supply-side options such that the best options can be deployed when they are required. The plan is that this option development continues in parallel with work to reduce the uncertainty regarding abstraction reductions during the period 2025 to 2030.

The scheme features in the draft Water Resources Management Plans 2024 of both Bournemouth Water and Wessex Water.

1.3.3 The need for accelerated development and regulatory oversight and support

The scheme should continue as a strategic resource option, overseen by RAPID, due to multi-company involvement and ongoing engagement requirements with regulators and stakeholders regarding recycling and to assist in obtaining the various consents required to construct and operate the scheme. Our responses to RAPID's eight criteria to be considered before schemes progress to the next gate are set out in Annex 1: Options Appraisal.

We have worked closely with the Environment Agency, DWI, Natural England and RAPID throughout this phase of work and we have not received any feedback to indicate that they perceive there to be any potential showstoppers.

Natural England's position is that the SROs in the West Country should be used to solve environmental needs in the region, which is effectively a showstopper for an inter-regional scheme.

1.3.4 Preferred option

Based on the Gate 2 Phase 1 work and the emerging regional plans, this scheme is required in-region to address the future supply demand deficit, that was not envisaged when the SRO transfer to Hampshire was originally promoted.

As the River Stour is an existing source for Bournemouth Water, the recycled water can be efficiently used, negating the need for new abstraction, storage and transfer assets, thereby providing a far lower cost and carbon impact than the original SRO.

Southern Water were in agreement that the scope of the scheme should change and supported the dialogue with RAPID to revise the approach during gate two.

The recommendation that the scheme progressed from this point as an in-region option only, as part of a best value WCWR regional plan was agreed by RAPID in a letter[1] on the 27th May 2022.

1.4 Scheme concept

The design includes a new pumping station at Poole STW, approximately 7km of pipeline to transfer the diverted effluent to a water recycling plant which provides supplementary treatment before discharging the water to the River Stour via a constructed wetland. The abstraction at Longham lakes will then be increased to enable the additional water to be taken alongside the existing licence quantities.

The deployable output of the scheme has been constrained by the reliable flows arriving at Poole STW. Historical flow variability, especially during sustained dry periods, and the impacts of forecast population growth within the work's catchment and demand management expectations have been considered. The peak deployable output,

[1] WCWR-Interim-letter-response-27-May-2022.pdf (ofwat.gov.uk)

including during extreme droughts, has been estimated at 25Ml/d, once predicted losses at Poole STW, the water recycling plant and along the Stour have been applied.

The suitability of the effluent to provide a safe drinking water source has considered the range of industrial wastes within the Poole STW catchment to produce a list of potential contaminants to be monitored and against which to produce the concept design of the water recycling plant. A monitoring programme has been developed, building upon the scheme specific risks and the approach being developed as part of the All Company Working Group (ACWG) on recycling.

The following table summarises all the key information about the SRO.

SRO Key Information	
Scheme type	Effluent recycling
Key components	7km raw water pipeline Water recycling plant Wetland 15km of river environmental buffer and abstraction] River Intake
Annual average deployable output	12.5Ml/d
Summer peak demand deployable output	25Ml/d
Requirement being met	Contributing to restoration of sustainable abstractions on the Hampshire Avon. Water supply resilience for BW and WSX customers in the Bournemouth and Poole area.
What plans does it feature in	WCWR draft regional plan, SWW and WSX dWRMP24s
When is it required	2035
AIC	191p/m^3
Carbon impact	224kg Co^2e/Ml
Duration to operational use	10 years
Should the scheme progress within the RAPID gated process and proposed Gate 3 submission date	Yes, Gate 3 Submission March 2025.

1.5 Conclusions and recommendations

The conclusions and recommendations are agreed by all the scheme partners.

The initial phase of the gate 2 work, which has already been agreed with RAPID, concluded that the best value use of the water resource was as an in-region option only.

Based on the gate 2 studies, which are described in more detail below and in the accompanying annexes, we conclude that the scheme:

- is technically feasible and deliverable
- has minimal environmental impact and multiple environmental benefits
- would provide a drought resilient water resource of 25Ml/d
- can be construction ready by 2030
- needs continued development to resolve the remaining risks and uncertainties
- provides a best value solution as an in-region option to meet forecast deficits in the Poole/Bournemouth area.

The project is selected in both Wessex Water and Bournemouth Water's dWRMP24, providing justification of the need for the solution, as a shared scheme.

Therefore, it is recommended that the scheme proceeds to gate three.

2 Background and objectives

2.1 National Framework and regional planning

The Environment Agency's (EA) National Framework (Meeting our Future Water Needs: A National Framework for Water Resources[2]) was published in March 2020 and it explores England's strategic long-term water needs across all key sectors up to and beyond 2050. It emphasises that if action is not taken many areas of England will face water shortages. The National Framework recognises that an increasing population, demand from agriculture and industry and improving our resilience to drought will all put significant pressures on our water resources, and that climate change will further increase these pressures.

If no action is taken, the National Framework identifies that the West Country may require an additional 227Ml/d by 2050 to meet future pressures on public water supply and that this could double by 2100.

The WCWR emerging plan[3] has identified that a new, strategic regional resource may be required in the next 20 years to maintain water supply resilience in the face of the above pressures. The plan shows that the region faces deficits across the range of forecast scenarios that will require supply side solutions in addition to ambitious demand and leakage savings. A summary, highlighting the need for this solution is provided in section 3.1.2 below.

2.2 Water company plans

Bournemouth Water (part of South West Water) are facing a major supply challenge in the Bournemouth area as a result of needing to reduce abstractions on the River Avon. The Poole SRO is required in all scenarios considered under their adaptive plan for dWRMP24. The timing of when beneficial use of the scheme is planned is driven by when it can be delivered as part of the long term strategy for the Rivers Stour and Avon. Alongside obtaining all the required consents and piloting and monitoring the performance of the proposed water recycling plant, the scheme is dependent upon delivery of the improvements to Poole STW and as such the WRMP assumes the scheme will not be available before 2033/34.

Wessex Water's dWRMP24 presents an affordable plan supported by customers, to deliver a positive supply demand balance and therefore a secure supply of water to 2079-80, which meets a 1 in 500 level of service for emergency drought orders by 2040, and also delivers important abstraction licence reductions to help protect Chalk streams in 2035 and 2050. The baseline supply-demand balance position shows that the planning period starts with a surplus which gradually declines throughout the planning period primarily as a result of a growing demand forecast into a deficit by 2079-80. On top of this long-term trend, further declines in available water occur due to licence losses in 2035 and 2050, resulting in overall planning deficits of 93 Ml/d by 2079/80 under the dry year critical period (DYCP) scenario. The option appraisal and decision making within the dWRMP selects the Poole SRO across all scenarios. The core pathway shows the scheme being needed by 2040, and the alternative pathway by 2035.

Both water company dWRMP's select the scheme, thus demonstrating the need for the SRO as a shared scheme. The earliest date that the scheme is called for is around 2035.

[2] https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources

[3] WCWRG Initial regional draft plan Jan

3 Solution design, options and sub-options

3.1 Options appraisal

The Poole effluent recycling scheme was originally identified as a potential source for a transfer to Southern Water, however as part of the gate 1 study, the potential to create greater value by using the source in region was identified, in light of the emerging pressures on resources in the Bournemouth and the wider West Country Water Resources (WCWR) area. RAPID's gate 1 final decision therefore stated that both options should be considered in gate 2.

The limited funding available for gate 2 required the appraisal of the potential uses of the source to be undertaken first such that the concept design of a single solution could be efficiently focussed on for the submission.

Details of the options appraisal are provided in Annex 1: Options Appraisal.

3.1.1 Objectives

For the reasons given above it was decided to split the gate 2 work into two phases. The objectives of phase 1 was to confirm the water resource availability and agree with RAPID the need that this should be allocated to for production of the gate 2 concept design and assessment.

The benefits of the alternative uses have been determined from the regional plans, reflecting the needs to which they could contribute. The determination of the most appropriate option to take forward to Gate 2 has therefore been made by considering the following:

- Which of the emerging regional plans does the scheme feature in, when and under what scenarios?
- What is the net benefit of incorporating the scheme in the regional plan, relative to the next best alternative?
- Comparison of the options costs, carbon and environmental impacts.
- The potential water resource benefit.

The Phase 2 appraisal was to determine the most appropriate location and scope of the scheme components.

3.1.2 Phase 1 options appraisal

A key consideration in determining which option should be progressed, was which was likely to feature in regional and company plans. Both the West Country and South East planning groups have issued emerging regional plans for consultation, setting out their range of long term needs and possible solutions. The regions are adopting adaptive planning approaches to deal with the large uncertainties in the drivers of the supply and demand forecasts. They will also apply a range of best value criteria in selecting solutions which do not just minimise cost but deliver wider societal and environmental benefits and support carbon neutrality and operational resilience.

West Country Water Resources Group (WCWRG)

The region's published emerging plan shows that the region faces deficits across the range of forecast scenarios that will require supply side solutions in addition to ambitious demand and leakage savings. Table 1 below presents the selection of strategic supply options under the region's range of environmental and demand management scenarios. This shows that Poole effluent reuse would be required in three out of the five scenarios by 2050. The scheme forms part of the WCWRG emerging regional plan. The adaptive plan means that it should continue to be developed in parallel to reducing the uncertainties regarding the future environmental destination and delivering the leakage and water efficiency programmes.

Table 1 WCWRG Emerging Plan Supply Deficits

	Base DYAA supply demand balance (Ml/d)	Supply-side options				Planning DYAA supply demand balance (Ml/d)
		Mendip quarry	Roadford pumped storage	Poole effluent reuse	Cheddar Two reservoir	
		90 Ml/d	30 Ml/d	30 Ml/d	16 Ml/d	
Policy Future	-42	ü				48
Higher demand future	-125	ü	ü		ü	11
Bad future	-186	ü	ü	ü	ü	-20
Stretching future	-277	ü	ü	ü	ü	-111
Alternative future	-132	ü	ü	ü		18

Water Resources South East (WRSE)

WRSE have similarly published an emerging regional plan, reflecting the range of potential future supply demand deficits that may be generated by future environmental destination, population growth and climate change scenarios. The West Country SROs (Poole effluent recycling and Cheddar two) were options within the regional investment model for consideration in producing the emerging plan. Neither scheme was selected under the range of future needs. Figure 2 below shows the schemes selected to 2040 in the WRSE emerging plan. After 2040 the plan considers three different scenarios to 2060 which each then further split to give nine possible futures beyond this time. Poole effluent recycling is not selected as part of the plan for any of these scenarios.

The WRSE plan continues to be refined and following consultation on the emerging plan, some currently selected schemes may be removed, requiring alternative solutions. However, it is considered that there are other schemes that would be implemented ahead of Poole effluent recycling, in such an event, due to its relatively high cost, low resource benefit and high carbon and environmental impacts, arising from the 55km transfer.

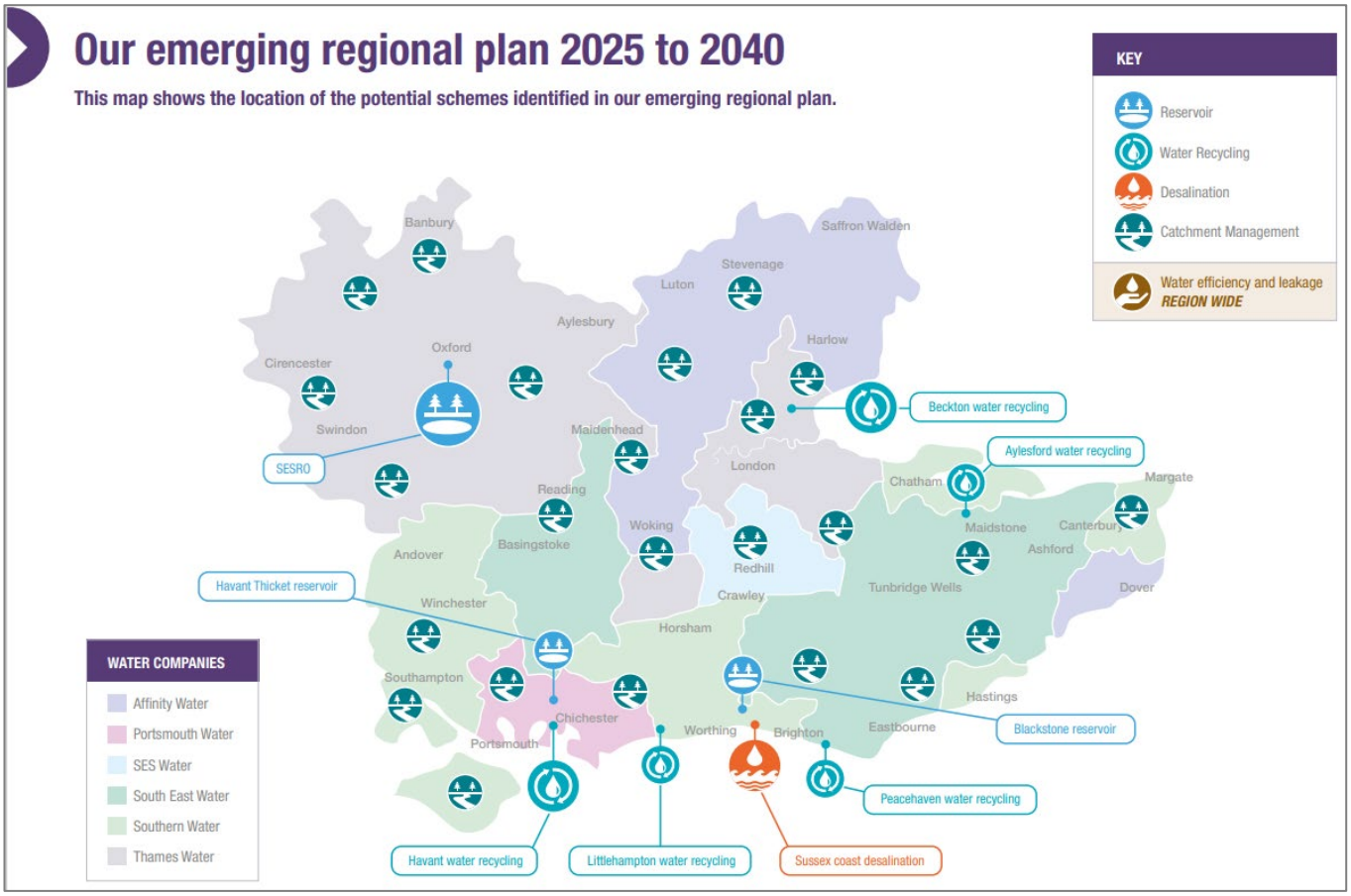


Figure 2 WRSE Emerging Plan

Scope, Cost and Carbon Comparison

Both the SRO and in-region options involve the same scope in treating the Poole STW effluent and conveying it to the river Stour. To transfer the water to Southern Water's Testwood site then required a new abstraction and storage, a pre-treatment works and the 55km transfer pipeline and pumping stations. Using the resource in-region requires increasing the abstraction screens, pumps and pipeline in to Longham lakes from where it is conveyed to Alderney WTW using the existing pipeline. Consequently, based on gate 1 estimates, the in-region option has a capital cost of just over one third of the original SRO scheme cost. Avoiding the pre-treatment and long distance pumping to Testwood means that the in-region option operating cost is approximately half of the original SRO opex.

Table 2 Comparison of Options' Gate 1 Cost Estimates

Option	Capex (£m, 2017/18)	Full Utilisation Annual Opex (£k, 2017/18)
Full SRO to Testwood	362.7	8,704
In-region SRO to Longham	134.8	4,643

The gate 1 estimate of the full SRO 60-year, whole life carbon cost was 280,847 tCO2e, the majority of which was operational carbon associated with the water recycling plant, pre-treatment plant and transfer pumping. The latter two are negated in the in-region option and it is estimated that the carbon cost would be approximately 25% lower.

Biodiversity Net Gain and Natural Capital

By abstracting the resource into Longham Lake, under the in-region option, a corresponding volume that would normally be abstracted from the River Avon at Matchams would be reduced. This would improve flows in the River Avon downstream of Matchams. The environmental benefit that this would deliver has been evaluated as part of the BNG assessment for the gate 2 submission.

Both options would provide benefits to Poole Harbour, by reducing the amount of effluent it receives as well as improving flows in the River Stour between the discharge point and re-abstraction at Longham.

Phase 1 Conclusions

The option to use the source in-region was clearly shown to be of best value and therefore it has been taken forward to gate 2.

3.1.3 Phase 2 options appraisal

To systematically identify, develop and appraise the most efficient and cost-effective options for a raw water transfer from Poole STW to the River Stour and then re-abstraction at Longham Lakes, the project was split into the following components and a screening methodology detailed in Annex 1: Options Appraisal, applied to each:

- Poole STW – Effluent Discharge Connection and High Lift Pumping Station
- Poole STW to the Water Recycling Plant Raw Transfer Main
- Water Recycling Plant
- Water Recycling Plant to Wetland
- Wetland and Discharge to River Stour
- Longham Abstraction and Low Lift Pumping Station
- Longham Low Lift Pumping Station to Longham Lakes Inlet Pipes

The screening process for the unconstrained SRO options is undertaken using two stages, where the level of scrutiny increases from Level 1, high level assessment using key parameters to a Level 2 screening which delves into a greater level of detail.

