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# Gate one submission for Lower Thames to West London Reservoirs Strategic Resource Option

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Solution owner(s): Thames Water

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# 1. Recommendations

- 1.1 Thames Water recommends the Lower Thames to West London Reservoirs (LTWLR) Strategic Resource Option (SRO) progresses to gate two. The proposed date for gate two is 28 October 2027.
- 1.2 There are no changes to the solution owners at gate one.
- 1.3 We enclose a letter signed by an executive director stating that Thames Water’s Board has received reports on the solution and is aware of the gate one submission.
- 1.4 As the LTWLR project evolves through subsequent RAPID gates, we are keen to move to a name that is easy for members of the public to understand and supports both the project's purpose and outcomes. We have developed options for a new name, which are currently going through customer research testing. Our intent is to move to a new project name in early 2026, once we have the results of the customer research.

## 2. Initial outline design

### 2.1 Overview and context

2.1 The West London Reservoirs (WLRs) are part of the raw water storage system serving customers in London. It consists of two separated systems, both filled from intakes along the Lower Thames. The WLRs can be divided into two discrete systems which sit north and south of the River Thames. The northern WLRs have a larger overall storage volume and are supplied by different intakes than those serving the southern reservoirs. Each subsystem also delivers water to a different configuration of water treatment works (WTWs), reflecting their separate operational roles within the wider supply network. See Figure 2-1 below.

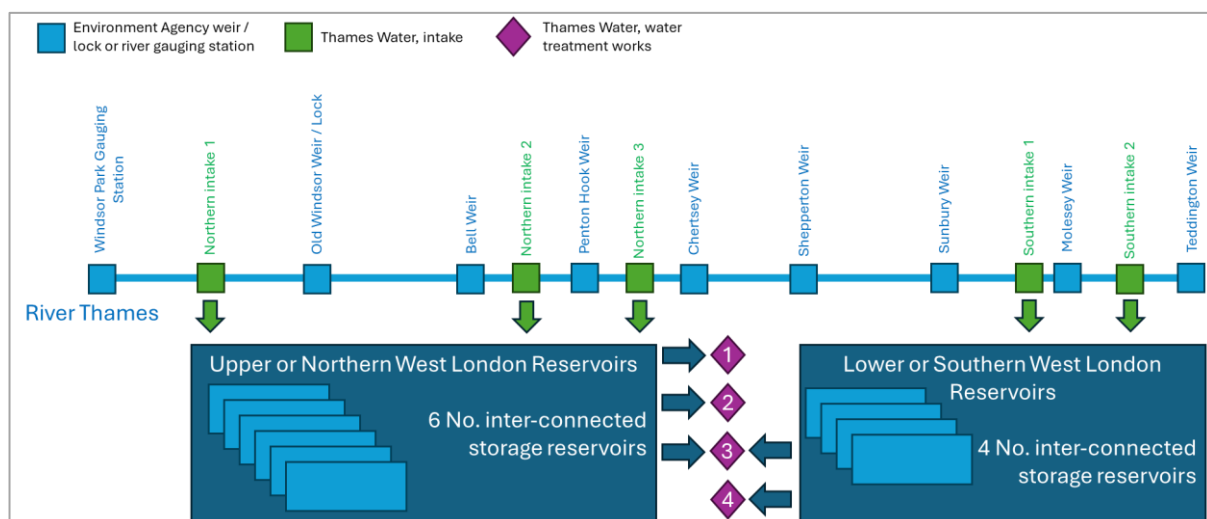


Figure 2-1: Simplified overview of the West London Reservoirs system

- 2.2 The northern and southern systems are not currently operationally connected, so raw water stored in one part of the system cannot be transferred to the other in the event of a shortfall. Hence, the flows through the treatment works are constrained by the current storage connections. This creates operational constraint during periods of low flow or drought.
- 2.3 Figure 2-2 shows the geographical extent of the indicative proposed solution for gate one, with local rivers and conservation designations.

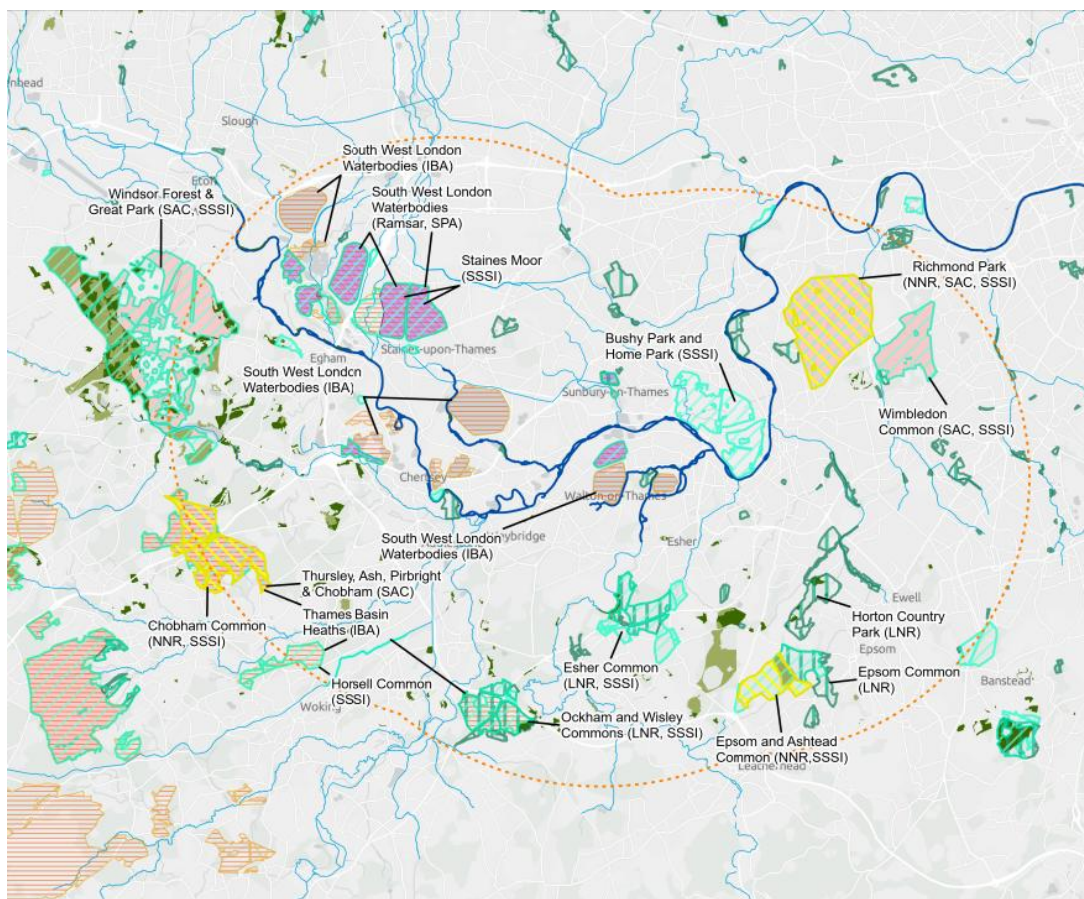


Figure 2-2: High level map showing lower River Thames and environmental designations