Level 1 screening removes all the options from the list that have major technical, environmental constraints and/or through comparative rejection showing better, more feasible options. The outcome is a simple pass or fail with supporting reasoning.

Level 2 uses a RAG system (red/amber/green) to present the findings of the assessment and to demonstrate how the options perform against the assessment criteria. This covers all areas or design and delivery.

Of all the component options screened it became quickly evident during the Level 1 screening that feasible options were limited and that a clear option per component was identified due to major constraints and comparative rejection.

As such, only one option per component was passed to the level 2 screening stage. The short-listed components provide the most practical route in terms of constructability, ease of future maintenance and cost-effectiveness. Engineering judgement of the increased scopes and complexities of the other options determined that they would cost significantly more to construct, have greater Opex and Carbon impacts and/or impact programme, the environment, society or stakeholders more.

The elements taken forward to concept design are:

Table 3 Selected scheme components

Site	Ml/d	Option No	Option Name
Water Recycling Plant (WRP) (Location)	30	Option 4	Area Adjacent/East of Blandford Road
Poole STW - Effluent Connection	30	Option 2	New Connection & Wet Well
Poole STW to WRP Pipeline	30	Option 1	Gate 1 Northern Road Alignment
River Stour Wetland	30		
Longham Lakes Abstraction	25	Option 3	New Intake West & New Raw Water Main

3.2 Concept design

The concept design of the selected components has been undertaken in accordance with:

- RAPID's "2022 Strategic regional water resource solutions guidance for gate two", with cognisance of the quality assessment criteria of robustness, consistency and uncertainty.
- The ACWG Design Principles as set out in the completed audit trail tables provided in Appendix A of Annex 2: Concept design report, meeting the guidance criteria for Climate, People, Place and Value.

The selection of system components and their materials has been made by also considering their contribution and impacts across the range of social, environmental and economic best value criteria. In particular, we have developed the overall solution scope to maximise environmental benefits and sought opportunities to minimise the whole life carbon emissions.

These principles will continue to shape the development of the design solution, as work progresses through the gated process.

3.2.1 Promoting water recycling

As the river Stour is an existing water supply source that has a number of sewage treatment works discharges, upstream of the abstraction point, the risks and sensitivities around discharging another work's effluent for the specific purpose of being able to abstract an equivalent additional volume are well understood. The solution therefore includes a robust, scientific solution to potential water quality risks as well as features that will address customer and stakeholder perceived risks of the recycling concept.

The discharge point has been located approximately 15km upstream of the abstraction, such that there is a long environmental buffer between them. Following discussions with the EA and NE we have included a wetland to take the recycled water from the WRP to the river. At this stage, an initial, constructed wetland concept has been adopted to confirm the hydraulic feasibility by assessing whether evaporative losses would be acceptable and the discharge could be consented and monitored to enable the operation of a put and take licence arrangement.

The wetland will bring environmental benefits and will help deliver the aspirations of the partners promoting the proposed Stour Valley Park. Having the recycled water pass through the wetland into the river will also help improve customers' perceptions of the scheme by removing the impression of a sewer outfall pipe at the river bank and further increasing the overall natural scope of the solution.

3.2.2 Solution components

Provided in Table 4 below are the summary details of the key components of the scheme.

Table 4 Components Summary

Section	Description	Water Type	Max Ml/d	Pipe Dia (mm)	Pipe Material	Distance (km)	No Pump Stations	Treatment Storage	Water Recycling	Potential Wetland Area
1A	Poole STW - Effluent Discharge Connection and High Lift Pumping Station	Raw	30				1			
	Poole STW to Water Recycling Plant Raw Transfer Main			600	DI	6.52				
	Water Recycling Plant						1	2	1	
	Water Recycling Plant to Wetland			600	DI	0.57				
	Wetland and Discharge									5+ Hectares
1B	Longham Abstraction and Low Lift Pumping Station	Raw	25				3			
	Longham Low Lift Pumping Station to Longham Lakes Inlet Pipe			600	DI	0.18				

Water Recycling Plant

The concept water recycling plant design has been developed to mitigate the risks to both human health and environmental quality posed by the scheme. It includes the following process stages with their configuration shown in Figure 3 below:

- Flow buffering and attenuation to promote consistent feed water quality and system operation;
- Coagulation and flocculation to precipitate dissolved pollutants;
- Ballasted clarification to remove precipitated solids, reduce Total Organic Carbon (TOC) and protect the downstream filtration process;
- Filtration to minimize turbidity and provide a cryptosporidium barrier;
- Advanced oxidation (AOP) to remove trace chemical constituents and significantly reduce pathogenic microbial levels, and
- Adsorption to remove any disinfection by-products associated with AOP, and provide a secondary barrier for trace chemicals.

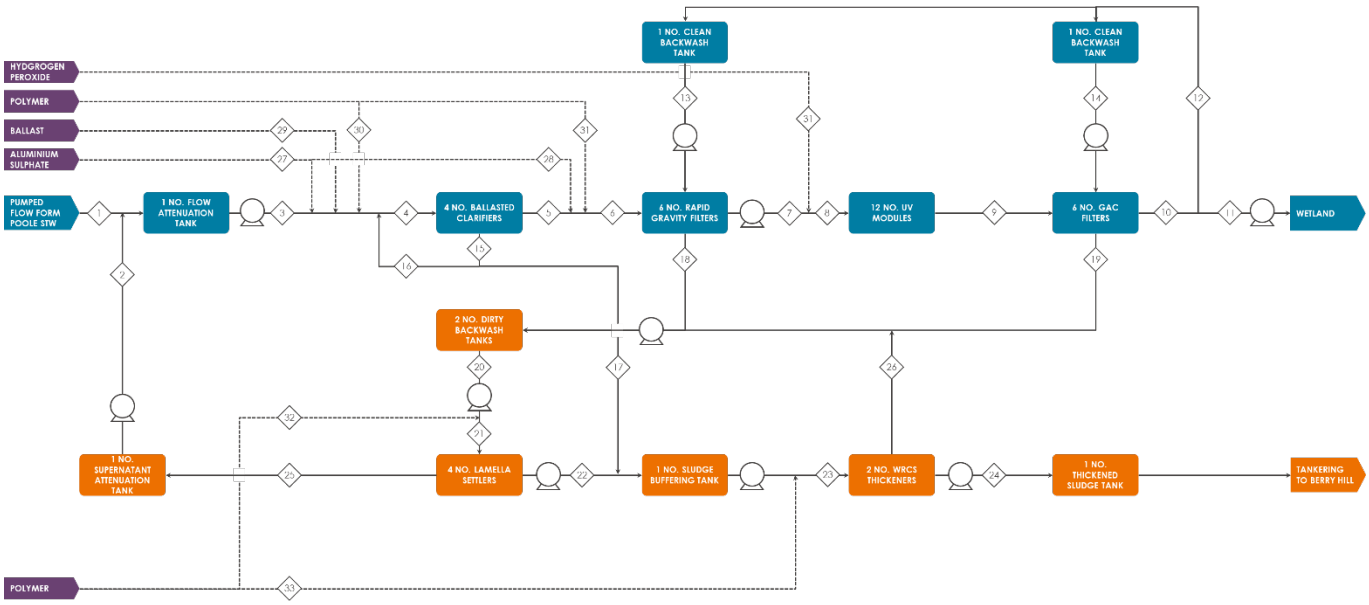


Figure 3 WRP concept process configuration

This treatment train will provide a level of multi-barrier protection sufficient to mitigate both the known and unknown risks discussed in Annex 4 - Water Quality, with scope for modular refinement once further water quality data has been obtained and analysed in the next stage of the project. The technologies selected at this stage are Drinking Water Supply Water Quality Regulation 31 compliant; they offer a range of procurement options and minimise complications related to unique and or proprietary systems (e.g. supply chain for critical components, warranty complications associated with significant flow variations or intermittency).

The additional data required to better understand risk and optimise mitigation will include (but not be limited to) microbial indicator parameters, endocrine disrupting substances, personal care products. A suite of parameters has been proposed in Annex 4 - Water Quality and should be finalised collaboratively with all stakeholders to ensure cost and programme efficiency.

Additional online monitoring of final effluent salinity, nitrate and Total Organic Carbon has also been proposed at Poole STW; this will provide valuable insights for scheme design in the medium term and enable proactive risk management in the long term.

As no land is currently available at or in close proximity to Poole STW, the additional treatment proposed will instead be located nearer to the River Stour discharge point. While this presents some constructability and existing third-party services issues, which may require refinement of the solution at the next stage of development, it also

- Creates a clear demarcation between conventional wastewater treatment and water recycling infrastructure, and
- Provides greater scope to develop a bespoke outreach and education centre to engage and educate customers.

Finally, it should be noted that while a wetland has been proposed to enhance the natural and social capital delivered by the scheme as discussed below, it has not been incorporated to achieve a specific treatment driver.

Wetland

The idea to incorporate a wetland as part of the scheme was agreed with stakeholders during the current phase of development. The design at this stage has therefore been limited to an arrangement that would not unacceptably impact on the scheme yield. The current design covers approximately 5 hectares to safely convey water with a flow rate of 30 Ml/d from the WRP to the river with a structurally complex emergent marsh surrounded by upland plant communities. The wetland includes a centre flow through channel with perimeter benched emergent and high marshes to both manage flow and provide habitat as shown in Figure 4 below.

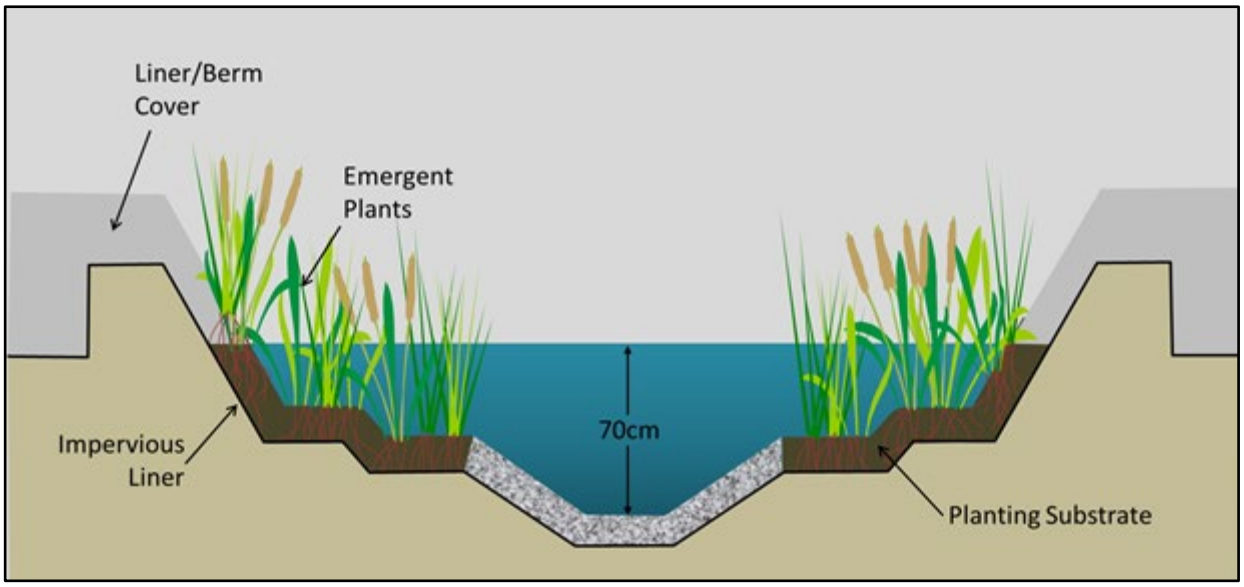


Figure 4 Typical wetland channel structure

Transmission Systems

The options are hydraulically viable and solutions have been designed to optimise the number of pumps in relation to the distances being covered.

We have also designed the hydraulics to limit normal operating pressure to a maximum of 16bar in the Poole STW to new WRP transmission system and 10Bar for the WRP to the wetland and Longham Lakes abstraction transmission systems. This was selected keeping in mind the risk of failure and consequence of higher-pressure pipelines.

We have selected pipe materials based on sound hydraulic principles, pipe pressure ratings, design limitations, ease of construction and the need for a high level of resilience, given the length of the system and the variable operating regime.

Pumps

Pumping stations have been designed using advice from suppliers and based on hydraulic analysis. They have been designed such that the layout provides generally a duty/assist/ /standby arrangement and they incorporate surge tanks where required based on hydraulic assessments.

4 Water resource assessment

4.1 Utilisation

The current scope of this SRO is to provide a replacement raw water source that will be treated at an existing water treatment works and as such does not increase the overall system deployable output. The scheme will help mitigate required sustainability reductions at SWW's abstractions on the river Avon by replacing water transferred from Matchams, into Longham lakes during periods when the current abstractions are negatively impacting flows in the river Avon. Analyses have shown that flows in the river Avon, downstream of Knapp Mill WTW are significantly below target in most years, during the summer lower flow periods. On average, flows are below target for approximately six months of the year between April and October and therefore the scheme will be utilised at capacity for this period. The scheme forms part of the overall strategy for reducing abstractions as set out in SWW's dWRMP24 for the Bournemouth area.

Currently SWW takes water from Matchams on the river Avon and from the existing abstraction on the Stour in to Longham lakes in roughly equal quantities during the summer months. The water is then transferred to Alderney WTW for treatment and onward distribution. Alderney WTW is currently undergoing reconstruction with the new works having a peak capacity of 81Ml/d and an average of 60Ml/d. The existing works have operated at an average of 52Ml/d and a peak of 76Ml/d. Longham lakes is a bank side storage facility to mitigate against short term risks to either of the river sources and as such does not have capacity to provide a resource benefit. Consequently, abstractions are managed within their licences to meet the demands on the WTW.

The following chart shows the recent historical abstractions at Longham on the river Stour and at Matchams on the river Avon. Abstractions from the Stour are minimised during winter high flow periods due to high turbidity and maximised during the summer to minimise the pumping costs from Matchams.

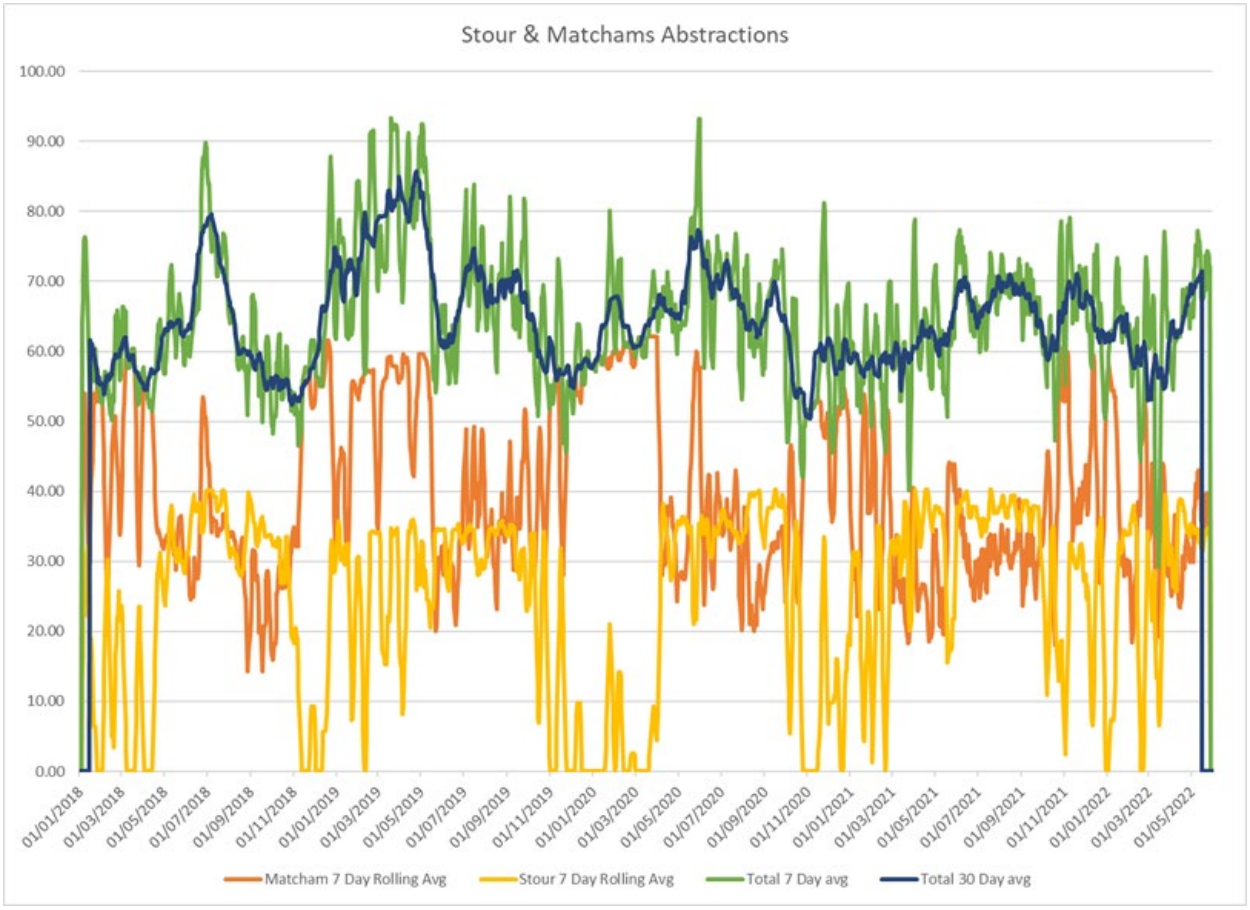


Figure 5 Longham and Matchams Abstractions

As can be seen in the chart, the flows from Matchams generally remain above 25Ml/d throughout the summer and therefore the SRO will be fully utilised during this period as a replacement source.