- 2.4 Abstraction from the River Thames into the WLRs takes place under a cumulative abstraction licence from the Environment Agency, referred to as the “M2 licence”. This licence, and the associated Lower Thames Operating Agreement (LTOA), limits the total annual volume that Thames Water can abstract and when water can be taken. The LTOA determines the minimum environmental flow that needs to be maintained over Teddington Weir, downstream of all intake points, based upon the water levels in the WLRs and the Lea Valley reservoirs. This ‘Teddington Target Flow’ (TTF) is to preserve freshwater flows into the tidally influenced section of the River Thames (known as the Tideway).
- 2.5 Abstraction is further constrained by the need to maintain a minimum water level in the river to avoid adverse impacts on navigation.

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## 2.2 Outline of the drivers for the scheme

- 2.6 The need for the LTWLR SRO was established during drought conditions in the summer of 2022. During this time Thames Water faced operational constraints which impacted the resilience and flexibility of the raw water system in west London, including:
- pump limitations which constrain abstraction during low flow periods at the raw water intakes between Datchet and Laleham;
  - limited abstraction capacity at the most downstream intake near Surbiton;
  - limited network connectivity to move raw water freely between all of the storage reservoirs; and
  - limited capability to significantly alter (lower) the outputs of the West London WTWs.
- 2.7 This led to the excess drawdown of storage within the northern WLRs despite flow over Teddington Weir exceeding the TTF. Similar conditions and issues were experienced during the summer of 2025. Further details of the water resource context and drivers for this project can be found in Section 4.

## 2.3 Indicative proposed solution for gate one

- 2.8 Optioneering work has resulted in an indicative proposed solution for gate one. The solution is a preliminary proposal, recognising further design and assessment work is required during subsequent gates. As a result, adjustments to the scheme design may be required as the project progresses.
- 2.9 To address the drought pressure on the northern WLRs, the proposal is to develop enhanced abstraction capacity and establish a new raw water transfer to link the southern and northern WLRs. The transfer is proposed to be a tunnel, abstracting at Surbiton before running west to the Queen Mary reservoir. The tunnel would also connect to the outlet of Queen Elizabeth II (QEII) reservoir to provide a transfer from the southern to the northern reservoirs.
- 2.10 The optioneering study also identified two additional solutions to help address the operational constraints experienced during drought:
- new variable speed pumps at the raw water pumping stations (RWPS) supplying the northern WLRs; and
  - refurbishment of the Environment Agency's Bell Weir, to prevent leakage.
- 2.11 These additional solutions will not form part of the LTWLR SRO but instead be delivered by Thames Water or by the Environment Agency, respectively, as part of their capital programmes. Therefore, only the indicative proposed solution associated with the Surbiton intake and transfer to Queen Mary reservoir would be delivered under this SRO project.
- 2.12 The connectivity between Surbiton and the Queen Mary reservoir may notionally be achieved through a variety of routings, and through construction of either a bored tunnel or the provision of new or rehabilitated conventional pipelines.

There are five shortlisted options at gate one: an indicative proposed solution and 4 alternative variants involving different concepts for the transfer (see Table 2.1). The alternative solutions using conventional pipeline designs have been costed for comparative purposes at gate one (see section 4).

Table 2.1: Shortlisted solutions for LTWLR SRO

Solution	Solution description
<b>Proposed solution for gate one: New intake at Surbiton and tunnel transfer to Queen Mary reservoir.</b>	Upgraded intake at Surbiton and transfer to the Queen Mary reservoir by tunnel via a new shaft to the north of Island Barn reservoir. Includes connection to QEII outlet.
<i>Alternative solution 1:</i> New intake at Surbiton to Queen Mary reservoir – mains rehabilitation (PE) and pipeline.	Upgraded intake at Surbiton and transfer to the Queen Mary reservoir by pipelines. A mixture of rehabilitated mains and a new pipeline. Pipe material (steel vs. polyethylene) is key difference between alternatives 1 and 2.
<i>Alternative solution 2:</i> New intake at Surbiton to Queen Mary reservoir – mains rehabilitation (PE/Steel) and pipeline.	
<i>Alternative solution 3:</i> New intake at Surbiton to Queen Mary reservoir – mains rehabilitation (PE) and tunnel.	Upgraded intake at Surbiton and transfer to Queen Mary reservoir. Rehabilitated mains to Island Barn reservoir followed by a tunnel to Queen Mary. Pipe material (steel vs. polyethylene) is key difference between alternatives 3 and 4.
<i>Alternative solution 4:</i> New intake at Surbiton to Queen Mary reservoir – mains rehabilitation (PE/Steel) and tunnel.	

2.13 Under the constraints that the LTOA minimum environmental flow over Teddington Weir could not change, and the M2 licence totals could not increase, the assumed maximum flowrate of 300ML/d has been used for design purposes at gate one. This value is at the upper end of expectations and, therefore, represents an intended conservative position with regards to asset capacity. The modelling work summarised in section 4 of this report shows that there is some limited additional benefit between a 200 and 300 ML/d capacity transfer. This should be used to refine asset requirements and lead to the identification of scheme efficiencies at gate two. The maximum flow rate at gate one is reduced from that assumed within Thames Water’s PR24 Business Plan submission, as it is now informed by the enhanced water resources modelling completed for gate one.

2.14 A connection from the QEII reservoir into the new transfer tunnel has been included at gate one, to increase the connectivity between the existing storage reservoirs. A connection from the Island Barn reservoir is not currently included but is recognised as a potential future opportunity subject to further investigation. A connection into Island Barn could increase the usability of this asset and help manage any water quality risks between Surbiton and the Queen

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Mary reservoir through intermediate retention and / or additional treatment, if required.

- 2.15 The tunnel solution is provisionally selected at gate one, due to uncertainties with the feasibility of refurbishing the existing mains and the exact capacity flow required (see benefits assessment in section 4). The existing pipelines are designed to transfer water in the other direction (i.e. west to east). There is insufficient confidence in the viability of rehabilitating and using these pipelines to promote a solution based on mains rehabilitation at this stage. As such, a new tunnelled solution is being progressed as the preferred option, but we will continue to consider alternative solutions during further optioneering in gate two.