The recycled water discharge into the River Stour will be minimised over the six-month winter period, when the transfer from Matchams is not in constraint, to minimise costs and operational carbon and to maintain normal flows

in the River Stour. The WRP will need to be operated at 25% capacity during this period to keep the system operational and avoid stagnation risks. The discharge of 7.5Ml/d into the river will not need to be abstracted at Longham to meet the demands on Alderney WTW and therefore does not contribute to the total annual utilisation of the scheme. The need is anticipated in all years and the scheme capacity has been based on water availability under extreme drought conditions such that it can operate at capacity, if required, under all events including up to a 1 in 500 year drought. Table 5 below summarises the annual operation of the WRP and the utilisation of the water.

Table 5 Scheme Utilisation

Period	Recycled Water Discharge	Water utilised via Longham Abstraction
1st April to 30th September	28.6Ml/d	25Ml/d
1st October to 31st March	7.5Ml/d	0Ml/d
Annual Average	18Ml/d	12.5Ml/d

4.1.1 Put and take licence

To realise the benefit of diverting the effluent from Poole STW and treating and discharging the recycled water into the Stour will require an additional abstraction licence at Longham. We have discussed with the Environment Agency's national permitting team, the viability of abstracting a volume of water at Longham lakes, equivalent to that being discharged from the WRP, via the wetland upstream, net of instream losses. This will require a discharge consent for the water from the wetland into the river and it was considered that a standalone permit would be granted, subject to the necessary requirements for the new abstraction. This will require appropriate flow measurement of the discharge and determining the transient time for the water between the two locations as well as determining the extent of any losses from the river along the 15km stretch between them.

A programme of flow gauging and level monitoring has commenced along this stretch of river and the results will be shared with the Environment Agency such that an agreement in principle can be gained for consenting the proposed operational arrangement in advance of gate 3. This will provide the promoters of the scheme with assurance that they will be able to realise the intended benefit before committing to major capital expenditure.

4.2 Water resource benefit

This solution is founded on reusing effluent from Poole sewage treatment works (STW) and hence the future reliable quantity of effluent has determined its potential resource benefit. Historic and forecast future influent flows at the STW have been assessed to confirm the availability of water in drought events of up to a 1:500 year severity.

Daily inflow volumes from 2015 to 2019 have been analysed from which the minimum 7-day rolling average value, during the summer peak demand months (June, July and August) has been estimated at 31.8 Ml/d. This 7-day average could potentially be replicated across an entire month during a 1:500 drought it is considered to be a conservative estimate to adopt for the peak deployable output (PDO) across a drought period.

In consultation with WSX staff, we have then estimated that there is a 5% process loss from the existing treatment works and an additional 5% loss will be incurred at the new water recycling plant, such that 28.6 Ml/d could be discharged into the River Stour in the peak demand summer months. Whilst we await the completion of the flow accretion survey on the section of the river between discharge and abstraction, we have adopted a conservative estimate of instream losses from an initial desktop analysis to conclude that the scheme would enable an additional 25Ml/d to be abstracted in to Longham lakes.

4.2.1 Drought availability

In order to assess whether the deployable output (DO) values based on flows recorded between 2015 and 2019 would be available in more extreme drought periods, the flows have been compared against precipitation records. This showed that there the period analysed contains times when the precipitation is at its driest in the wider historic context, meaning the flow data used in the above DO assessments can be considered representative of the sort of magnitude of flows to be expected in a 1:500-year drought. Use of minimum 7-day average flows assumed to extend over a much longer peak demand period adds some extra confidence to the choice of PDO value.

4.2.2 Future effluent availability

Effluent discharge volumes from Poole will increase in the future in line with the forecast property and population growth of new developments in the area. However there will also be a downward pressure due to government's targets for future per capital consumption.

Forecast future water demand in the area will impact the resource availability as it is directly linked to the volume that will be returned to the treatment works. Water supply in the area is split between Wessex Water and Bournemouth Water. The properties sending wastewater to the works will mainly be supplied by Wessex Water with some Bournemouth Water supply properties potentially also connected to Poole STW. Both companies' WRMP19 forecasts showed relatively stable demand with housing and population growth being offset by water efficiency and leakage reductions.

4.3 Long term opportunities and scalability

The current solution has been scoped to be able to provide a 1 in 500 year drought resilient source, in line with WMRP guidance. This has limited its capacity to the reliable effluent availability under such conditions. The Poole STW catchment is a wastewater only system, with surface water managed through a separate drainage network. Consequently, the annual average flows are only approximately 10Ml/d higher than the drought values adopted in the solution. There is, therefore, limited opportunity to increase the yield of the scheme during normal conditions. As BW's dWRMP provides a solution for extreme drought resilience, increasing the capacity of this scheme for resilience in normal conditions would not be cost effective as the company's plan will already have a significant annual average supply demand balance surplus.

4.4 Flood relief potential

Flood risk to the proposed solution components, risks they could create and how they could improve overall flood relief have been considered within the concept design development as set out in Annex 2: Concept design report.

The hydraulic modelling results show that the introduction of the recycled water to the River Stour will result in increases in water levels in the lower flow range only and will not increase water levels at higher river flows and hence will not impact flood risk along the river.

5 Drinking water quality considerations

5.1 Introduction

The scheme is similar to de facto effluent reuse which is standard all across the UK, and has been happening on the River Stour for decades. It is an example of what can be termed planned Indirect Potable Reuse (IPR), a water recycling practice well established with a proven safety track record in water scarce regions including North America, Australia and Singapore, but relatively novel to the United Kingdom.

In this instance, the intention is to augment the River Stour, which is one of two raw water sources currently used to produce drinking water at Alderney Water Treatment Works (WTW), with suitably processed final effluent from Poole STW. This will help to unlock a wide range of water supply resilience and natural social capital improvements for the local community, which are discussed elsewhere in this report.

The typical risks posed by IPR systems were discussed in general terms in the Gate 1 submission, drawing upon international experience but considering the UK water industry context. This submission explores the scheme specific risks associated with the proposal in more detail, including

- the impact on the baseline water safety panning risk profile of the River Stour as a raw water source (section 5.2)
- the suite of control measures available to mitigate risks to human health and environmental quality posed by the scheme (sections 5.3 to 5.4.1), and
- the activities required to better understand risk and refine mitigation design.

5.2 Key water safety planning risk areas

The following sub-sections provide a summary of the water safety planning analysis, which is included in Annex 4 - Water Quality.

5.2.1 Baseline Risk Profile

Bournemouth Water operate Alderney WTW, which serves Bournemouth and parts of Poole, and undertake routine water safety planning risk analysis in line with water industry best practice. Their latest risk assessment has been used to evaluate the current risk profile of the River Stour using the ACWG methodology, with the results summarised below:

- **Microbial hazards** are the only parameters with a ***"high"*** risk score (4 parameters in total), with Cryptosporidium receiving the highest score in the assessment.
- A range of other naturally occurring, agriculture related or acceptability influencing **chemical hazards** have also been allocated ***"moderate"*** risk scores (14 parameters in total).
- All other parameters with an existing South West Water risk analysis were allocated a corresponding ***"low"*** risk score (32 parameters in total).

This risk profile, which is relatively typical of a lowland surface water influenced by STW discharges, provides an important baseline to help understand the potential impacts of the scheme.

5.2.2 Scheme Risk Implications

The River Stour already receives a number of treated final effluent discharges from STWs upstream of Longham Lakes.

The combined flow from these works, averaging approximately 14.6Ml/d between 2015 and 2021, but decreasing to 8.6Ml/d in dry summers over the same time period is significantly lower than the 28Ml/d maximum discharge of the scheme. As such, the proposal has the potential to significantly increase the treated wastewater content of the River Stour. Moreover, the Poole sewer catchment contains trade and industry activities that may not be present in the catchments upstream of existing discharges.

This has important water safety planning implications:

- I**ncreased Microbial Risks (e.g. from domestic sewage and medical facilities):** In general terms, STWs in the UK are primarily designed to protect the aquatic environment from human activities. They remove

substances from wastewater which could negatively impact the receiving waterbody, but are not purposefully designed to comprehensively remove all the viruses, bacteria and protozoa which may be harmful to human health (with some notable exceptions related to shellfish and bathing waters). A high quantity of secondary treated wastewater from a large sewer network such as Poole will contain a high microbial loading, particularly given the presence of medical facilities in the catchment, increasing the corresponding baseline water safety risk scoring accordingly.

- **Increased Chemical Risks (industrial wastewater, household cleaning products, urban surface runoff):** There are a variety of permitted trade discharges in the Poole catchment, with permit holders operating facilities that include metal working, food processing, industrial cleaning and landfill sites. While trade discharges are a small proportion of the flow received at Poole (equivalent to approximately 2% of the permitted Dry Weather flow), they may contain substances not present in the catchments of STWs which already discharge into the River Stour – with landfill leachate particularly difficult to characterise.
- **Increased Water Quality Uncertainty:** Between the size and urban population density of Poole, the scope for unknown substances to enter the sewer network is broad. This includes the personal and domestic care products, endocrine disrupting substances and other chemicals of emerging concern such as "*forever chemicals*" (e.g. PFOS, PFAS etc.).

At present, the data available to describe influent water at Poole is limited to the parameters used to understand the efficacy of wastewater treatment rather than the safety of potable water supply. A comprehensive, long term data capture programme is required to better understand water quality hence water safety planning risks.

5.3 Risk mitigation strategy

The aim of the risk mitigation strategy for the scheme is to ensure that there is no significant deterioration to the River Stour baseline water safety planning risk profile.

Until a more sophisticated picture of water safety risks is developed, a suite of conservative measures has been proposed for business planning purposes, summarised in Figure 5 below:

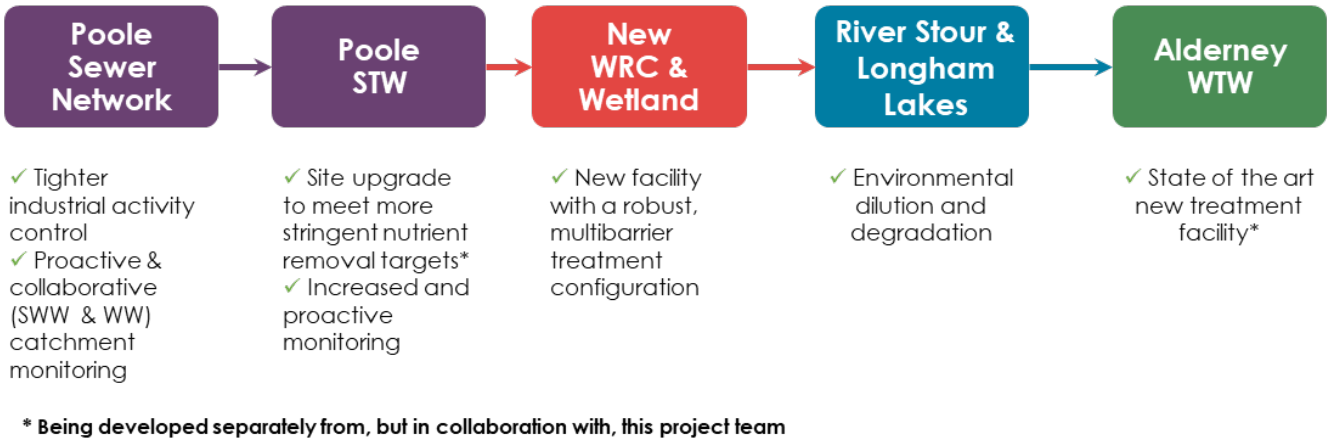


Figure 5 Risk mitigation strategy summary

This strategy will be refined based on further data capture, and ultimately pilot testing, to ensure that the solution selected protects public health whilst offering value for money.

5.3.1 Proactive Source Control

Wessex Water already undertake a proactive approach to management of non-domestic discharges within the Poole STW catchment.

The current approach will be reinforced by increased testing where deemed necessary based on trader activities and historic water quality data. The water safety planning risks posed by new applications will be considered collaboratively by an expanded Wessex Water trade and South West Water safety planning team on a case by case basis, with point source control or tankering diversions to alternative sites deployed where necessary.

5.3.2 Risk Informed Treatment Technology Selection

The scheme will incorporate a new Water Recycling Plant (WRP) upstream of the discharge to the River Stour, designed to mitigate the potential risks to both human health and the environment posed by the scheme.

It will be used in conjunction with proactive source control (Section 5.3.1), operated on data-driven risk analysis basis (Section 5.3.4), and refined based on data collected to better understand risk in subsequent project stages (Section 5.4.1).

The WRP will comprise the following key processes:

- Flow buffering and attenuation to promote consistent feed water quality and system operation;
- Coagulation and flocculation to precipitate dissolved pollutants;
- Ballasted clarification to remove precipitated solids, reduce Total Organic Carbon (TOC) and protect the downstream filtration process;
- Filtration to minimize turbidity, reduce downstream competition for oxidants, and provide a cryptosporidium barrier;
- Advanced oxidation (AOP) to remove trace chemical constituents and significantly reduce pathogenic microbial levels, and
- Granular Activated Carbon (GAC) adsorption to remove any disinfection by-products associated with AOP, and provide an additional barrier for trace chemicals.

This treatment train should provide a level of multibarrier protection sufficient to mitigate both the known and unknown risks discussed in discussed in Annex 4 - Water Quality, with scope for modular refinement once further water quality data has been obtained and analysed in the next stage of the project.

The technologies selected at this stage are also Drinking Water Supply Water Quality Regulation 31 compliant; they should offer a range of procurement options and minimise complications related to unique and or proprietary systems (e.g. supply chain for critical components, warranty complications associated with significant flow variations or intermittency).

As no land is currently available at or in close proximity to Poole STW, the additional treatment proposed will instead be located nearer adjacent to the River Stour discharge point. This provides an opportunity to

- Create a clear demarcation between conventional wastewater treatment and water recycling infrastructure, and
- Develop a bespoke outreach and education centre to engage and educate visitors to the adjacent wetland.

Finally, it should be noted that while a wetland has been proposed to enhance the natural and social capital delivered by the scheme, it has not been incorporated to achieve a specific treatment driver.

5.3.3 Validating Treatment Performance

Given that the treatment system will play a central role in regional drinking water supply resilience, a rigorous testing process will be required to establish that the required degree of treatment is achieved in commissioning.

This treatment validation process will be:

- developed to align with final technology selection (i.e. once further data is collected and the design is refined)
- draw from international experience validating the treatment efficacy of planned reuse systems (e.g. Stantec experience in North America and Asia-Pacific), and
- consider how treatment performance should be re-verified after significant changes in flow regime (i.e. from “sweetening flow” operation to full design deployable output).

It is important to note that while the system may only operate at its deployable output on an intermittent basis, it will function continuously to ensure availability when needed, hence will always have the potential to influence Longham Lakes. Ensuring sufficient treatment in “sweeting flow” conditions will, therefore, also be critical for regional water safety planning.

5.3.4 Long-term Monitoring for Operational Risk Management

A detailed treatment process operation and management plan will be developed to continuously ensure that risks are sufficiently mitigated throughout scheme operation.

This will plan will be developed to align with final technology selection once further water quality data has been collected to better understand risks hence refine design, but will include as a minimum:

- **Online water quality surrogate parameter monitoring.** This will be implemented at multiple critical control points (e.g. locations with important operational functionality), and will include parameters selected to characterise treatment performance relative to key substances of concern and groups of pollutants (e.g. conductivity, turbidity, pH, TOC, orthophosphate and nitrate).
- **Routine indicator parameter sampling and analysis.** Online data monitoring will be supported by routine sampling and analysis for a set of parameters selected to better understand removal efficacy in respect to key treatment targets. This suite of parameters will be significantly larger than those traditionally associated with municipal wastewater treatment systems in the UK, and may require careful planning to ensure lab capability and capacity are available when needed.

Given the relative complexity and criticality of the system in comparison to conventional wastewater treatment, extensive and scheme specific training will be necessary for the operations, process science and asset management team responsible for the treatment system.

Adopting a Hazard Analysis and Critical Control Point (HACCP) based approach to operation and maintenance, similar to that utilised for safe bioresources management, may be one means of establishing this in a governance structure familiar to UK water industry personnel.

5.4 Next steps required to develop water safety plan

The key next steps in developing the water safety risk mitigation aspects of the scheme are summarised below.

5.4.1 Short-term Data Capture for Broader Risk Understanding

The additional data required to better understand risk and optimise mitigation will include (but not be limited to) microbial indicator parameters, endocrine disrupting substances, personal care products.

A suite of parameters has been proposed in Annex 4 - Water Quality and should be finalised collaboratively with all stakeholders to ensure cost and programme efficiency. The final sampling programme will be developed with in-built flexibility, ensuring it reflects the latest industry understanding of risk (i.e. emerging DWI, CIP and EU watch list risks) and can be tailored in response to data already captured.

Careful consideration of planned upgrade work at Poole (and potentially Wimborne, the closest STW to the Longham Lakes abstraction) will be needed when designing this programme, and a balance struck between the progression requirements of this and parallel schemes.

In the short term, deployment of online conductivity monitoring in Poole STW final effluent will help to understand the risks salinity pose to the project and identify potential deterioration in the sewer network upstream of the works.