## 2.4 Potential interactions with other solutions

- 2.16 The LTWLR SRO indicative proposed solution for gate one has the potential to interface with a number of other SROs, which are summarised below.
- The South East Strategic Reservoir Option (SESRO) SRO is a proposed raw water storage reservoir in Oxfordshire. The reservoir will provide augmented flows into the River Thames during low flow periods. The LTWLR SRO has a potential interaction with this project through the optimal abstraction of the augmented flow from SESRO.
  - The Thames to Affinity Transfer (T2AT) SRO is being developed to enable the transfer of raw water from Thames Water's Wraybury reservoir to Affinity Water. The ability to maximise storage volume and flexibility within the West London reservoir system is an important factor for the resilience of this proposed future transfer.
  - Preliminary analysis suggests that the LTWLR SRO has the potential to interact with the timing and duration of use of the proposed Teddington Direct River Abstraction (TDRA) project, which is part of the London Water Recycling SRO. Given the complexity of the triggers for drought schemes such as TDRA, the interaction between the two schemes needs to be further explored and confirmed during subsequent project stages and maintained under review as part of the WRMP annual monitoring process.
- 2.17 Additionally, the LTWLR SRO also has the potential to interface with the Environment Agency's proposed River Thames Scheme (RTS), which is discussed further in section 4.

## 2.5 Relevant diagrams and schematics

- 2.18 Figure 2-3 showing how it interfaces with the existing WLR system.

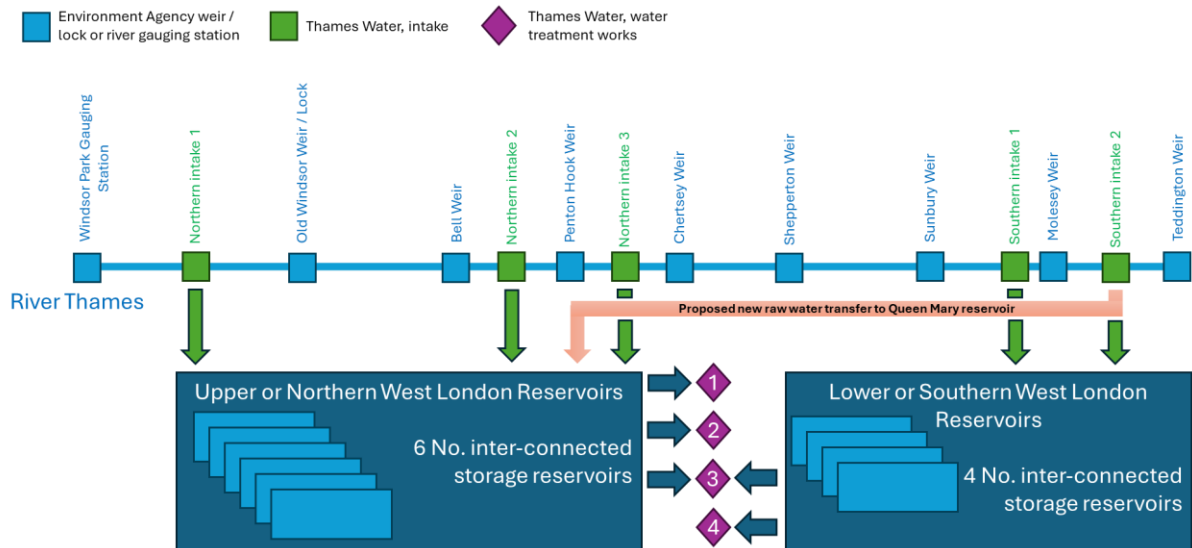


Figure 2-3: High level schematic of the LTWLR indicative solution in the context of Thames Water's existing WLR system.

### 3. Current delivery plan including key milestones

#### 3.1 Programme overview

3.1 A high-level programme has been developed gate one and is shown in Figure 3-1. The key dates associated with this programme are provided in Table 3.1 below.

Table 3.1 Project milestones at gate one

Key Milestone	Date
<b>RAPID gate one</b>	Q1 2026
<b>RAPID gate two</b>	Q4 2027
<b>RAPID gate three</b>	Q4 2029
<b>Ofwat DPC stage 2</b>	Q4 2029
<b>Ofwat DPC stage 3</b>	Q1 2031
<b>Planning determination</b>	Q4 2031
<b>RAPID gate four</b>	Q4 2031
<b>Ofwat DPC stage 4</b>	Q1 2034
<b>Construction start</b>	Q2 2034
<b>Water Available for Use (WAFU)</b>	2037/38

3.2 The timing of gates three and four will be subject to review at gate two once the final concept design and procurement and planning strategies are agreed.

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- 3.3 The WAFU date is now later than estimated at PR24. The complexity of the works and experience from other SROs indicates a longer lead-in time is required up to planning consent, before the scheme moves into procurement and delivery. Additional time has also been built in between consent and contract award, to account for the complexity of the expected Direct Procurement for Customers (DPC) process. Further work is required to confirm the consenting route and procurement strategy for LTWLR. Figure 3-1 shows the current preferred route to project delivery.
- 3.4 Construction is forecast to start in AMP9, and this programme includes a specific allowance for enabling works, which includes the procurement of the Tunnel Boring Machine (TBM) and commissioning of the system. The current programme assumes a single TBM, however, there is opportunity for the use of two TBMs to reduce the construction time. Work will continue to review and refine the schedule as the design is developed ahead of gate two.
- 3.5 Given the change to the project's WAFU date from the that forecast at PR24, and the urgent need for this project, options to accelerate the programme and potential interim short-term solutions will be considered during gate two.



## 3.2 Planned engagement with regulators

### 3.2.1 Engagement completed ahead of gate one

- 3.6 To gate one, as the project has been focused on optioneering and the consideration of technical issues, engagement with stakeholders has been limited. We have undertaken technical engagement with key statutory bodies to provide an overview of the project and ensure visibility of the initial risk assessment and screening work. However, as the spatial definition of the indicative proposed solution is still very embryonic, we have not yet expanded this engagement to include local planning authorities or communities, both of whom will be engaged during subsequent project gates.
- 3.7 An overview of the engagement undertaken to gate one is presented in Table 3.2.

Table 3.2: Overview of engagement on LTWLR to gate one

Stakeholder	Scope of interest	Activity to date
<b>Environment Agency</b>	Environmental permitting / licensing and aquatic environmental assessment including the requirements of, and compliance with, the Water Framework Directive (WFD).	National Appraisal Unit technical workshop to facilitate collaborative working and ensure early visibility of key technical studies and initial findings. Pre-gate one review of technical assessments for WFD compliance and Invasive Non-Native Species (INNS) risk assessment.
<b>Natural England</b>	Habitats Regulations Assessment (HRA), protected species issues.	Pre-gate one review of technical assessments for HRA screening and Strategic Environmental Assessment appraisal.
<b>Drinking Water Inspectorate (DWI)</b>	Compliance with drinking water quality legislation and ensuring water quality risks are properly assessed and evaluated.	Initial technical meeting held to discuss the Water Quality Risk Assessment methodology and the potential risks to drinking water quality and supply issues. Initial discussion on monitoring for gate two.
<b>Regulators' Alliance for Progression of Infrastructure Development (RAPID)</b>	Oversees the gated process within which SROs are developed and assessed.	Active engagement to update and introduce general options analysis and project overview. Checkpoint meetings held prior to gate one submission to ensure early visibility of submission and any associated issues.

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### 3.2.2 Stakeholder engagement proposed to Gate two

3.8 As LTWLR progresses towards gate two, it is expected that the spatial definition of the scheme will be refined and optimised and specific sites identified for temporary works and permanent assets. This will enable more detailed technical engagement with statutory bodies and local communities to explain the project and seek initial feedback on proposed solutions. At this stage, it is expected that stakeholder engagement in gate two would include the following key activities:

- Ongoing liaison with the Environment Agency and Natural England via the development of a Technical Liaison Group, to enable open discussion of key environmental issues and agreement of survey methodology and key assessment activities.
- Development of technical liaison with the Local Planning Authorities likely to be affected by (and the consenting authority for) the project – see section 5. This would be likely to include initial discussion of consenting route and then technical engagement with officers and specialists as required to discuss specific topic areas.
- Initial technical liaison with officers from Surrey County Council, the Greater London Authority (GLA) and Transport for London (TfL) to discuss specific issues for which they would retain responsibility, such as Highways and heritage matters.
- If required, liaison with other interested or affected bodies should relevant issues be identified with the proposed project, such as English Heritage or National Highways. This would be done via the development of specific Technical Liaison Groups, as required.
- Initial community engagement on the need for the scheme, initial options and preferred solutions. This would be likely to be via meetings with local councillors initially, but may also include public exhibitions or similar events, if appropriate.
- Continued engagement will occur up to gate two, with regulators and strategic stakeholders to ensure legal, regulatory, and strategic issues are identified and addressed.

3.9 Building on the initial opportunities analysis completed for gate one, and recognising the potential for local social, economic and environmental benefits beyond providing a resilient and sustainable water supply, we will also develop a plan to enable active participation in the co-creation of the design of the scheme with regional and local stakeholders, for implementation after gate two.

### 3.3 Dependency dates with other solutions

3.10 The expected dependency dates with other solutions are listed in Table 3.3 below, aligned with the solutions discussed in section 2. These dates should be considered in the context of the preliminary project schedule for LTWLR, as

shown in Figure 3-1 above, and will be subject to further modelling and analysis after gate one.

Table 3.3: Estimated dependency dates with other solutions

Scheme	Dependency date	Commentary
<b>Thames Water RWPS enhancements</b>	Due for completion by Thames Water in AMP8	Planned to be completed prior to the delivery phase of LTWLR
<b>Environment Agency's Bell Weir refurbishment</b>	Scheduled for delivery by Environment Agency in 2026/27	Planned to be completed prior to the delivery phase of LTWLR
<b>SESRO SRO</b>	Scheduled for delivery by 2040	LTWLR scheduled for delivery prior to commissioning of SESRO hence available to manage resilience for augmented flows
<b>T2AT SRO</b>	Scheduled for delivery by 2045	LTWLR scheduled for delivery prior to commissioning of T2AT hence available to manage resilience for the transfer
<b>TDRA SRO</b>	Scheduled for delivery in AMP9	Potential interactions will be confirmed as part of LTWLR gate two investigations, ahead of DCO submission for TDRA
<b>Environment Agency's Proposed RTS</b>	Delivery schedule unknown, but likely to precede LTWLR	LTWLR delivery may be required to mitigate possible impacts so need to maintain close liaison with the Environment Agency regarding delivery timescales

### 3.4 Work needed ahead of gate two

3.11 A summary of planned work required by gate two is shown in Table 3.4. This is based upon the previous guidance issued by RAPID for gate two submissions<sup>1</sup>.

Table 3.4: Gate two proposed activities

WBS category	Activity summary
<b>Programme &amp; project management</b>	Programme manager, project controls and programming support, assurance, project director and Executive governance
<b>Feasibility assessment and concept design</b>	Engineering design and all associated studies (e.g. flood risk, optioneering, opportunity development), client technical direction, technical liaison and engagement with Operations, cost and carbon estimating
<b>Option benefits development and appraisal</b>	Water resources modelling to confirm benefits, including deployable output (DO) assessment, long-term utilisation analysis, scoping for long-term operational decision-support model(s),

<sup>1</sup> RAPID, April 2022, [https://www.ofwat.gov.uk/wp-content/uploads/2022/02/Strategic-regional-water-resource-solutions-guidance-for-gate-two\\_RAPID.pdf](https://www.ofwat.gov.uk/wp-content/uploads/2022/02/Strategic-regional-water-resource-solutions-guidance-for-gate-two_RAPID.pdf)

<b>WBS category</b>	<b>Activity summary</b>
	natural capital assessment (and other benefits metric analysis, as required)
<b>Environmental assessment</b>	Environment Agency and Natural England costs, water quality modelling and analysis, WFD and aquatic ecological assessments, desk-based assessments and initial appraisal of high-risk environmental issues, initial HRA, biodiversity net gain (BNG) assessment, abstraction licensing strategy
<b>Data collection, sampling, and trials</b>	Ground investigations and surveys, asset condition appraisal and testing including testing of existing intake pumping arrangements, initial aquatic and terrestrial environmental surveys, water quality survey (River Thames and tributaries)
<b>Procurement strategy</b>	Strategic review and appraisal of procurement routes based upon PR24 methodology, initial market engagement, client governance, external advisory services and steering group on commercial matters, engagement with Ofwat
<b>Planning strategy</b>	Local Planning Authority liaison, strategic planning review and confirmation of consenting strategy, land access and acquisition strategy, initial site selection work for required land / sites
<b>Stakeholder engagement</b>	Customer research and preference studies, particularly around water quality issues if required, stakeholder engagement planning and implementation, technical consultee and regulatory engagement, public and community liaison and engagement
<b>Legal</b>	Legal advice on various issues and policies