5.4.2 Harnessing the Experience of Successful Sister Schemes

There are a number of conceptually similar reuse schemes with a long-term track record of safe operation in North America, Australia and Africa and a selection of schemes which have addressed similar challenges in the UK, including the Langford, Deephams and Old Ford plants.

Engagement with teams who have designed, operated and maintained these schemes could provide invaluable insights on a range of topics from risk mitigation to public engagement, and this can be done in parallel with the data collection activity described in Section 5.4.1.

5.4.3 Enabling Evidence Based Technology Selection

Once additional data has been captured, and the water safety planning risk understanding updated accordingly (e.g. through quantitative microbial risk assessment), a pilot trial should be developed to identify the best possible risk mitigation technologies available and build operational familiarity.

Pilot and bench scale demonstration systems can also form an important part of education and outreach, and are discussed in Annex 4 - Water Quality.

6 Environmental assessment

As a major infrastructure project involving pipeline construction and a new river discharge and river abstraction, the construction and operation of the scheme (and constituent components) has the potential to generate a range of effects on numerous environmental, social and economic receptors. To address this during gate 2, the following technical environmental assessments have been undertaken as fully reported in Annex 5 – Initial Environmental Appraisal and Technical Appendices 5.1 – 5.5:

- Appendix 5.1 HRA
- Appendix 5.2 WFD Compliance Assessment
- Appendix 5.3 Natural Capital and Biodiversity Net Gain Assessment
- Appendix 5.4 Carbon Assessment
- Appendix 5.5 INNS Risk Assessment

The outcomes of theses regulatory and non-regulatory technical environmental assessments are summarised below.

6.1. Habitats Regulations Assessment (HRA)

The Habitats Regulations Assessment (HRA) report aims to establish whether the scheme is likely to have a significant effect on European sites, either alone or in-combination through *informal* Stage 1 Screening. This is judged in terms of the implications of the scheme on the site's conservation objectives, which relate to its 'qualifying features'. Where the scheme has been screened in, an *informal* Stage 2 Appropriate Assessment has been completed.

6.1.1. Results

A total of 14 European sites were screened in based on proximity (within 10 km) and hydrological connectivity to the proposed scheme. Likely significant effects at *informal* Stage 1 Screening were identified on five European sites during construction works. These included Dorset Heathlands SPA and Ramsar, Dorset Heaths SAC and Avon Valley SPA and Ramsar site.

Likely significant effects were also identified at *informal* Stage 1 Screening on 10 European sites during operation of the scheme. These included River Avon SAC, Poole Harbour SPA and Ramsar, Avon Valley SPA and Ramsar, Solent and Dorset Coast SPA, Solent Maritime SAC, Solent and Southampton Water SPA and Ramsar and South Wight Maritime SAC.

The scope of the *informal* Stage 2 Appropriate Assessments is summarised in Table 6. No adverse effects on European site integrity were identified based on currently available information. However, uncertainty remains regarding scheme design and composition of treated effluent for discharge into the River Stour. Therefore, the appropriate assessments will need to be reviewed and updated once more detailed information becomes available.

Table 6 Scope of the informal Stage 2 Appropriate Assessments.

Phase	Relevant European site	Scope of *Informal* Stage 2 Appropriate Assessment
Construction	Dorset Heathlands SPA and Ramsar	• The assessment considered the potential adverse effects from anthropogenic disturbance (noise, vibration and visual) on qualifying bird populations associated with Dorset Heathlands SPA. Species included in the assessment were informed by local record centre data. • The assessment considered the potential adverse effects from dust and air emissions on the Northern Atlantic wet heaths and acid mires; qualifying features of Dorset Heathlands Ramsar site and supporting habitat for qualifying birds of the SPA.
	Dorset Heaths SAC	• The assessment considered the potential adverse effects from dust and air emissions on Northern Atlantic wet heaths with *Erica tetralix*; and European dry heaths.
	Avon Valley SPA and Ramsar	• The assessment considered the potential adverse effects from anthropogenic disturbance (noise, vibration and visual) during construction of the intake and associated pipeline for the proposed abstraction on the River Stour into Longham Lakes. This is due to the potential functionally linked habitat for gadwall; a qualifying feature of both the Avon Valley SPA and Ramsar site.

Phase	Relevant European site	Scope of *Informal* Stage 2 Appropriate Assessment
Operation	River Avon SAC	• The assessment considered the potential adverse effects of changes in flow, velocity, depth and water quality on functionally linked habitat present in the River Stour on Atlantic salmon and sea lamprey. In addition, the potential impact of exposure to determinants and potential impacts on olfactory cues was considered.
	Poole Harbour SPA and Ramsar	• The assessment considered the potential adverse effects of changes in flow, wetted width and water quality in Poole Harbour and associated qualifying habitats of Poole Harbour Ramsar, as a result of the diversion of effluent. • The assessment considered the potential adverse effects of changes in the suitability of supporting habitat for qualifying birds as a result of the diversion of effluent and changes in flow, wetted width and water quality.
	Solent and Dorset Coast SPA	• The assessment considered the potential adverse effects of changes in water quality on supporting habitat of qualifying birds which include sandwich tern, common tern and little tern.
	Solent Maritime SAC	• The assessment considered the potential adverse effects of changes in water quality on qualifying habitats of the Solent Maritime SAC.
	Solent and Southampton Water SPA and Ramsar	• The assessment considered the potential adverse effects of changes in water quality on functionally linked habitat for qualifying birds of the Solent and Southampton Water SPA and Ramsar site. • The assessment considered the potential adverse effects of changes in water quality on qualifying habitats fully submerged or regularly inundated by the tide.
	South Wight Maritime SAC	• The assessment considered the potential adverse effects of changes in water quality on qualifying reef habitat.
	Avon Valley SPA and Ramsar	• The assessment considered the potential adverse effects from changes in water quality in Longham Lakes during operation of the scheme and potential impacts on functionally linked habitat for gadwall populations.

6.1.2. Nutrient neutrality

Natural England have raised concerns about the impact of the project on the nutrient load in the River Stour and its effect on the SAC and SSSIs in the area of The Solent, which is some 10–15km east of the mouth of Christchurch Harbour, where the Rivers Stour and Avon discharge into the sea in Christchurch Bay. The scheme is designed to operate on a 'put and take' basis so depending on the differences in concentrations of nutrients between the river and the discharge there may not be a significant change in the load. Our proposed way forward on this issue is to carry out a high level review of the likely changes in the River Stour to inform a workshop with stakeholders in order to understand whether it is a problem and the scale of the issue.

Then, if necessary, in gate 3 we will undertake a scoping study to gather data and understand the likely effects in order to inform a more detailed HRA. The scope will be subject to agreement, and could include:

- all potential projects in the Stour and Avon catchments (e.g. Poole effluent recycling and transfer SRO, Mendip quarries SRO, other projects in dWRMPs)
- ongoing changes in agricultural practice
- take into account planned changes for Poole Harbour
- liaison with Southern Water about changes in the contributors to Southampton Water
- mixing and currents in Poole Bay and Christchurch Bay and the flow regime between them and The Solent.

As this study is wider than just one SRO, we suggest that it may be appropriate for this to be included as a joint project in the PR24 WINEP

6.2. Water Framework Directive (WFD)

The Water Framework Directive (WFD) Compliance report sets out the WFD Regulations[4] Compliance Assessment for the scheme at gate 2. The study area for the WFD Regulations Compliance Assessment for the scheme at gate 2 relates to effects on surface waters, and is limited to specific reaches potentially impacted by construction and/or operation of the scheme. The list of water bodies passed forward for a detailed assessment, along with associated ACWG listed activities is provided in Table 7. Three water bodies, Poole Harbour, Hampshire Avon (Lower) and Christchurch Harbour, have been screened as compliant, and therefore not subject to Level 2 screening.

Table 7 WFD Compliance assessment summary – Water bodies passed forward to Level 2

WFD Water Body	Water Body ID	ACWG Listed Activity
Stour (Middle) d/s Pimperne Brook	GB108043016052	Low volume discharge of water with a quality element of the same or higher WFD status than the receiving water body
Stour (Lower)	GB108043011040	Transfer of water via a river, canal, or aqueduct. New or increased surface water abstraction

6.2.1. Results

Table 8 Gate 2 WFD Compliance Assessment Level 2 summary in both Stour (Middle) and Stour (lower) WFD waterbodies

WFD assessment objective	Potential non-compliance issues (high or medium confidence at Gate 2)	Potential non-compliance risks (low confidence at Gate 2)
To prevent deterioration of any WFD element of any water body	Fish olfactory cues (medium confidence in data at Gate 2).	Ammonia (low confidence in design at Gate 2) Fish (low confidence in habitat condition change at Gate 2) Chemicals (low confidence in data at Gate 2)
To prevent the introduction of impediments to the attainment of 'Good' WFD status or potential for any water body	Phosphate (medium confidence in data and design at Gate 2)	Macrophytes and phytobenthos combined (low confidence in data noting RNAG links nutrient pollution from sewage)
To ensure that the planned programme of water body measures in RBMP2, to protect and enhance the status of water bodies, are not compromised.	-	Phosphate (subject to further review in Gate 3 with EA and Wessex Water on planned catchment measures to reduce WRP loads)

Potential non-compliance issues at gate 2 associate most strongly with phosphate discharge from the scheme which is designed at 'best available technology' design quality of mean 0.25mg/l total phosphorus. The Gate 2 assessment using the EA RQP tool identifies within class deterioration at point of discharge and recognises that the current status is not Good status. Hence the Gate 2 assessment concludes the potential for introduction of an impediment to attaining Good status for phosphate. At the RAPID Gate 3 stage review and discussion will be required on environmental permitting, including discharge permitting of phosphorus and the wider context of catchment targets.

Other potential non-compliance issues associated with the scheme at Gate 2 associate with changes in water quality or changes in flow-dependent habitat. The changes in phosphate could impact on macrophytes and phytobenthos (dRBMP3 status less than Good in both water bodies) achieving target Good status. The Gate 2 design indicates total ammonia could reduce in status from High to Good, but this needs further evidencing around design in Gate 3, particularly linked to permitting and not just WFD compliance. Without bespoke understanding of the chemical

[4] Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017 No. 407

composition of Poole STW influent and/or final effluent a risk assessment of the efficacy of Gate 2 treatment design on prevention of deterioration or impeding attainment of target status is incomplete. Holistically these potentially impact on fish. The EA has identified difficulties in fish survey methods in the lower River Stour in general. As such an enhanced understanding of available habitats for the fish assemblage present and the magnitude of habitat change (both short and long term) from scheme operation is required.

6.2. Biodiversity Net Gain / Natural Capital (BNG/NC)

The Biodiversity Net Gain (BNG) and Natural Capital (NC) assessment completed at Gate 2 has informed the site selection work and provides a preliminary assessment of BNG and NC losses and benefits of the Scheme.

6.2.1. Results

A total of 15.6 ha of temporary habitat loss and 5.6 km of temporary hedgerow loss was calculated for the whole scheme due to pipelines and construction compounds. In the absence of off-site mitigation this would result in a net change of -57.7% BNG area units and -16.3% of hedgerow units. A total of 2.1 ha of permanent habitat loss and 0.07 km of permanent hedgerow loss was calculated for the whole scheme, in the absence of off-site mitigation, resulting in a net change of -100% BNG area and hedgerow units. The proposed wetland area creation would deliver an increase of 13.6 BNG area units which would equate to a 15.6% net gain for the permanent construction impact, which will be achieved via change in associated grassland habitat condition from moderate to high status. Areas of land which may be suitable for mitigation have been identified using scoring criteria with the highest scoring sites potentially offering more effective, functioning mitigation.

The overall environmental benefits in relation to climate regulation, natural hazard regulation and agriculture ecosystem services over the 80-year lifespan of the scheme have been calculated as having a value of £304,326. However, the Natural Capital methodology does not take into account the monetary cost of land acquisition and management for the required mitigation. The current buffer for the assessed components extends to just the assumed construction zones. Whilst acceptable for a high-level approach, greater detail will be necessary following stakeholder engagement, refinement of design and surveys to determine current habitat conditions as part of further scheme development.

6.3. Carbon Assessment

The Carbon Assessment presents the whole life carbon projection of the scheme, how carbon has been considered in best value planning decision making and identifies possible opportunities to further reduce emissions. The assessment includes the embodied and operational carbon impact of all scheme components, with the exception of the wetland, and estimates the whole life carbon impact of the proposed scheme. The wetland has been excluded from the assessment while conceptual design details are finalised but will be included in subsequent analyses.

6.3.1. Results

Embodied carbon from the initial construction of the assets associated with the scheme is summarised in Table 9 to provide a holistic view of the overall carbon impact of the scheme.

Table 9 Embodied Carbon Associated with SRO Construction

Solution	Embodied Carbon (tCO2e)
Poole WTW Pumping Station (HLP)	451
Transmission Lines (pipeline)	2,480
Water Recycling Plant (WRP)	6,481
Culvert Pumping Station (LLP)	212
Longham Abstraction and Intake Structure	222
Total	**9,847**

The water recycling plant is the most carbon intensive component (6,481 tCO_2e). This is largely attributed to the GAC media with a carbon impact of 3,120 tCO_2e (which accounts for 48% of the WRP's total embodied emission), due to the high emission factor of virgin GAC (10 $kgCO_2e/kg$). The remainder of the embodied carbon impact from

the WRP comes from the construction of different reinforced concrete (RC) tanks and units, along with the UV disinfection system and ballasted clarifiers and the supply of associated equipment.

Annual operational emissions of assets for 2035 (first operational year) is summarised in Table 10 for the full throughput, average and minimum utilisation scenarios.

Table 10 Annual Operational Carbon Associated with SRO Construction

Solution	Total Annual Operational Carbon for Full Throughput (tCO_2e)	Total Annual Operational Carbon for Average Throughput (tCO_2e)	Total Annual Operational Carbon for Minimum Throughput (tCO_2e)
Poole WTW Pumping Station (HLP)	171	107	43
Transmission Lines (pipeline)	-	-	-
Water Recycling Plant (WRP)	1,962	1,226	490
Culvert Pumping Station (LLP)	9	6	2
Longham Abstraction and Intake Structure	15	12	4
Total	**2,157**	**1,351**	**539**

Similar to the embodied carbon findings, the WRP is the most carbon-intensive of the assets associated with the scheme. This can be attributed to the high energy consumption in the WRP and the required GAC regeneration (associated with the energy use in production). The major energy demand comes from the UV disinfection system and ballasted clarifiers.

The overall 60-year whole life carbon of the scheme is summarised in Table 11 below.

Table 11 Whole life carbon summary

	Full Throughput (tCO_2e)	Average Annual Throughput (tCO_2e)	Minimum Throughput (tCO_2e)
Total embodied carbon (from construction)	9,847	9,847	9,847
Renewals for M&E and Steel/GRP (e.g. pumps and kiosks)	3,777	3,777	3,777
Renewals for consumables (e.g., GAC)	18,720	18,720	18,720
Operational carbon (electrical)	6,520	4,099	1,630
Operational carbon (chemicals and transport)	89,105	55,691	22,276
Whole life carbon (60 years)	**127,969**	**92,133**	**56,250**
Carbon intensity ($kgCO_2e/Ml$)	**195**	**224**	**343**

An indicative assessment of wind or solar requirements to meet the scheme's electricity requirements is shown below in Table 12.

Table 12 Indicative Renewable Energy Sources to Meet Electricity Demands for the WCS Poole Effluent Recycling and Transfers SRO

Solution	Full Throughput (hectares)	Average Annual Throughput (hectares)	Minimum Throughput (hectares)
Solar PV	19.7	12.4	4.9
Wind	1.6	1.6	-

6.4. Invasive Non-Native Species

The Invasive Non-Native Species (INNS) assessment conducted at Gate 2 provides an updated, detailed assessment of the INNS risk associated with construction and operation of the scheme based on the latest scheme understanding and methodologies.

6.4.1. Results

A total of 4 INNS were recorded between Poole STW and the wetland and 9 INNS were recorded along the River Stour to Longham Lakes during the baseline period within the NBN atlas, as shown within Table 13 below. An analysis of the INNS present in the operational catchment can be found in **Appendix 5.4 – INNS Risk.**

Table 13 INNS recorded within 500m of the scheme between 2010 and 2022 inclusive, from NBN records.

Component	Common Name	*Scientific Name*	Occurrences
Poole STW to wetland	Spanish Bluebell	*Hyacinthoides hispanica*	6
	Butterfly Bush	*Buddleja davidii*	2
	Rhododendron	*Rhododendron ponticum*	2
	Common Carp	*Cyprinus carpio*	1
River Stour to Longham Lakes	Himalayan Balsam	*Impatiens glandulifera*	6
	Japanese Knotweed	*Fallopia japonica*	3
	New Zealand Mudsnail	*Potamopyrgus antipodarum*	2
	Nuttall's waterweed	*Elodea nuttallii*	2
	Spotted touch-me-not	*Impatiens capensis*	2
	Least Duckweed	*Lemna minuta*	2
	Rhododendron	*Rhododendron ponticum*	2
	Tree-of-Heaven	*Ailanthus altissima*	1
	Butterfly Bush	*Buddleja davidii*	1

The movement of biological material in the form of soils and vegetative matter both to and from the site was identified as likely to be the most significant INNS transfer risk during construction. Several terrestrial invasive plant species have been recorded in proximity to the pipeline routes from Poole to the River Stour and from the River Stour to Longham Lakes. Also, given the requirement for modification of river banking there is an additional risk of immediate impacts to the River Stour and Longham Lakes. Given the short distance between the abstraction point and discharge, aquatic species such as New Zealand Mudsnail (*Potamopyrgus antipodarum*), Nuttall's waterweed (*Elodea nuttallii*) and Least Duckweed (*Lemna minuta*) may also present a transfer risk during construction for this aspect of the scheme.