### 3.4.1 Design development and opportunities proposed for gate two

- 3.12 Proposed design activities for gate two will be focused on back-checking the indicative proposed solution for gate one against improved data and further refining and developing the detail of proposed concept design. This work will analyse the range of possible route options and transfer modes (i.e. tunnel vs. new pipeline or rehabilitation of existing mains) and optimise the capacity for the transfer.
- 3.13 Further to this optioneering review, consideration will also be given to options which are faster to deliver, potentially using permitted development powers or optimising the use of existing assets. This will explore whether an interim solution could be implemented in the shorter term, to help minimise the current risks to Thames Water in London as a “stop gap” whilst the long-term SRO solution is developed.
- 3.14 Due to the high level of uncertainty at this formative stage, the indicative proposed solution for gate one has adopted a conservative approach to asset specification. However, a range of opportunities has been identified for future assessment that may potentially lead to either reduced scheme costs and/or

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increased benefits. These opportunities may be unlocked through additional investigation work supported by further data collection, which will be initiated after gate one. A summary of the design activities to be undertaken during gate two is provided below.

- *Review optimum solution based upon transfer capacity* – refinement of the optimum transfer capacity via further water resources modelling which may result in a change in the relative cost-effectiveness of a tunnel solution compared to a more conventional pipeline solution.
- *Refinement of design for the intake near Surbiton* – considering: improved information on local site issues and constraints, opportunities for rationalisation of assets at the existing intake, and potential changes to the transfer design.
- *Condition assessment of existing raw water mains* – the existing raw water mains between Surbiton and Walton potentially offer a more cost-effective solution but their condition is unknown. Rehabilitation and/or reconfiguration would likely be required to incorporate these assets into a transfer scheme, but an asset condition assessment is required to establish the scope and extent of work required.
- *Incorporation of connections with the Island Barn reservoir* – further consideration of the cost and benefit of enabling a cross-connection to or from this reservoir which may provide additional flexibility to the gate one solution.
- *Rationalisation of pumping at RWPS supplying Queen Mary reservoir* – optimising the pumping requirements to the Queen Mary Reservoir by making full use of existing assets alongside the proposed AMP8 enhancements. This could result in a more efficient single pumping arrangement for both the existing intakes and the new transfer from Surbiton.
- *Refinement of scheme operation* – currently, the scheme is proposed to operate as a ‘wet tunnel’, that is drained down when not in active use to mitigate against sediment deposition, zebra/quagga mussel growth and to allow for maintenance activities. This proposal requires further testing and development and could change substantially if elements of conventional pipeline were to be substituted for the proposed wet tunnel.
- *Other supporting work* – other work elements will be required to support scheme progression beyond gate two including: water quality, environmental screening, procurement, planning and costing. This is likely to include further screening and back-checking of alternative options based on improved data.

## 4. Cost estimates and deployable output benefit

### 4.1 Water resource benefits

#### 4.1.1 Introduction

- 4.1 The need for the LTWLR project emerged during the drought conditions experienced in the summer of 2022. The summer of 2022 was one of the hottest and driest on record in the South East of England. During this period, Thames Water experienced pump constraints on the operation of the existing raw water intakes between Datchet and Laleham, resulting in unforeseen and excessive drawdown conditions in the storage across the northern WLRs.
- 4.2 During the 2022 drought, hydrological records show flow over Teddington Weir was in excess of the TTF. This was despite storage levels within the northern WLRs being drawn down to a much greater degree than expected. Storage levels within the southern WLRs were maintained, however, it was not operationally possible to transfer water from the southern to northern reservoirs.
- 4.3 Flow analysis of the 2022 drought, shown in Figure 4-1, concluded that significant levels of excess water flowed over Teddington Weir during this period.

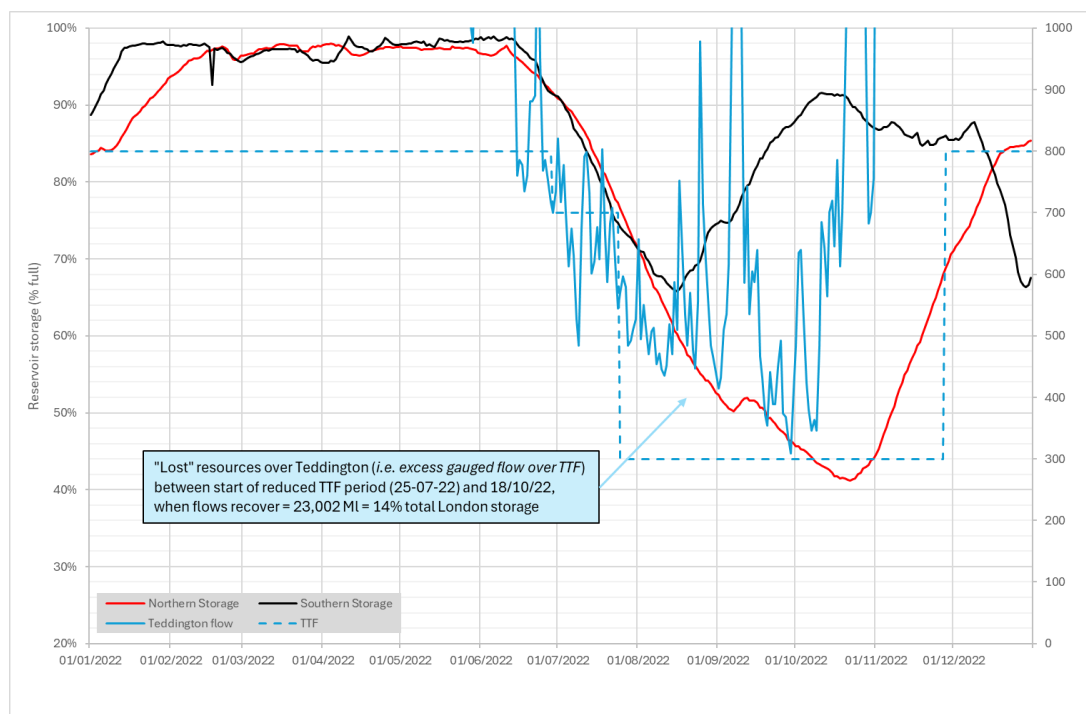


Figure 4-1: Hydrological records of flows in the Lower Thames during the 2022 drought

- 4.4 Hydraulic models<sup>2</sup> of Bell Weir, Penton Hook Weir, Chertsey Weir, Shepperton Weir and Molesey Weir, in combination with Thames Water's water resources model (WARMS2), have been used to explore the causes of the operational challenges experienced during the 2022 drought.

<sup>2</sup> Infoworks Integrated Catchment Modelling (ICM) 1D

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- 4.5 Similar conditions were experienced during the summer of 2025, albeit to a lesser degree, which has resulted in comparable operational challenges being experienced. To mitigate the impact of low flow or drought conditions on abstraction within the lower River Thames, and protect customers' water supply, greater operational resilience and flexibility within the West London reservoir system is required.

#### **4.1.2 Overview of current issues and drivers**

- 4.6 There are several critical issues which operate in conjunction to compromise Thames Water's ability to abstract the maximum amount of licensed water resources from the Lower Thames, particularly during low flow periods. These issues are summarised below, focusing primarily on the operational issues affecting the existing raw water system, but also influenced by factors associated with the management of the River Thames water levels by the Environment Agency.

##### *Primary Issue 1: Limited flexibility in source water for Thames Water's West London WTWs*

- 4.7 Each water treatment work within West London is supplied by a fixed combination of reservoirs. Due to the limited raw water network flexibility and limited capability to significantly alter the outputs of the West London WTWs, the amount of water required from the reservoirs must remain relatively constant. Therefore, if abstraction into the northern reservoirs is constrained, as experienced during drought conditions, then this results in excessive drawdown of the reservoir levels as the flow to the treatment works has to be retained.

##### *Primary Issue 2: Lack of connectivity between the southern and northern systems of the WLRs*

- 4.8 Water stored in the southern WLRs cannot be transferred into the northern WLRs, meaning that drawdown in the northern system, for whatever reason, cannot be balanced with water abstracted into the southern system. If there are issues with the intakes or storage levels in the northern system, then there is limited flexibility to recover storage from the smaller southern system to help support the larger northern system.

##### *Primary Issue 3: Limitations on abstraction near Surbiton*

- 4.9 There are limitations on the amount of water that can currently be abstracted near Surbiton and subsequently used. These limitations are driven by the pump capacity and associated eel screening arrangements. However, even if the abstraction capacity were higher, in isolation this would not necessarily resolve the overriding issues. Currently, water abstracted near Surbiton can only be used to refill the smaller southern reservoir group.

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#### *Primary Issue 4: Raw Water Pumping Station (RWPS) low flow constraints*

4.10 The existing intake pumps at the intakes for the northern WLRs are constrained at low flows. They use fixed speed drives for the intake pumps (i.e. either off or operating at a fixed flow rate), meaning that at low river flows, where the allowable abstraction is below the minimum fixed speed of the pumps, they cannot be used to abstract all available water into that part of the system. This asset issue is the reason for proposed new variable speed pumps at these locations, which will allow all available water to be abstracted. These enhancement works are funded and planned for delivery under Thames Water's AMP8 capital programme.

### **4.1.3 Overview of influencing factors**

4.11 Additionally, there are several factors that are contributing to the situation experienced in the lower Thames system, as seen during 2022 and 2025. Some of these are temporary and hence should be resolved in the near-term, some are reflective of future risk and others result from the natural evolution of a managed system over time. However, they all form part of the overall basis of the LTWLR needs case, hence are included here for completeness.

#### *Influencing Factor: Asset deterioration at Bell Weir lock and weir structure (owned and maintained by the Environment Agency)*

4.12 Asset deterioration and resulting leakage is an issue at the EA's Bell weir and lock within the River Thames. This is thought possibly to be due to the impact or trapping of large debris, which has resulted in parts of the structure leaking at levels exceeding those observed during pre-2022 droughts (2005 was used for comparison). This means that constraints on abstraction, to maintain river levels for navigation, are reached at higher river flows (i.e. earlier in a dry period). This is, however, a temporary issue and, although a significant contributory factor in the 2022 drought event, is scheduled for refurbishment in 2026 / 27, which should resolve this specific influencing factor.

#### *Influencing Factor: Other navigational driven water level constraints*

4.13 The same navigation driven constraints exist for the intakes supplying the northern WLRs, affected by the structures at Penton Hook and (in particular) Chertsey. Although such navigation constraints have always been part of the operation of the M2 abstraction licence, hydraulic modelling suggests that there appears to be additional leakage compared to historical data, albeit at a much lower level than at Bell Weir. Each carries a flow and level constraint affecting when Thames Water's intakes can operate, further affecting abstraction. This is thought to be largely due to expected asset ageing and not a major cause for concern in isolation, at current levels.

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### *Influencing Factor: Changes to fish passage arrangements*

- 4.14 The fish passage structures at Molesey Weir were upgraded in 2014. These upgrades have increased the flow through the fish passes thereby further constraining abstraction to maintain levels for navigation. The modelling indicates that, in addition to the reduction in abstraction at the northern intakes discussed above, the resulting additional water that now passes to more downstream areas cannot be as effectively captured by the intakes supplying the southern WLRs due to these fish passage developments at Molesey Weir.

#### **4.1.4 Summary of issues and drivers**

- 4.15 During low flow periods, the issues and influencing factors discussed above limit Thames Water's ability to abstract water into the northern WLRs using the existing intakes. To make best use of the lower intakes and storage within the southern WLRs greater flexibility in the operation of the raw water system as a whole is required. Constraints on the upper intakes naturally places greater reliance on the operation of the intake near Surbiton, which is the last opportunity to abstract upstream of Teddington Weir.
- 4.16 Currently, our ability to abstract near Surbiton is limited and the water abstracted only supplies the southern WLRs which have a much smaller storage volume than the northern reservoirs. There is no mechanism to transfer raw water from the southern to northern system. Enhanced capability to extract additional resource near Surbiton and to balance raw water resources between the two systems could help manage the uncertainty in the operational performance of the upper intakes and also help in response to any changing hydraulic conditions on the River Thames or further future changes to the third-party assets within that system.

#### **4.1.5 Potential future risks**

- 4.17 The issues with the existing system are potentially further compounded by future development pressures, particularly the Environment Agency's proposed River Thames Scheme (RTS), which is a flood risk management initiative.
- 4.18 The early design of this project proposes the construction of two flood relief channels<sup>3</sup> which could require a continual "sweetening" flow, even during low flow events, to maintain water quality.
- 4.19 Discussions with the Environment Agency indicate a reasonable worst-case scenario that a constant flow of 1 m<sup>3</sup>/s could be taken out of the River Thames upstream of Laleham. The same amount could also be taken out downstream of Laleham but upstream of Chertsey Weir. Both relief channels would return the sweetening flows to the river upstream of Walton. However, the requirement for sweetening flows through the flood relief channels could reduce the potential

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<sup>3</sup> The first channel between Egham Hythe and Chertsey and the second between Laleham and Littleton North Lake.

water resource available for abstraction at the existing Thames Water intakes supplying the northern WLRs.