Table 14 Results of the SAI-RAT assessment of the scheme

Name	Risk (%)
25 Ml/d River Stour Longham Lakes connection	41.25
Sweetening flow (7.5 Ml/d) River Stour Longham Lakes connection	43.25

The assessment completed using the SAI-RAT tool (Table 14), which assigns a risk value based on the characteristics of the transfer option, indicates that the transfer of the scheme-on volume and sweetening flow are likely to present a similar risk being scored at 41.75% and 43.75% respectively. Although there is a risk that INNS may be transferred during the operation of the scheme there already exists a hydrological connection between the River Stour and Longham Lakes in the form of an existing abstraction from the River Stour. The increased volume of transfer resulting from the implementation of the scheme may result in an increased propagule pressure upon Longham Lakes, but whether this will increase the potential for INNS to establish at the lakes is debatable. As such the relative impact of the operation of the raw water transfer aspect of the scheme is perceived to be minor at this stage, but confidence in this assessment is limited due to the lack of monitoring data available for the subject area.

Proposed monitoring of INNS at Gate 3 to further understand the risk they present during construction and operation, as well as an outline of potential mitigation measures, is described within the following section.

6.5. Risk assessment

An assessment of the key risks, as informed by the environmental assessments undertaken and summarised above, together with consideration of wider environmental issues, is presented in Table 15. More detailed identification of environmental risks can be found in Annex 5 – Initial Environmental Appraisal.

Table 15 Assessment of the key risks of the scheme.

Topic	Receptor	Activity and impact (construction and operational phases)	Embedded Mitigation	Additional mitigation	Uncertainties/Further Information Required	Risk RAG Rating
Biodiversity	European protected sites – SPA, SAC, Ramsar site	Poole Harbour SPA and Ramsar site; Dorset Heathlands SAC, SPA and Ramsar site (Corfe Hills) **Construction** • Loss of habitat or fragmentation; • Habitat deterioration (e.g. soil compaction); • Species disturbance loss or harm; and • Degradation of European Protected sites downstream and adjacent to the pipeline. **Operation** • Pollution and discharge risks to water quality (surface and groundwater) including from pipe sterilisation/ maintenance and associated outfalls to Poole Harbour.	Best practice construction measures	Pipeline/working area optimisation informed by habitat mapping and condition surveys. Avoid construction during nesting bird season (March – August inclusive). Habitat reinstatement following construction. Discussions with NE to agree additional mitigation measures.	Need for habitat mapping along pipeline route. Need for a Habitats Regulation Assessment with monitoring. Ecology and protected species surveys required to inform habitat sensitivity. Opportunity for biodiversity net gain including habitat establishment and improvement.	
Biodiversity	Invasive Non-Native Species (INNS) – Area surrounding the scheme	Transmission of INNS to / from the River Stour and Longham Lakes **Construction** • Risk of spreading INNS; • Establishment of INNS communities in new areas. **Operation** • Degradation or habitat loss from INNS; • Reduction in biodiversity and species richness; • Changes to extent and quantity of macrophyte, plant and animal species • Shift in trophic level food chain.	Best practice construction measures Mapping of INNS and locations with all relevant site method statements (including Ecological Protection Plan and Species Protection Plan)	Effluent to be stored in closed-storage containers to prevent secondary INNS transfer Equip abstraction with eel regulation compliant screens (2mm) All site staff to be made aware of the risks and implications of managing INNS Nominating a designated Clerk of Works to manage INNS from an early stage.	Monitoring of the River Stour at intervals between the discharge location and the abstraction point (wetland and Longham Lakes) to inform INNS risk. INNS specific monitoring of Longham Lakes Survey of the construction area to be completed during the growing season prior to work commencement.	
Water	The River Stour, Poole Harbour, Pimperne Brook and	**Construction** • Pollution and discharge risks to water quality; • Ground instability and contamination; • Loss or degradation of groundwater dependent terrestrial ecosystems (GWDTE);	Best practice construction measures	Monitoring of Poole STW final effluent, River Stour at Corfe Mullen and on the River Stour at Iford.	Monitoring of Poole STW final effluent against suite of EQSD chemicals and fish olfactory inhibitors for a minimum of 12 samples.	

Topic	Receptor	Activity and impact (construction and operational phases)	Embedded Mitigation	Additional mitigation	Uncertainties/Further Information Required	Risk RAG Rating
	surrounding water bodies	• Pollution risks to soil and land quality; • Soil erosion and sedimentation of adjacent watercourses; • Loss or reduction of flood plains (natural storage); • Increased flood risks (pluvial, fluvial and/or groundwater sources) resulting from temporary and permanent changes to ground conditions and/or drainage patterns. **Operation** • Degradation of water quality due to sedimentation and in-channel works, changes in river flows (resulting from abstractions and discharges); • Changes to watercourse geomorphology (bed and banks); • Changes in preferential flow regimes (surface and groundwater); • Impacts on fish, invertebrates and macrophyte habitats and behaviours; • Impacts on the characteristics of waterbodies designated as protected areas; • Impacts on public and private water supplies; • Potential changes in WFD status.		Discussions with EA & NE to determine the suite of chemicals and emerging substances to be screened for. Morphological Surveys undertaken to identify and map habitats within the reaches. Installation of continuous water level loggers in the River Stour between Corfe Mullen and Longham Lakes to understand risk of transmission losses and to validate hydraulic habitat models. Further detailed water quality assessment, including recommended water quality data. Eel screens at Longham Lakes to comply with the Eels (England and Wales) Regulations 2009.	Fish habitat (spawning/ nursery area) suitability to be investigated and recorded. River cross sectional surveys of bed profile, water depth and flow velocity in the River Stour between Corfe Mullen and Longham Lakes to better understand flow accretion.	
Historic Environment	Unknown archaeological assets	Potential for unknown archaeological assets particularly in the area of the proposed wetland, WRP and where the scheme converges with the routes of the Roman roads, and other undisturbed parts of the scheme **Construction** • Removal or disturbance of known or currently unrecorded archaeological assets; and • Temporary effects on the setting of heritage assets.	Best practice construction measures	Pipeline/ working area optimisation informed by Geophysical surveys. A full Historic Desk-Based Assessment (HEDBA) should be prepared and submitted alongside planning applications. Consultation with Dorset Council Archaeologist.	Geophysical surveys to be conducted at areas of archaeological potential along the pipeline route. Evaluation trenching to be employed in areas of potential archaeology, as advised by the geophysical survey.	

6.5.1. Key risks summary

Potential effects on the River Stour and other water bodies have been identified as being potentially major/moderate environmental constraints which are likely to be challenging to overcome (Red rating in Table 15). A range of potential effects have been identified, with potential changes in WFD status likely to be the greatest issue. However, this rating has primarily resulted from current uncertainty surrounding understanding of the effects and/or the scope/effectiveness of additional mitigation measures. There is particular uncertainty regarding water quality, geomorphological, hydrological and ecological conditions within the River Stour and a suite of surveys has therefore been proposed to address the data gaps at Gate 3.

Other topic areas for which major/moderate environmental constraints have been identified, but for which it is considered that with known or commonly applied mitigation measures the effect can be overcome (Amber rating in Table 15), include:

- **Poole Harbour SPA and Ramsar site; Dorset Heathlands SAC, SPA and Ramsar site (Corfe Hills):** Potential effects include for example loss or fragmentation of habitat and species disturbance, loss or harm. Proposed mitigation / enhancement includes best practice construction methods and exploring opportunities for biodiversity net gain including habitat establishment and improvement. Monitoring proposed at Gate 3 includes: habitat mapping along pipeline route and ecology and protected species surveys to inform habitat sensitivity.
- **Transmission of INNS to / from the River Stour and Longham Lakes:** There is potential for increased INNS pressure on Longham Lakes due to the installation and operation of additional abstraction infrastructure on the River Stour (although this is in the context of an existing abstraction already operating). Best practice construction measures and site method statements are proposed as mitigation. Monitoring proposed at Gate 3 includes: monitoring of the River Stour at intervals between the discharge location and the abstraction point (wetland and Longham Lakes) and INNS specific monitoring of Longham Lakes.
- Potential for unknown archaeological assets particularly in the area of the proposed wetland, WRP and where the scheme converges with the routes of the Roman roads, and other undisturbed parts of the scheme: Potential effects include removal or disturbance of known or currently unrecorded archaeological assets and temporary effects on the setting of heritage assets. Any required mitigation will be developed following geophysical surveys to be conducted at areas of archaeological potential along the pipeline route. Evaluation trenching will be employed in areas of potential archaeology, as advised by the geophysical survey.

6.6. Next Steps and Monitoring at Gate 3

The next steps for environmental assessment work at Gate 3 are summarised in Table 16 below. The table identifies the key data gaps and uncertainties remaining at Gate 2 and the work proposed at Gate 3 to address those.

Table 16 Next Steps at Gate 3

Receptor	Data gaps/uncertainties	Informing Topic	Proposed work at Gate 3
Invasive Non-Native Species	Currently INNS data are limited to the occurrence records from NBN Atlas. The majority of data available within open source datasets has not been captured as a result of INNS-specific surveys.	Invasive Non-Native Species	Specific monitoring of the River Stour at intervals between the discharge location and abstraction points to inform INNS risk. INNS-specific monitoring of Longham Lakes will provide an indication of the current impact distribution pathways and the effect the scheme could have on the spread of INNS to Longham Lakes. Monitoring should include a multi-method approach sufficient to capture the presence of various species belonging to different functional groups and should be supported by eDNA. A survey of the construction areas should be completed in the growing season prior to the commencement of work (note that this may be after Gate 3). This will enable targeted mitigation advice to curtail the risk of INNS transfer during construction.
Habitat	BNG / NC assessments have been undertaken using open-source data only	Biodiversity Net Gain/ Natural Capital / Ecological Protection	UK Habitat survey and BNG habitat condition surveys required of the full construction corridors to provide a complete baseline data set to inform the BNG metric calculations and reduce the assumptions required to determine the impacts and off-site mitigation requirements. This will inform the Potential Biodiversity Opportunities (PBO) and confirm the habitats present or the suitability for the required enhancements and could identify important linkages between enhancements. Hydrogeological studies to inform pipeline routing and depth in sensitive areas. Ecology and protected species surveys required to inform habitat sensitivity. Arboricultural surveys carried out commensurate to the level of detail required at Gate 3 and considering a construction start date of c. 2030.
Land ownership	Water company land assets data, as well as general land ownership, was limited for BNG/ NC assessment	Biodiversity Net Gain/ Natural Capital	PBO for BNG enhancement have been outlined in principle, but access to water companies' land assets and individual water company's BNG ambitions on their land holdings would support opportunities for BNG in Gate 3. Land ownership (private or water company assets) for PBOs was uncertain and needs to be investigated to inform opportunity areas. Stakeholder engagement to continue between Gate 2 and 3 to ensure synergy of ideas, additional data collection and mapping. At that stage the engagement plan should be further refined through discussion.
Geomorphology of the River Stour	River Stour geomorphology is not well understood	Habitats Regulation Assessment Biodiversity Net Gain/ Natural Capital Water Framework Directive	River cross sectional surveys of bed profile, water depth and flow velocity (using Acoustic Doppler Current Profiler) in the River Stour between Corfe Mullen and Longham Lakes to understand flow accretion and to validate hydraulic habitat models. This will aid the assessment of potential adverse effects on functionally linked habitat for Atlantic salmon and sea lamprey populations associated with the River Avon SAC. River MoRPh/ fish habitat surveys covering at least 20 % of the impacted reach to map the various habitats associated with the reaches. This will aid identification of suitable fish spawning and nursery habitats for Atlantic salmon and sea lamprey if present.
Water quality	Water quality data, water temperature and dissolved oxygen data are unavailable at a sufficient resolution on the River Stour	Habitats Regulations Assessment	Installation of continuous water level loggers in the River Stour between Corfe Mullen and Longham Lakes to both better understand risk of transmission losses and to validate hydraulic habitat models. Continuous monitoring of water temperature in both the Poole STW final effluent and the River Stour at Corfe Mullen.

Receptor	Data gaps/uncertainties	Informing Topic	Proposed work at Gate 3
	There has been no assessment of potential risk of change in fish olfaction inhibition chemicals in the River Stour There are data gaps for assessing aquatic ecology including spatial variability, particularly with regards to invertebrate, diatom and macrophyte data There is a lack of long-term ecological datasets for fisheries, development of operational control, including ramping up/down between standby (sweetening flow) and on periods for use in environmental assessment	Biodiversity Net Gain/ Natural Capital Water Framework Directive	An assessment of the macrophyte communities within the affected reaches will aid understanding of functionally linked habitat present in the River Stour for Atlantic salmon and sea lamprey populations. The proposed River Habitat Survey / Morph surveys should also be used to identify suitable locations for a future spot monitoring program for macroinvertebrates and diatoms, to bolster existing datasets and to provide seasonably variable, long-term and targeted monitoring. For this reason, existing EA sample sites should be included in the future monitoring program where possible. Monitoring of Poole STW final effluent, River Stour at Corfe Mullen and River Stour at Iford for a full suite of Water Framework Directive chemicals, Environmental Quality Standard Directive chemicals as additionally considered by the Environment Agency for environmental permitting and a suite of fish olfactory inhibitors (to be scoped and agreed with the Environment Agency) for a minimum of 12 samples. Fish passage barrier assessment during scheme operation to better understand risks to fish olfactory cues. Verification is required of hydraulic flood models for use under low-moderate flow conditions in the River Stour for fish habitat change assessment.
Water level	Water level monitoring was insufficient to understand the risk of transmission losses along the River Stour	Water Framework Directive Habitats Regulation Assessment	Installation of continuous water level loggers in the River Stour between Corfe Mullen and Longham Lakes to understand risk of transmission losses and to validate hydraulic habitat models.
Constructed wetland	Enhanced wetland design allowing environmental assessment.	Biodiversity Net Gain/ Natural Capital Water Framework Directive Habitats Regulation Assessment	Detailed design of the wetland and modelled effects on nutrient reduction and water temperature modulation are required at Gate 3 Outfall wetland design, including its potential effects on nutrient reduction and water temperature modulation, needs to be developed at Gate 3.
Archaeology and Heritage	Only initial assessment undertaken at Gate 2, therefore more detailed assessment required at Gate 3.	Archaeology and Heritage	A full Historic Desk-Based Assessment (HEDBA) should be prepared and submitted alongside planning applications. Geophysical surveys to be conducted at areas of archaeological potential along the pipeline route. Evaluation trenching to be employed in areas of potential archaeology, as advised by the geophysical survey.
Climate	Analysis of future carbon savings	Climate / Carbon	Pilot testing to understand performance, estimate corresponding renewal and replacement frequencies, and explore the whole life cost and carbon benefits of alternative approaches to treatment, including GAC. Detailed design to focus on whole life carbon savings.

7 Programme and planning

7.1 Project Plan

The overall delivery plan for the scheme reflects its dependency on and need for integration with WSX's planned upgrade to Poole STW and the work required in the remainder of AMP7 and into AMP8 to determine the water recycling plant treatment requirements to gain a consent for the discharge to the River Stour and for re-abstraction into Longham Lakes for water supply.