- 4.20 It should be noted that this bypass flow value is derived from the Preliminary Environmental Information Report (PEIR) which was produced in support of the Environment Agency’s Statutory Consultation of that scheme. Through pre-gate one engagement, the Environment Agency has indicated that, should the RTS progress, the Environmental Statement would include mitigation (such as variable low flow regime) which would reduce this figure. Therefore, this is treated as a future risk only and not as a core aspect of the drivers for the LTWLR at this preliminary stage.

### 4.1.6 Estimate of water resource benefits

- 4.21 Based upon the water resources modelling completed to gate one, the benefits of the different aspects of the proposed solutions are shown in Table 4.1. The impacts or benefits are presented as an impact on the DO of the London Water Resource Zone. It should be noted that Deployable Output impacts are stated as Deployable Output in London (DYAA), calculated using the first failure within a historical flow series (1920 to 2022). This is not equivalent to a full 1 in 500 year DO assessment, that would be required to compare this option to others within the WRMP. Completion of this further DO analysis to more extreme conditions will be developed for gate two.
- 4.22 For all this gate one modelling, it is assumed that Bell Weir has been refurbished, the Thames Water RWPS enhancements have been completed but the performance of the remaining EA weirs and locks are in accordance with current conditions.

Table 4.1: Summary of estimated water resource benefits from proposed solutions

Solution Description	Deployable Output Benefit (Ml/d) *
LTWLR Indicative proposed solution at gate one (200 Ml/d capacity)	106
LTWLR Indicative proposed solution at gate one (300 Ml/d capacity) **	117

\* Deployable Output impacts stated as Deployable Output in London (DYAA), calculated using the first failure within a historical flow series (1920 to 2022)

\*\* Minimum additional deployable output benefit identified for 400 Ml/d capacity, hence not reported separately

- 4.23 The various solutions also increase the operational flexibility of the WLR system, enabling it to adapt to differing operating conditions or constraints across intakes and balance resources more effectively. This strengthens the system’s overall resilience to both current and future pressures.
- 4.24 Modelling indicates that the new intake and transfer tunnel forming the indicative proposed solution for the LTWLR SRO at gate one would operate for, on average, 9% of the time. This is based upon simulations across the whole

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historical timeseries from 1921 to 2022. However, during extreme drought events the frequency of operation can increase to over 50% of the time (e.g. during 1976). The more extreme the drought, the more the transfer would be required. For 2005/06, the time that the transfer would be active is predicted to be 5% and in 2022, it would have been approximately 25% (assuming Bell Weir had been refurbished).

#### **4.1.7 Mitigation against other future risks**

4.25 Furthermore, the proposed approach will also provide resilience against the risk of outages at each intake or further damage to third party assets. The balancing of resource across the northern and southern WLRs would help protect the system from outage at particular treatment or distribution assets and enable better long-term outage planning for maintenance of this critical raw water system.

#### **4.1.8 Summary**

4.26 Overall, the preliminary modelling completed for gate one shows that the combined impact of the current operational issues and the other influencing factors may be reducing Thames Water's baseline deployable output for London. The modelling suggests that the deployable output for London may be lower than reported at WRMP24. However, this requires further modelling and testing to confirm the scale of the issue for extreme drought conditions.

4.27 The indicative proposed solution for LTWLR SRO at gate one provides a preliminary assessment of additional benefit of 117 Ml/d deployable output during simulation across the historical timeseries from 1921 - 2022, with greatly enhanced resilience and flexibility in the operation of the system.

4.28 This level of benefit largely balances out the estimated combined impact of the current operational issues within this system and the influencing factors from the management of the River Thames. Primarily, the modelling undertaken for gate one suggests that the LTWLR provides additional flexibility and resilience for the London raw water system, rather than new deployable output during a 1 in 500-year drought. Further exploration of the net deployable output for LTWLR will be developed for gate two.

4.29 The larger capacity transfer (300 Ml/d), which has been used as the basis of the gate one optioneering, provides only marginal additional benefit above a transfer with a capacity of 200 Ml/d<sup>4</sup>. This will be further investigated for gate two and an optimised capacity confirmed. There is very little additional benefit seen for a transfer larger than 300 Ml/d.

4.30 The potential future impact of the RTS is significant. The indicative proposed solution for LTWLR SRO at gate one could provide additional resilience against this risk, as it provides capacity to abstract and transfer the additional resource, that has bypassed the existing intakes, back from Surbiton to the northern reservoirs.

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<sup>4</sup> The benefit reduces to 106 Ml/d with a 200 Ml/d capacity transfer.

## 4.2 Cost Estimates

- 4.31 High-level cost estimates (capex and opex) for the five different options were developed using cost base data from Thames Water’s Engineering Estimating System (EES) and other cost models. These estimates include direct and indirect costs, derived using Thames Water’s Asset Planning System (APS) as standard for the estimation of costs at a strategic concept level. Appropriate direct and indirect costs have also been supplemented with benchmark cost data from schemes of similar scale and complexity to this SRO.
- 4.32 The cost estimates include an allowance for optimism bias in line with HM Treasury Green Book. No allowance has been included for Quantitative Costed Risk Assessment at this early stage of option development and as a result optimism bias has not been scaled back. Quantitative costed risk assessment and associated adjustments to optimism bias will be assessed for gate two, once there is greater confidence in the preferred solution.
- 4.33 As standard for Thames Water capital projects overhead recovery is added to the estimate within the APS. This is consistent with the approach taken to the estimate of the scheme for PR24.
- 4.34 A suitable capex range has been estimated for the different types of options considered. Because of the immaturity of the design detail at gate one and hence the preliminary nature of this estimated cost range, it is not considered appropriate to convert this to a ‘point’ estimate for gate one.
- 4.35 The resulting estimate ranges are shown in Table 4.2 below. Estimates are indexed to 2022/23 (financial year average) prices, again for consistency with PR24.
- 4.36 Initial operating cost estimates for gate one are based upon an indicative assumption of 90 days per annum operation, to cover use during peak demand periods. This will be reviewed and refined during later project stages as the utilisation is confirmed.
- 4.37 Significant uncertainties remain around both capex and opex estimates as the flow requirements are not yet confirmed. The confidence level for these estimates, given this uncertainty and the preliminary nature of the design for gate one, is low. Further work will be undertaken at gate two to improve these estimates and confirm option choice.

Table 4.2: Estimated capex and opex expenditure (2022/23 prices) for the indicative proposed solution and alternatives at gate one.