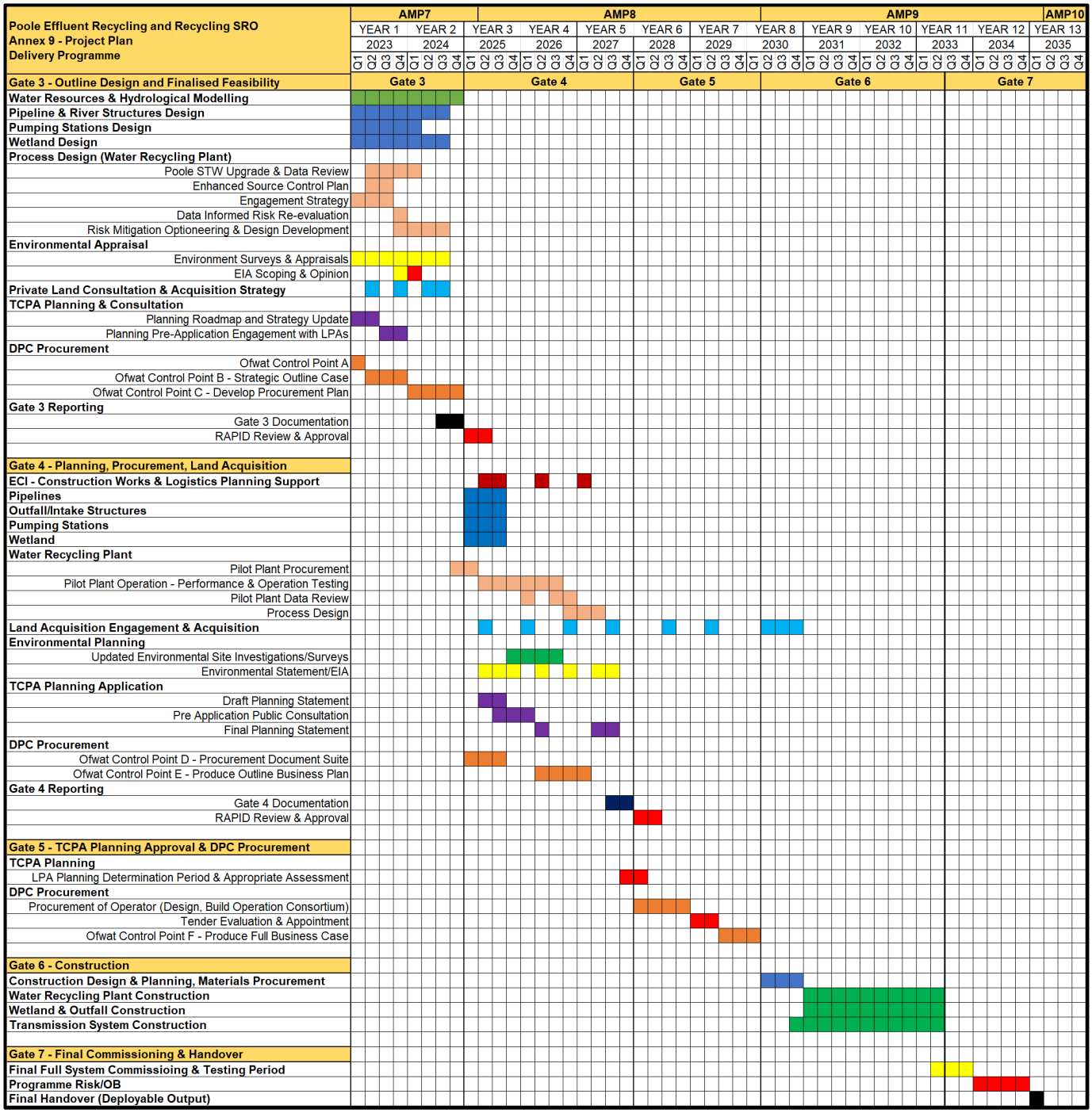


Figure 6 Delivery programme summary

The plan assumes work on the SRO will continue and gate 3 activities will start in January 2023 with submission in early 2025.

Following the scheme development and additional knowledge acquired at Gate 2 and reassessment of risks, the plan includes one year for risks. Thus, the central estimate for the overall future project duration is 12 years with beneficial use from 2035.

All the prompts detailed within the Gate 2 guidance document have been considered, as summarised below:

- The scheme is required to enable abstraction reductions on the River Avon, however its delivery needs to be coordinated within the improvement works at Poole STW.
- A total of 51 assumptions have been used to inform the programme, including:
    - The scheme will proceed based on the gate 2 concept design
    - DPC will be used to appoint a CAP for the transfer and WRP
    - Planning approval will be achieved via two TCPA applications.
- To ensure sufficient level of detail is available for the submission and remove the risk of potential changes post approval, design will be progressed to outline design level, designing to limits of deviation to allow for minor changes following consent. Any minor changes will be incorporated as part of the DPC procurement, where the tenderers will be required to undertake detailed design as part of their submission.
- Enabling works and mobilisation will start in summer 2030, with main construction later that year.
- With the project reverting to an in-region option and not required to meet the Southern Water's Section 20 date, the programme is on track.
- Gate 4 incorporates an extended period for operation of the WRP pilot plant.
- Gate 5 will consist of the DPC procurement of the DPC Consortium as well as TCPA approval with completion late 2029/early 2030.
- Due to the scale of the works involved we believe the funding currently allowed will not be sufficient to complete all the activities required for planning, environmental assessment, including detail design and procurement.
- Missing information – Section 7.5 below, provides a summary of the Gate 3 activities which includes investigation and survey activities across all disciplines to address unknowns and confirm assumptions.

7.2 Planning and consenting route

In broad terms there are two options for obtain consent for the proposed scheme, namely:

- TCPA 1990;
- Reliance upon PDR for relevant components in combination with planning applications under TCPA 1990 for all other infrastructure not benefitting from PDR.
- Outline planning permission followed by discharge of reserved matters
- Detailed planning permission
- Hybrid planning permission (combination of above, relating to different elements of a scheme)
- Planning Act 2008 (PA 2008) by means of a Development Consent Order (if qualifying or through a Section 35 Direction by the SoS).

The recommended consenting strategy has been determined by considering the scale, scope, and complexity of the Scheme, the merits and risks of each consenting option, and looking at the precedence of similar projects including lessons learnt from their applications.

The gate 1 submission did not recommend a consenting option, and instead provided the risks and merits of each consenting option and determined that there was insufficient information to recommend a single consenting option. As the scheme has advanced to the point of a chosen route with preliminary technical aspects known, a

recommended consenting strategy can be given. However, as the scheme is still being developed, any changes would require the recommended strategy to be reviewed and amended accordingly.

The recommended consenting strategy has been formulated through the analyses of the risks and merits of seeking consent through the PA 2008 and TCPA when taking into consideration the need for the scheme and its scale, scope, and complexity.

7.2.1 Recommended Consenting Strategy

It is recommended that the Scheme should seek consent as two separate TCPA applications.

One application should include:

- 7.2km pipeline from the Poole STW to the Water Recycling Plant (WRP);
- The WRP, wetland and discharging infrastructure.

A second application should include:

- The Longham lake intake (LLI) and associated infrastructure.

The reasoning for this recommendation and the main risk is set out below under the headlines of the key aspects of the scheme that have formed the recommendation.

Scale and Complexity

The scale and complexity of the Scheme means it likely would not benefit from using the DCO process. Furthermore, although the Scheme is of the type supported by the dNPS and is required to support the larger scope of the regional water resources plan, by itself the Scheme may struggle to demonstrate the "national significance" needed to secure a Section 35 Direction into the DCO process. For example, the scale and extent of the Scheme may only be considered locally significant and the need for multiple consents and/or the acquisition of additional land or rights may also be limited.

Two Applications

The distance between the pipeline / WRP and the LLI, the lack of physical connection and the fact the two elements can operate independently, would potentially mean that two separate planning applications would be required. Furthermore, the scheme spans two planning authority areas, and if submitted as one application, there is a greater risk of one of the authority areas, either holding the process up, or seeking to refuse a particular 'element'.

Submitting two applications can also simplify the process as each application would only include the pertinent information for the elements within that authority area. This would provide more clarity, and potentially reduce the information that each planning authority would need to consider.

The submission of two applications may also provide more opportunity for the use of PDR, as smaller schemes would have more chance of being classed as non-EIA development.

Permitted Development

Prior to submitting an application(s), it would be prudent to consult with the planning authorities and determine whether the Scheme would be considered EIA development, and if so, whether this applies to individual elements or the Scheme as a whole. If only certain parts are considered EIA development (e.g. the pipeline where it abuts the Dorset Heathlands SAC, SPA, Ramsar Site), other elements of the Scheme may be granted consent through PDR. This would greatly reduce the required assessments and resources needed to gain consent for the Scheme and could reduce the application to only include those elements that are unsuitable for PDR.

7.3 Key risks and mitigation measures

Risks to the cost, delivery duration and potential benefits of the scheme have been tracked through the gate 2 scheme development. As the studies and assessments have removed uncertainties, risks have been removed or reduced.

Overall, the greatest challenges for this scheme are related to diverting effluent for the intention of subsequent re-abstraction for water supply. This presents two key risks:

- Understanding the degree of treatment required to protect both the environment and human health upstream prior to discharge into the River Stour, and
- Ensuring public acceptance of intentionally using recycled water in the local supply system (there is a degree of natural, or de facto recycling inherent in the existing system, something common to many supplies across the UK).

These risks will be addressed through a combination of public engagement and water quality data analysis. The former will draw upon local and international best practice, with specialist services procured where necessary. The latter will encompass a comprehensive range of priority hazardous substances, personal and domestic care products and other emerging risks (e.g. “forever chemicals” including PFAS and PFOS) as discussed in the Water Quality submission, and be used to ensure robust mitigation measures are developed.

An updated quantitative risk assessment has been completed to inform the overall cost estimate for gate 2. The top three cost risks are presented in the table below.

Table 17 Key cost risks

Category	Description	Consequence	Probability score	Cost score	Total Score
Design uncertainty / complexity	Water Recycling - Salinity levels in Poole STW effluent are unacceptable	Part or all of the design flow will require cost and carbon intensive Reverse Osmosis or Ion Exchange treatment, dependent on salinity levels - or remediation within the upstream network to prevent saline intrusion	2	4	**8**
Stakeholder	Land Compensation	Costs higher than expected due to design constraints for location of sites, value of land or constraints with alignment make alternate route costly	3	3	**9**
Economic	Rise in cost of materials above inflation due to market forces	Increase in material costs	3	3	**9**

The key risks to the delivery schedule are summarised in Table 18 below.

Table 18 Key programme risks

Description	Consequence	Probability score	Schedule score	Total Score
Land Compensation	Additional costs due to higher than expected due to design constraints for location of sites, value of land or constraints with alignment make alternate route costly	3	3	**9**
Current assumption is that all major crossings can be undertaken using no dig solutions.	Risk that this assumption turns out to be incorrect, leading to realignment of the route in order to find a preferred alignment.	3	3	**9**
Failure to pass project level SEA/EIA/HRA (Failure of project to pass tests and/or failure of stakeholder approval)	Delays due to potential need to re-design and re-assess, increase in infrastructure complexity (and cost) and delay to operation start date.	3	3	**9**
DPC not appropriate due to interface with existing systems to maintain operability. DPC liability v Water Company Liability issues with provision of water	Delays to procurement process, causing programme and funding delays. Risk to Water Company if DPC progresses, understanding liabilities	3	3	**9**

Description	Consequence	Probability score	Schedule score	Total Score
Water Recycling - Salinity levels in Poole STW effluent are unacceptable	Part or all of the design flow will require cost and carbon intensive Reverse Osmosis or Ion Exchange treatment, dependent on salinity levels - or remediation within the upstream network to prevent saline intrusion	2	4	**8**
TCPA with Permitted Development not approved. All pipelines to be put through planning application as well as above ground infrastructure.	There is a risk that the timescales involved in approving each scheme are much greater than assumed in the schedule, leading to key milestones being missed.	2	4	**8**

Table 19 ACWG Risk Scoring Guide

Description	Probability	Cost impact	Schedule Impact
1 - Very Low	Improbable (1-10%)	Minimal (<1%) effect on project cost	No delay to project delivery
2 - Low	Remote (11-30%)	Small (1-2%) effect on project cost	Minimal (1-2%) effect on project delivery
3 - Medium	Possible - Likely (31-50%)	Moderate (2.1-5%) increase in project cost	Small (2.1 - 5%) delay to project delivery
4 - High	Probable (51-70%)	Significant (5.1-15%) increase on project cost	Significant (5.1-15%) delay to project delivery
5 - Very High	Almost certain (71-99%)	Major (>15%) increase in project cost	Major (>15%) delays to project delivery

7.4 Proposed gate 3 activities and outcomes

To support the consenting strategy outlined above, and to optimise a positive determination of the application(s), the following steps are recommended prior to the submission of the Scheme at Gate 3. Full details of the gate 3 planned activities are provided in Annex 9. The activities are to address the key risks and uncertainties regarding the yield of the scheme, water quality and cost and programme:

- Agree and initiate a long-term water quality data collection programme to better understand human health and WFD risks (e.g. 2 – 3 years sampling). The scope should be agreed with all relevant project stakeholders before commencement to ensure cost and programme efficiency, and to avoid duplication of effort with respect to other sampling activities. It should also be developed with the flexibility to account for wider industry developments and results collected to date (e.g. CIP, DWI and academic research).
- Deploy online salinity and TOC monitoring at Poole STW to build a better understanding of key treatment indicators, assess diurnal and seasonal salinity risks, and proactively monitor for saline intrusion into the sewer network.
- Engage with utilities who successfully operate similar schemes internationally (e.g. in North America and Asia Pacific) and nationally (e.g. Langford) to collate a reference library of reuse design, operation and asset management lessons learnt.
- Undertake focussed customer engagement on the scheme with the customer groups who will be receiving water from Alderney WTW. This will require developing an engagement strategy to gauge opinion, educate the public, and promote the wider benefits of the recycling scheme.
- Update the water safety planning risk profile with additional data when available, refine WRP technology options accordingly, then develop a trial system to identify the optimal configuration and build operational familiarity (e.g. 1 – 2 years operation).
- Continue to refine the detail of the Scheme including the proposed route, the red line boundary, the number of land parcels impacted, and the scale, location and type of on and off-site associated and enabling works.
- Complete flow accretion surveys to derive instream losses and overall scheme deployable output
- Develop the scope of the wetland as an integrated scheme component that does not significantly reduce the river flow augmentation.

- Understand the full suite of planning and non-planning consents to be submitted with the application, and the key information required for each consent, and the stakeholders that need to be consulted in relation to the consents.
- Undertake EIA screening and scoping with the local planning authority and conduct ongoing consultation with the Environment Agency, Natural England and other key stakeholders. Undertake environmental surveys to inform the scheme design and to support the EIA process. For the pipeline route and working areas these surveys to include arboriculture, habitat, ecology, protected species and archaeology geophysical surveys. For the River Stour these surveys to include water quality (including the Poole STW final effluent), water level, geomorphology, invasive non-native species (including Longham Lakes) and fish habitat suitability surveys.
- Prepare a consultation plan that identifies all key statutory bodies and affected parties/ landowners that would need consulting. Early consultation with the relevant planning and statutory environmental stakeholders is recommended to identify and mitigate planning risks early. Consultation with PINS should be undertaken to attain Section 35 planning advice.
- Prepare technical notes on the land rights, including the quantum and location of land parcels where CPO may be required, and a programme for consultation with the relevant land owners and CPO consent application(s). Legal advice should be sought on the CPO applications.

It should also be noted that there are several potential project interdependencies that could influence the scheme delivery timeline:

- **Pool STW Nutrient Removal Upgrade impact on WRP Feed Quality:** The existing treatment system at Poole STW will be upgraded to meet tighter Total Phosphorus (TP) and Total Nitrogen consents of 0.25mg/l and 5mg/l respectively. While it is possible for scheme to continue irrespective of this project, the upgrades required to achieve the tightened TP permit will achieve a broader improvement in water quality across a number of water safety planning parameters (whilst also potentially increasing metal content). The project is expected to be included in the PR24 WINEP with a timescale for the upgrade spanning AMP8 and AMP9.
- **AMP7 WINEP Schemes on River Stour Quality:** There are a number of Phosphorus permits being introduce at STWs discharging into the River Stour along or upstream of the reach influenced by the scheme. These will yield an improvement in water quality.

A decision on how to account for the former is particularly important, as data collection is on the critical path for risk mitigation design and pilot trial development.

7.5 Procurement, ownership and operation

7.5.1 Assessment for DPC

At Gate 1, this scheme was considered with a transfer to the Hampshire area. The SRO has now changed to an in-region option due to the requirement to reduce abstractions at Matchams. We note that further changes to the SRO are likely to be made as regional and individual plans are developed and water resource requirements evolve. This will be reflected in future gates, impacting on the DPC assessments and potential financial and contractual arrangements.

In Gate 2, the DPC analysis has been updated for the new scheme elements based on Ofwat's guidance[5] – including revised 'size' and 'discreteness' tests and a new 'value for money' test with the cost data now available. These tests have been run for Option 1, the scheme as a whole and two alternative options:

- Option 2: As Option 1 but excluding works at Poole STW and Longham Lakes
- Option 3: As Option 2 but excluding the wetland.

[5] Ofwat, Delivering Water 2020: Our methodology for the 2019 price review, Appendix 9: Direct procurement for customers (December 2017)

The table below summarises the results of the assessment for DPC:

Option	Size (£100m totex)	Discreteness	VfM	Overall recommendation
1. All DPC				Not suitable for DPC
2. As Option 1 but excl. Poole STW & Longham Lakes				Not suitable for DPC
3. As Option 2 but excl. wetland				Potentially suitable for DPC

The scheme as a whole and Option 2 pass both the size and value for money tests but are considered unsuitable for DPC based on the discreteness test. For Option 1, this finding is driven by the high integration with existing assets at Poole STW and pumping stations at Longham Lakes. For Option 2, this finding is driven by the nature of the works required in developing and maintaining a wetland area. Once these assets are excluded from the scope, the remaining elements of the scheme can be considered suitable for DPC.

7.5.2 Delivery parties

Based on the results of the DPC assessment, it is proposed that the following parties deliver each element of the scheme:

- **Wessex Water:** would undertake works for elements of the scheme that are considered not discrete and located in their region, i.e. Poole STW and wetland. Wessex Water will need to have contractual arrangements with the Beneficiary (South West Water) to specify the service required and recover costs.
- **South West Water:** would undertake works on elements of the scheme tied to their existing assets, i.e. inlet works at Longham Lake. South West Water would be expected to raise finance for its own works that it could recover from its customers.
- **Competitively Appointed Provider (CAP):** is the appropriate party to deliver the remaining elements of the scheme. Given the location of the assets and interface with the Wessex Water network, Wessex Water is considered to be the most appropriate contract counterparty. The CAP would seek to recover its finance costs from South West Water's customers (as Beneficiary) via Wessex Water, however, it will be reliant on Wessex Water and South West Water to complete the other works set out above.

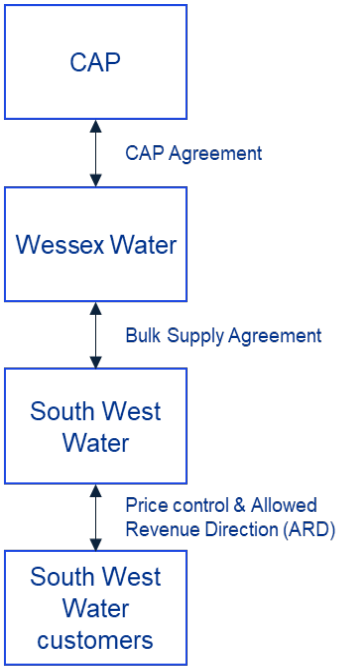
7.5.3 Contractual and operational arrangements

Set out below is an indicative contractual arrangement based on the delivery parties identified above. The principal purpose of each contract would be:

- *CAP Agreement:* sets out the services the CAP will deliver and the basis on which they will be paid. The payment amount will be based on the bid during the competitive procurement process.
- *Bulk Supply Agreements:* between South West Water and Wessex Water to include the provision of works required to be undertaken by Wessex Water and any payment for the water resource. Where Wessex Water is the CAP counterparty, there would also need to be provision for recovering CAP costs on a back-to-back-basis.
- *Price Control and Allowed Revenue Direction:* South West Water would be expected to recover the schemes costs from its customers, as appropriate. To date, ARDs have typically been developed where they are back to back with the CAP Agreement. We would need to discuss with Ofwat how the ARD would work where the Beneficiary is not the CAP counterparty.

Operation of the scheme as a whole may be through a number of alternative arrangements – for example bilateral communication between each party as required, or a System Operator relaying instructions to all parties.

While a system of bilateral communications may work in most eventualities, there is a concern as to how it would respond to disruptions in any part of the chain a central clearing house, or System Operator, may be required.



Illustrative financial structure

7.5.4 DPC tender model

For Option 3 the most appropriate tender model for appointing the CAP has been considered. Potential alternatives include:

- **Early model** – schemes will be tendered out once the preferred solutions have been identified by incumbent companies. The tender and handover of assets will be at the 'initial solution design' stage.
- **Late model** – schemes will be tendered out once after incumbent companies will obtain consent and initial design has been completed. The tender and handover of assets will be at the 'detailed design of assets' stage.
- **Split model** – scheme is tendered out in two separate tenders. One for the design and second for the construction and operation of the asset. Under this model, there will be two handover points, one at the 'initial solution design' stage and second at the 'detailed design of assets' stage.
- **Separation of construction and financing** – following the example of TTT, the separate procurement of the construction contractor and the project company that will finance and own the asset. This could be considered a bespoke version of the late model.

Based on a consideration of the examples where the alternative tender models have been applied or are in development (including Offshore Transmission Owners/ Competitively Appointed Transmission Owners/Private Finance Imitative/ Public Private Partnership/Thames Tideway Tunnel) we consider the late model to be the most appropriate tender model.

An early model may mean significant cost uncertainty at the time of appointment and the split model could add significant lead times with two procurements. Separating the finance and construction may mean that bidders are unable to optimise the risk allocation between contractors and the CAP. The late model can be aligned to the TCPA planning application timelines as well as providing additional benefits to customers in the form of fixed prices for the contract duration.

Additional consideration on whether there is a case for applying the Specified Infrastructure Projects Regulations (SIPR) will be undertaken at gate three. At that point, a case for moving the third party into a separate licenced entity (as in the case of TTT) in order to manage the size and complexity of the scheme, can be considered, however, it is unlikely given the current scope.

8 Solution costs

The capital and operating costs of the SRO have been updated from gate 1 to reflect the updated scope for the in-region use of the source and inclusion of a wetland as part of the recycled water discharge to the River Stour.

The capital cost estimate, including key risks and optimism bias have been calculated in accordance with the All Company Working Group Cost Consistency Methodology (August 2020) and Update to Guidance on Optimism Bias (1 February 2021).

Average Incremental Cost (AIC) estimation has followed the process from the All Company Working Group to ensure consistency in the calculation of Net Present Value (NPV) and AIC across all SROs. The estimation method is consistent with that used in WRMP24.

Full details of the cost estimation are provided in Annex 7.

8.1 Capital costs

The capex estimates have been produced using ChandlerKBS' Cost Intelligence Database (CID). The CID is a system of integrated cost databases and costing tools that allows users to review and compare multiple cost models, project data and indices to normalise and derive industry average costs for a range of asset drivers.

The CID comprises data from thousands of capital projects delivered by UK water companies over the past 20 years, including Wessex Water, South West Water, Bristol Water, Thames Water, Welsh Water, Scottish Water and Northern Ireland Water.

The process for deriving a 'total cost to client' capex cost was based on two approaches. A top-down estimate was initially assessed using high level, total cost to client rates and cost models. Subsequently, a low-level refined cost estimate was produced comprising direct costs and indirect costs.

Direct costs consist of aggregated labour, plant and material costs to reflect the scope. Indirect costs, relevant to the asset type, are added as an uplift factor to account for contractor management, design, tender-to-outturn and client overheads. Due to the highly subjective nature of land acquisition and power supply costs, these have been estimated with provisional sum allowances, which are also reflected in the key risk allowances.

To adjust cost data to account for its age, a factor has been applied that represents the industry's variance in construction costs from the cost data's base date to the estimate base date of Q3 2021. The adjustment factors have come from the Civil Engineering cost index (reference 1191) published by Building Cost Information Services (BCIS). To adjust cost data for UK regional differences, a factor has been applied to adjust the cost data's base region to reflect the UK average. The factor is determined by an index of UK regions (Regional Index) which is published by BCIS.

8.1.1 Risk

The Quantitative Cost Risk Assessment (QCRA) was carried with reference to the Cost Consistency Methodology Technical Note and Methodology (Revision C), dated 28 August 2020.

A Risk Workshop was held with the project engineering and design team and the costing team to identify the known risks associated with each project. The key risks were recorded using the All Company Working Group (ACWG) QCRA Template and are summarised in Table 16 in Section 7.3 above.

As specified in the QCRA Template, the risk cost included in the SRO Capex Cost estimates is the P50 value, whereby it is anticipated that half of the potential outcomes are expected to be below the selected value.

8.1.2 Optimism Bias

The Optimism Bias for the scheme was derived in accordance with the Cost Consistency Methodology Technical Note and Methodology (Revision C), dated 28 August 2020, and the Update to Guidance on Optimism Bias, dated 1 February 2021.

The proportions of standard and non-standard civil engineering activities were attributed, based on the estimated capex values of assets. This allowed the upper bound of optimism bias to be calculated. A review was carried out by the project team which had technical and commercial knowledge of the project together with an understanding of the approach to costing. Each contributory factor was considered and the extent that mitigation factors have been applied to produce a scaled back optimism bias.

Following completion of the capex cost estimating and the QCRA, a review was carried out to consider whether there was any further adjustment required to the optimism bias. The optimism bias percentage for the SRO was further adjusted to mitigate risks identified in the costed risk register, to give a final value of 38.5% as shown in Table 20 below.

Table 20 Optimism Bias

Risk Category	Optimism Bias Upper Limit (%)	Scaled Back Optimism Bias (%)	Risk Register Adjusted Optimism Bias (%)
Procurement	7.9	6.9	4.7
Project specific	18.7	14.2	10.6
Client specific	20.5	17.5	16.3
Environment	5.1	4.2	3.3
External influences	8.2	6.4	3.7
Total	**60.4**	**49.2**	**38.5**

8.1.3 Benchmarking

The benchmarking focused on the most significant cost components of the scheme capex cost estimate, i.e., pipelaying, including crossings, treatment works and water storage tanks.

The benchmark for pipelines utilised project cost data from various sources in the South West region. Major pipe laying projects were analysed to assess their alignment with the base estimate. In addition to the project cost analysis, recent estimates and benchmarks of similar works were utilised to identify a range of anticipated costs.

Overall, the benchmark estimate was within 5.5% of our scheme capex estimate and at a programme level, a difference in price of 10% would generally be an acceptable indication that the estimate of costs is in line with the market.

8.2 Operating costs

The opex cost estimate was produced from combining ChandlerKBS' CID data and Wessex Water rates for power and chemical costs. The estimate is based on modelled historical data and assumptions that can be affected by many different factors including operating regimes and raw water quality. ChandlerKBS' CID opex utilisation rates have been normalised to 100% and adjusted to align with the utilisation rates required by the scope.

8.2.1 Fixed opex

The fixed opex costs were calculated for the annual operation and capital maintenance costs of the assets irrespective of flow through the assets. Fixed opex costs were derived on the following basis:

- A base rate of 3.0% of mechanical, electrical and ICA (MEICA) capex
- Labour costs as a proportion of the MEICA capex costs per annum.

A benchmark check of the fixed opex cost calculation utilising an alternative base rate method of 1.5% of MEICA capex and 0.5% of civil capex derived a variance of circa 3%. This indicates a high confidence in the fixed opex value.

8.2.2 Variable opex

The Variable Opex cost per megalitre was calculated utilising the capacity driver of the individual assets to derive costs for power, chemicals, labour, maintenance and other costs.

Supporting information provided by the project engineering and design team that identified the anticipated power and chemical usage for each asset based upon the maximum and minimum outputs. Unit rates from the CID were applied to the power and chemicals usage. This information was used to adjust the CID opex models to suit the forecast operating regime of each site. However it should be noted that power and chemical costs have changed a considerably from the historic baselines in the past year and there remains a risk of further volatility.

8.3 Cost estimates

The 80-year NPV of capital financing costs, opex and Water Available for Use (WAFU) have been calculated using the AIC MS excel template produced by Mott MacDonald. The AIC tool calculates the NPV over an 80-year period from the beginning of the capital investment.

Maximum and minimum WAFU values are based on operating the scheme at its capacity of 25Ml/d and at its' 25% sweetening flow of 6.25Ml/d respectively.

The current proposal is that the scheme would operate at capacity for the six months from April to October and at the sweetening flow for the other six months, every year. This gives an anticipated annual average utilisation of 15.6Ml/d.

The 80-year NPV summary outputs are presented below in Table 21.

Table 21 NPV cost summary

	Min utilisation	Max utilisation
NPV Finance	£132.7m	£132.7m
NPV opex	£49.7m	£92.5m
NPV WAFU (m^3)	117,816,142	117,816,142
AIC (p/m^3)	155	191

9 Stakeholder and customer engagement

9.1 Stakeholder Engagement

Throughout Gate 2, an important element of the development of the preferred solution has been regular engagement with environmental and planning stakeholders. Consultation on the potential impacts of a new discharge of recycled water into the river Stour and the associated increase in abstraction at Longham lakes have informed both the scope of investigations and the solution components. Regular reviews of emerging findings and proposals have enabled work to progress efficiently and a clear plan of monitoring and investigations for the next phase to be established. Our engagement has included:

- Site visits to the proposed development site with Regulators' Alliance for Progressing Infrastructure Development (RAPID), with the Environment Agency (EA) and Natural England (NE) for a site introduction;
- Regular progress meetings with the EA and NE to review concept design and environmental assessment work, discuss environmental issues associated with each scheme (e.g. implications of proposed abstractions) and agree assessment scope;
- Introductory meetings with external stakeholders to introduce the project, including the Drinking Water Inspectorate (DWI), RAPID and local councils;
- Key milestone workshops with EA and NE to provide an update on the progress of the technical work undertaken and to enable discussions that guide further work that will be undertaken. During the workshops, local and regional specialists attended to provide further input and to make connections with our technical leads to take discussions offline;
- Topic specific meetings with EA and NE local specialists to enable an iterative procedure when completing the technical annexes/appendices and to ensure a comprehensive study is completed; and,
- Provision of draft environmental reporting to EA and NE for review, followed by meetings to discuss risks identified at component levels.

A schedule of all engagement activities undertaken is provided in Table 22.

Table 22. Schedule of Environmental and Planning Stakeholder Engagement for SRO at Gate 2.

Date	Engagement	Attendees	Agenda
11.11.2021	Biweekly progress meeting	EA & NE	Introductions and update on the evolving scheme design and environmental work to be carried out at Gate 2
25.11.2021	Biweekly progress meeting	EA & NE	Preparation for key milestone workshop, to present the findings of the Gate 2 Phase 1 work
06.12.2021	Key milestone workshop	EA & NE	Presentation outlining the key findings of the Gate 2 Phase 1 scheme design and environmental work followed by discussion
09.12.2021	Biweekly progress meeting	EA & NE	Follow up from workshop
23.12.2021	Biweekly progress meeting	EA & NE	Progress discussion, including regarding preparation of Gate 2 Phase 1 environmental technical reports
06.01.2022	Biweekly progress meeting	EA & NE	Progress discussion, including regarding preparation of Gate 2 Phase 1 environmental technical reports
20.01.2022	Biweekly progress meeting	EA & NE	Preparation for February site visit.
16.02.2022	Site visit	RAPID EA & NE	Project introduction and presentation on and discussion of key environmental issues.
21.04.2022	Monthly progress meeting	EA & NE	Recommencement of consultation Update of next steps
19.05.2022	Monthly progress meeting	EA & NE	Update on the overall project work completed to date Modelling of the wetland opportunity Put and take license agreement and discussion
16.06.2022	Monthly progress meeting	EA & NE	Update on the overall project work completed to date Modelling of the wetland opportunity Upcoming workshop set up and agenda

Date	Engagement	Attendees	Agenda
21.06.2022	Key milestone workshop	EA & NE (incl. local specialists)	Scheme level assessments emerging findings workshop Key questions for local specialists prepared and discussed
14.07.2022	Hydrology and future baselines meeting	EA specialists	Overview and review of the hydrological modelling completed and the inclusion of future baselines in the modelling
21.07.2022	Monthly progress meeting	EA & NE	Review of actions and progress updates from the June workshop
22.07.2022	Hydrology, water resources and fish stocks meeting	EA specialists	Review of the hydrological modelling Future baseline modelling
04.08.2022	INNS risk and fish stocks meeting	EA specialists	Sensitivities of fish stock on the River Stour Assessing INNS risk via onward transmission pathways
18.08.2022	Monthly progress meeting	EA & NE	Outstanding actions to be completed and programme review Clarity on the work being completed for emerging substances within water quality and WFD Availability of assurers and reviewers
07.09.2022	Introductory meeting	EA Area Director	Outline solution to EA area senior management
08.09.2022	Key milestone workshop	EA & NE (incl. local specialists)	Overview of preferred option and summary of environmental outputs from Gate 2 with further work outlined
09.09.2022	Put and take licence	EA national permitting and NAU	Discussion on consenting requirements for the operation of the discharge and abstraction on a put and take basis.

In addition to the above, regular, quarterly check point meetings have been held with RAPID where progress and emerging issues have been presented. These have enabled feedback from the regulators on the solution development and provided guidance on expectations.

A meeting was held on 26th July 2021 with BCP Council to present and discuss the proposed improvements at Poole STW and the Poole effluent recycling SRO. The meeting was attended by both officers and members of the council and there was general support for the SRO scheme from them.

Table 23 below summarises the feedback received at Gate 1 and how this has been addressed.

Table 23. Stakeholder Engagement action log

Date/ Consultee	Stakeholder feedback	How action has been addressed
Gate 1 - EA/ NE	Implications of new discharge point, offtake, bankside storage and intermittent operation will need to be carefully considered to avoid contravening WFD objectives and detrimental morphological change.	Key engagement has included workshops but also monthly progress meetings with EA/ NE to gain feedback from works being undertaken. To ensure that the scheme does not impede WFD objectives and induce detrimental morphological changes in the River Stour, next steps and monitoring at Gate 3 and beyond have been set out in Annex 5.
Gate 1 – EA/ NE	The River Stour is already failing due to orthophosphate impacts and eutrophic impacts. Any plans to bring in additional treated effluent needs to carefully consider nutrient loading and balancing in the catchment.	During the Gate 2 concept design phase, careful consideration of new emerging substances, from a water quality and WFD perspective, have been accounted for and designed to accommodate this. During Gate 2, consultation with EA/ NE has been ongoing, on a project wide basis, and WFD topic specific discussions with local EA staff. To ensure that the nutrient loading of the treated effluent does not impede improvements to water quality in the River Stour, next steps and monitoring at Gate 3 and beyond have been set out in Annex 5.
Gate 1 - EA	The reports suffer from adequate maps	During the Gate 2 submission, more maps, visualizations and schematic were sought to be included in final submission documents. The scheme is now presented in a visual format.

Regular engagement with environmental and planning stakeholders will continue and intensify at Gate 3 (and subsequent gates), with planned activities including:

- Early engagement with the EA and NE to agree the scope of the technical studies and associated surveys required in and around the River Stour. These studies will need to be completed in sufficient time to inform a refined options appraisal;
- Engagement with relevant landowners, statutory consultees, local planning authorities, MPs, local communities, businesses and relevant non-statutory consultees (e.g. environmental groups such as the Wildlife Trust);
- Monthly progress meetings with the EA and NE throughout Gate 3 to review design and environmental assessment work, discuss environmental issues associated with each scheme (e.g. implications of proposed abstractions) and agree assessment scope;
- Follow-up technical workshops with the EA and NE (and other relevant stakeholders as appropriate) to review environmental monitoring findings, address specific risks and likely significant effects, and review mitigation options.
- Provision of draft environmental reporting for review, followed by meetings to discuss risks identified at component and scheme levels.

Tailored briefing notes issued to and meetings with Local Planning Authorities hosting major infrastructure components to outline the relevant scheme, discuss how planning and environmental issues are being addressed and to inform the development of detailed consenting strategies (building on Annex 6 – Consenting Strategy).

Further consultation with relevant environmental and other relevant stakeholders should continue and intensify as the Scheme progresses to future appraisal gates. This should include updates to any existing stakeholder engagement strategy.in terms of the type and scope of the environmental assessments required, its potential impacts and to identify and respond to issues raised regarding the delivery of the Scheme. This should continue to include the EA and NE, but also relevant landowners, statutory consultees, local planning authorities, MPs, local communities, businesses and relevant non-statutory consultees (e.g. environmental groups such as the Wildlife Trust).

9.2 Customer Engagement

SWW held a number of customer focus group sessions to understand customer views on future pressures, including demand increases and environmental protection and improvement for the Bournemouth area. They also investigated preferences for demand and supply-side options within the WRMP. In total, 32 participants were involved in the in-depth discussions with focus groups including a cross section of BW customers (including a range of ages and socio-economic groups). All customers were responsible for their water bill.

The study provided the following findings:

- Customers are largely unaware of the scale of the challenges facing BW.
- They find it worrying that there may not be sufficient water supply in future and encourage BW to take action. Customers feel strongly that there should be greater awareness of future water supply issues and BW should be educating customers and planning for the long-term.
- Even at an early stage of the discussions, customers recognised that interventions will be required to address the pressures on future water supplies. They also accept some usage restrictions when absolutely necessary.
- Support for compulsory metering and reducing usage increases when customers are informed of the water supply challenges
- Customers consider metering to be a fair method of charging, although managing affordability is a key part of ensuring customer support.
- They agree that there is a collective responsibility for conserving water and feel it is realistic for most people in the country to reduce their daily water usage, especially if they are able to monitor usage.
- Of the supply options presented during the research, a new reservoir is customers' most preferred option.
- Customers are willing to accept the higher short-term impact of a new reservoir for a long-term benefit.
- They are less accepting of effluent recycling, due to concerns about chemicals, carbon, and increased energy usage. Some customers also feel it is unpleasant. Direct effluent recycling polarised views more than indirect recycling.
- Sharing water is seen as a fair option – customers feel it 'makes sense' providing that the region giving the water is not left lacking supply.

10 Board statement and assurance

Board statements

The Boards of each of the solution owners assure that they:

- support the recommendations for solution and/or option progression made in this submission
- are satisfied that progress on the solution is commensurate with the solution being "construction-ready" in the period 2025 to 2030
- are satisfied that the work carried out to date is of sufficient scope, detail and quality as would be expected of a large infrastructure scheme of this nature at this stage in its development
- are satisfied that expenditure has been incurred on activities that are appropriate for gate two and is efficient.

The Board statement (with signatures redacted) is included in Appendix 1.

Assurance

The final determination and the report template provided by RAPID calls for external assurance of the quality and consistency of data and approaches used in preparation of the submission, as well as evidence of efficient cost expenditure (refer to section 11 below). Based on feedback and lessons learnt from the previous gate one submissions the assurance requirements have been revised so that they focus on the desired outcomes rather than being a check on how well the submission templates have been completed.

In addition to internal review and sign-off by the team responsible for each workstream, members of the wider programme team and internal experts from the companies have reviewed the key deliverables.

Mott MacDonald, as independent third party external assurers, have reviewed the gate two report and the key supporting annexes, data and information. Table 24 summarises the assurance used to support the Board statement.

Table 24 Board statement and supporting assurance

Board statement	Assurance
The Board support the recommendations for solution and/or option progression made in this submission.	• The recommendations about scheme progression have been agreed by all the scheme partners and discussed with RAPID in advance of submission. • The recommendations align with the West Country Water Resources Group regional plan and with the partner's WRMPs. • The Executive directors of each partner have been briefed on the conclusions and approved the recommendations. • The progress on the project has been reviewed and delegation of authority to finalise, approve and submit has been obtained from the partner companies' Boards. • Third party assurance by Mott MacDonald
The Board are satisfied that progress on the solution is commensurate with the solution being "construction-ready" in the period 2025 to 2030.	• The supporting information and analysis set outs the data used to carry out the assessment. • A detailed project plan has been prepared and reviewed. • Third party assurance by Mott MacDonald. • For the Poole scheme the project plan indicates construction commencing in 2030. • This statement is not applicable to Southern Water.
The Board are satisfied that the work carried out to date is of sufficient scope, detail and quality as would be expected of a large infrastructure scheme of this nature at this stage in its development.	• Preparation of initial concept design and feasibility assessment by industry leading engineering consultancy company with their own internal review. • Peer review of documents by representatives of the partner companies. • Third party assurance by Mott MacDonald.

Board statement	Assurance
The Board are satisfied that expenditure has been incurred on activities that are appropriate for gate one and is efficient.	• Evidence of efficient cost expenditure has been reviewed by Mott MacDonald. • This follows an approach consistent with the successful gate one submissions in 2020 and 2021. • Third party assurance by Mott MacDonald.

11 Efficiency of expenditure for gate two and forecast for future gates

This section sets out:

- The gate two allowances, that is the maximum expenditure that the regulator has allowed for the gate two activities
- The actual gate two costs, with a breakdown, as well as a comparison with the allowance and the partner share percentages
- The forecast for future gates along with the proposed gate allowances.

11.1 Gate two allowances

The maximum allowances based on the PR19 final determination and the subsequent changes and adjustments are set out in Table 25 below.

Table 25 Gate two allowances

	£m @ 2017/18 prices	
Gate two	0.71	50% of the original PR19 FD allowances for two SROs: West Country South sources and transfers and West Country South – Southern Water transfer, in accordance with RAPID's final decision in September 2021
Underspend from gate one carried forward	0.09	As agreed with RAPID. 50% of the underspend for the two SROs.
Maximum allowance for gate two	0.80	Total

11.2 Gate two costs

As mentioned above, we adopted a phased approach to the gate two studies in order to maximise efficiency and provide justification for focussing the work on an in-region solution only. The phases comprised:

- Phase 1 to March 2022, covering the main factors affecting scheme feasibility, such as water resources assessments, as well as
    - Alignment with regional plans
    - Elimination of unfeasible or sub-optimal solutions (in accordance with the second bullet of section 3.2 of the guidance for gate two)
- Phase 2 to November 2022 for the preferred in-region option only
    - Concept design, environmental assessments and cost estimates.

This approach was endorsed by RAPID in May 2022, refer to our interim letter and RAPID's confirmation: interim letter relating to the West Country Water Resources solutions and the response from RAPID.

Table 26 below provides a breakdown of the costs for gate two, in the format requested by RAPID, at 2017/18 prices. It is based on actual costs incurred at the time of writing and a forecast of costs to complete. Current costs have been deflated to a 2017/18 price base using the CPI-H index. Of the total gate two expenditure 24% was incurred in Phase 1 to 31 March 2022, with the balance in Phase 2.

Table 26 Gate two efficiency of expenditure template

Category	Activity	Expenditure (£m @ 2017/18 prices)	% of Total Expenditure
Programme & Project Management	Programme management and partner costs	0.11	14%
	Technical assurance	0.03	4%
Feasibility Assessment and Concept Design		0.25	33%
Option benefits development and appraisal	Options development	0.07	9%
	Cost estimating	0.03	4%
Environmental Assessment		0.15	20%
Data Collection, Sampling, and Pilot Trials		0.02	2%
Procurement Strategy		0.02	2%
Planning Strategy		0.01	1%
Stakeholder Engagement	Environment Agency National appraisal unit and area costs (based on offer letters from EA)	0.03	5%
	Natural England Discretionary advice service costs	0.01	2%
	Stakeholder Engagement - other	0.00	0%
Legal		0.00	0%
Other		0.03	5%
Total		0.77	100%
Gate two allowance		0.80	
Gate Under / Overspend		-0.03	-3%

Expenditure on the gate two studies has been delivered efficiently, because:

- Work has only been undertaken on activities included in the list of gate activities in the PR19 final determination appendix for the specific solution
- The packages of technical work and environmental assessment have been awarded following competitive tenders or through framework agreements that were competitively tendered. Compensation events for additional work are based on the rates from the tenders. The packages are based on defined scopes of services, activity schedules, defined deliverables and key dates.
- Programme management and scheme partner in-house staff costs are based on actual and forecast staff time (hours) and rates, with defined scopes and budgets which are subject to regular reviews.
- Efficiencies have been realised by running the two standard gate two solutions (Cheddar two source and transfer & Poole effluent recycling and transfer) as a single programme with a single programme manager, combined governance and steering group meetings and combined checkpoint meetings etc.
- We agreed with RAPID to eliminate unfeasible options and sub-optimal inter-regional options early in the programme.

The change in solution scope agreed with RAPID in May 2022 gives rise to some changes in the solution partner arrangements. At PR19 there were three partners including Southern Water, who were originally intended to be the beneficiary. With the change in scope to a solution for in-region use only rather than an inter-regional transfer, it was not appropriate that Southern Water continued to fund the development. Therefore Southern Water have dropped out as a partner as from the end of Phase 1 on 31 March 2022. Their share of the project budget is reallocated to the remaining partners on a pro rata basis.

The revised solution partner shares are as shown in Table 27 below.

Table 27 Revised solution partner shares

SRO	SWB	WSX	SRN	BRL	Comments
Gate 2 original %s to 31 March 2022					
Poole effluent recycling and transfer	41.1%	29.5%	29.5%	0.0%	Revised following merging of 2 SROs as agreed with RAPID
West Country - Southern Water transfer	n/a	n/a	n/a	n/a	Stopped
Gate 2 revised %s from 1 April 2022 onwards					
Poole effluent recycling and transfer	58.2%	41.8%	0.0%	0.0%	SRN drop out, pro rata balance
West Country - Southern Water transfer	n/a	n/a	n/a	n/a	Stopped

Thus for example Southern Water's (SRN) expenditure is 29.5% of the phase 1 expenditure, which was 24% of the total gate two expenditure (i.e. £0.76m x 29.5% x 24% = £0.05m).

11.3 Forecasts for future gates

No gate three activities have been advanced into the gate two period, and therefore Table 11.2 above does not include expenditure for any gate three activities.

The proposed gate three activities and timelines are described in section 7 above. The aim of gate three is to demonstrate substantive progress in solution design, costs and benefit assessment, planning and consenting, procurement, environmental and drinking water quality assessments, such that the project can be implemented to the required timeline. The required timeline is driven by the need in the regional and company water resource plans and the lead-in time of the solution.

Table 28 below provides a preliminary estimate of the expenditure required for gate three and gate four. This is indicative and will need to be developed 'bottom up' once the timeline for the project is confirmed in final WRMPs.

The gate three programme includes proposals for extensive pilot trials at Poole STW. The trials will need to include a pilot plant for the proposed enhanced nitrogen and phosphorus removal providing the feed water to a pilot plant of the proposed water recycling processes. The trials will be required over an extended representative period of up to two to three years. There will be an comprehensive water quality sampling and analysis programme as outlined in Annex 4. A preliminary cost estimate is included in the table below. These costs do not scale according to scheme size i.e. the pilot plant costs will be similar for a 30 Ml/d scheme and a 300 Ml/d scheme. Thus we consider that an extra-over allowance is required as set out in Table 28.

Table 28 Preliminary gate three and four estimate

Category	Activity	Expenditure (£m @ 2017/18 prices)			% of total expenditure
		Gate three	Gate four	Total	
Programme & Project Management	Programme management and partner costs	0.5	0.5	1.1	10%
	Technical assurance	0.05	0.05	0.1	1%
Feasibility Assessment and Concept Design	Concept design	1.7	0.3	2.0	19%
Option benefits development and appraisal	Options appraisal	0.5	0.0	0.5	5%
	Cost estimating	0.1	0.1	0.2	2%
Environmental Assessment		0.4	0.4	0.8	8%
Data Collection, Sampling, and Pilot Trials	Data collection & sampling	1.0	0.7	1.6	15%
	Pilot Trials	0.5	1.1	1.6	15%
Procurement Strategy		0.1	0.2	0.3	3%
Planning Strategy	Including project plan	0.2	0.3	0.5	4%
Stakeholder Engagement	Environment Agency National appraisal unit and area costs	0.23	0.23	0.5	4%
	Natural England Discretionary advice service costs	0.05	0.05	0.09	1%
	Stakeholder engagement	0.1	0.1	0.3	3%
Legal	Land	0.2	0.2	0.4	3%
Other	Contingency	0.5	0.5	0.9	8%
Total		6.1	4.7	10.8	100%

Solution partner shares are as shown in Table 29, based on carrying forward the revised percentages from gate two. We recognise that it would be best to base the percentage share of costs by partner on the final agreed shares of the deployable output of the scheme, but these will only be available once the final WRMPs are approved. Therefore we propose that the solution partner share percentages are revisited during the gate three period.

Table 29 Gate three solution partner shares

SRO	SWB	WSX	SRN	BRL	Comments
Poole effluent recycling and transfer	58.2%	41.8%	0.0%	0.0%	As Gate 2 final

Although we have been able to achieve all of the key deliverables during gates one and two, the available funding allowances have been constraining. The original PR19 development allowances for all of the West Country strategic resource options were based on a capital cost derived from a notional £ per Ml/d. These notional capital cost estimates have been shown to be substantial underestimates.

For gates three and four the allowances will need to be reset as part of PR24. Based on the latest capital cost estimate we have re-calculated the total gate three and four allowances @ 2017/18 prices. The proposed timeline for the project now extends into AMP8 rather than being completed in AMP7 as per the original PR19 plan. We have limited the gate three expenditure in AMP7 to no more than the remaining allowances allocated at PR19, with the balance of the new reset allowance in AMP8. The proposed allowances are set out in Table 30 below, along with an indicative phasing. The actual/forecast expenditure in AMP7 will be reconciled with the PR19 allowances through a PR24 reconciliation model. Any underspend or overspend at each gate can be carried forward to the next gate.

Table 30 Proposed gate three and four allowances

£m @ 2017/18 prices		AMP7/PR19		AMP8/PR24		Total
Original PR19 allowances - revised following merger of two SROs		**G3**	**G4**	**G3**	**G4**	
		1.66	1.90	0.00	0.00	3.56
Proposed reset allowances			**G3**	**G3 continued**	**G4**	
	'Reset' based on latest capex estimate		1.8	1.0	3.1	6.0
	Extra-over costs for pilot plant, sampling & monitoring		0.8	0.8	1.7	3.3
	Total		2.6	1.8	4.9	9.3

The Poole effluent recycling and transfer SRO is on the preferred pathway in SWB's and WSX's WRMP and therefore we request a revised allowance of £10m for gates three and four.

For solutions that progress beyond gate two cost sharing is applied to the ring fenced development allowance as set in the PR19 final determination appendix, with 50% of underspend or overspend shared between customers and the water companies. Therefore it is essential that the allowance reflects the agreed scope and is based on an up to date capital cost estimate.

12 Conclusions and recommendations

The conclusions and recommendations are agreed by all the scheme partners.

The initial phase of the gate 2 work, which has already been agreed with RAPID, concluded that the best value use of the water resource was as an in-region option only.

Based on the gate 2 studies, we conclude that the scheme:

- is technically feasible and deliverable
- has minimal environmental impact and multiple environmental benefits
- would provide a drought resilient water resource of 25Ml/d
- can be construction ready by 2030
- needs to continued development to resolve the remaining risks and uncertainties
- provides a best value solution as an in-region option to meet forecast deficits in the Poole/Bournemouth area.

The project is selected in both Wessex Water and Bournemouth Water's dWRMP24, providing justification of the need for the solution, as a shared scheme.

Therefore it is recommended that the scheme proceeds to gate 3.

13 Supporting documentation

Details of the various work stream activities and their findings that have been undertaken during the gate 2 programme are documented in the following supporting reports.

Reference	Document
Annex 1	Options Appraisal
Annex 2	Concept Design
Annex 3	Water Resources
Annex 4	Water Quality & Treatment
Annex 5	Initial Environmental Assessment
Appendix 5.1	HRA
Appendix 5.2	WFD
Appendix 5.3	BNG
Appendix 5.4	INNS
Appendix 5.5	Carbon
Annex 6	Planning
Annex 7	Cost Estimation
Annex 8	Procurement
Annex 9	Programme

Appendix 1: Board statement

POOLE EFFLUENT RECYCLING AND TRANSFER STRATEGIC RESOURCE OPTION

The Boards of each of the solution partners assure that they

- support the recommendations for solution and/or option progression made in this submission
- are satisfied that progress on the solution is commensurate with the solution being "construction-ready" in the period 2025 to 2030
- are satisfied that the work carried out to date is of sufficient scope, detail and quality as would be expected of a large infrastructure scheme of this nature at this stage in its development
- are satisfied that expenditure has been incurred on activities that are appropriate for gate two and is efficient.

Signed by

Andy Pymer

Director of Regulation and Finance

On behalf of

Wessex Water Services Ltd

Signed by

Dr Lisa Gahan

Group Director of Regulatory, Strategy and Asset Management

On behalf of

South West Water Ltd

Signed by

Malcolm Cooper

Non-Executive Director

On behalf of

Southern Water Services Ltd

With respect of the work completed prior to the change of scope on 31 March 2022 as agreed with RAPID and excluding the second bullet of the above statement.