Solution name	Capex Range (£m)	Annual Opex (£m/yr)
<b>Indicative proposed solution for gate one:</b> New intake at Surbiton to Queen Mary reservoir via new Island Barn Shaft	£550 – £980	£1.3
Alternative solution 1	£800 – £1,550	£2.3
Alternative solution 2	£930 – £1,790	£2.5

Solution name	Capex Range (£m)	Annual Opex (£m/yr)
Alternative solution 3	£610 - £1,130	£2.1
Alternative solution 4	£740 - £1,370	£2.2

- 4.38 The headline capex estimates suggest that:
- An end-to-end tunnel over the full length of the tunnel connection from Surbiton to Queen Mary would be the lowest cost.
  - Retaining some tunnelled sections but replacing the tunnel between Surbiton and the Island Barn/Walton area with rehabilitated pipelines adds significant cost to the scheme (alternatives 3 and 4).
  - Replacing the tunnel wholly with a conventional pipeline scheme further increases costs (alternatives 1 and 2).
- 4.39 Assumed option scopes have been based on the extent of known information at gate one, that still includes substantial uncertainty related to design, maximum flowrates and existing assets condition, in particular.
- 4.40 In broad terms, the greater degree of opportunity is considered to relate to the various elements of pipeline rehabilitation rather than the tunnelling. In simple terms, the pipelines are both ‘scalable’ with respect to flowrate and can potentially be ‘worked harder’ hydraulically by raising operating pressures to deliver the same flowrate through smaller and/or fewer assets. In contrast, the tunnel represents a substantially fixed cost because its diameter is driven by overarching health and safety requirements that are not related to hydraulic design.
- 4.41 With the above points in mind, the cost estimates currently suggest that the lowest cost option is a tunnel for the entire transfer length (the indicative proposed solution), while the options depending on pipelines providing the entire transfer length (alternative solution 1 and 2) are the highest cost. However, this finding must be treated with substantial caution at this stage and further refinement of the cost estimates will be undertaken for gate two, once key design parameters (including the required transfer flow rate) are confirmed.
- 4.42 The indicative proposed solution at gate one has been refined and optimised from that provided at PR24, resulting in some cost efficiencies at this preliminary design stage. The key changes to the indicative proposed solution from the scope at PR24 include:
- Change in the proposed tunnel alignment to north of Island Barn reservoir;
  - Removal of the proposed new shaft, pumping station, and inlet infrastructure connecting into QEII reservoir;
  - Removal of the tunnelled spur from Boormans Field Shaft to the main transfer tunnel; and

- Reduction in assumed design capacity from 500 Ml/d to 300 Ml/d, due to the refinement of the ‘need’, informed by the gate one water resources modelling

4.43 It is noted that some of the opportunities identified may result in potential capex cost increases that may offset some of the potential savings from the change of solution scope since PR24, notably including integration of the tunnel with the Island Barn reservoir and existing raw water pumping assets.

### 4.3 Carbon estimates

4.44 Initial estimates of carbon resulting from capex for each of the options outlined previously, is shown in Table 4.3. This analysis is indicative only, based upon the preliminary level of design available at gate one. Therefore, the carbon analysis will be subject to refinement and change as the design progresses.

4.45 At this preliminary stage no significant difference is noted between the options sufficient to suggest a preference away from the indicative proposed solution at gate one.

Table 4.3: Carbon from capital estimates summary at gate one

Solution name	Carbon from CAPEX (tCO <sub>2</sub> e)
<b>Indicative proposed solution for gate one:</b> New intake at Surbiton to Queen Mary reservoir via new Island Barn Shaft	67,116
Alternative solution 1	72,991
Alternative solution 2	72,333
Alternative solution 3	60,451
Alternative solution 4	59,793

## 5. Consenting route and secondary consents

5.1 An initial consenting strategy has been developed to support the gate one submission. The strategy explores the consenting routes available for the indicative proposed solution at gate one. An initial preferred consenting route is identified following an assessment of thresholds and potential factors including planning and environmental legislation, national and local policy, the need for the scheme, potential environmental impacts, public and stakeholder support and adjacent water related infrastructure.

5.2 The preferred consenting route for the LTWLR SRO is through an application under the Town and Country Planning Act 1990 (TCPA). The scheme involves development in the Local Authority areas of Elmbridge Borough Council and Spelthorne Borough Council. Therefore, planning applications would be submitted to both of these Local Planning Authorities (LPAs). Alongside planning

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- permission, it is anticipated that Thames Water would be able to use its powers under the Water Industry Act (WIA) to gain access and acquire land and rights, where necessary, to construct the scheme.
- 5.3 The extent of permitted developments rights under the General Permitted Development Order (GPDO) was also explored. We do not consider that permitted developments (PD) rights could be used for the indicative proposed solution at gate one. However, should any shorter-term interim works be identified (as discussed in paragraph 3.13) PD rights may be applicable to help facilitate delivery of such elements. This will be considered further as the optioneering is progressed during subsequent stages.
- 5.4 The suitability of consenting LTWLR via a Development Consent Order (DCO) under the Planning Act 2008 (PA2008) was also considered. The benefits of a DCO include:
- greater certainty over the timescales for consent under the PA 2008;
  - the ability to include other consents required for developed within the DCO, avoiding the need for a separate process;
  - more streamlined stakeholder and public engagement; and
  - inclusion of compulsory acquisition powers within a DCO to allow temporary and permanent access and acquisition of land required for the scheme.
- 5.5 No elements of the scheme meet all the thresholds set out in the PA2008 to be considered a Nationally Significant Infrastructure Project (NSIP) and thus consented via a DCO. Therefore, planning permission will be sought under the TPCA. The main benefit of this over the DCO route is that the TPCA planning process is typically shorter.
- 5.6 However, a 'direction' from the Secretary of State, under Section 35 (s35) of the PA2008, may be sought to designate a project as an NSIP hence consented under the PA2008. This will be retained as an option for consideration in the next stage of the project. The s35 direction would need to be sought prior to the environmental impact assessment (EIA) scoping under the Infrastructure Planning (EIA) Regulations and, if chosen as the preferred consenting route, it will be in the planning strategy at gate two.
- 5.7 The consenting route will be kept under review as the scheme progresses through the RAPID gated process to ensure the most efficient strategy is pursued to achieve a legally compliant and robust consent.

## **6. Procurement strategy**

### **6.1 Routes to procurement**

- 6.1 Initial consideration has been given to a range of potential procurement options for the indicative proposed solution at gate one, including all varieties of the Direct Procurement for Customers (DPC) model. Due to the current early stage of scheme development, the initial strategy does not provide a definitive

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- recommendation for a single procurement option but does provide a preferred 'direction-of-travel' to take forward to gate two for further development.
- 6.2 A range of possible DPC procurement models for delivery and operation of the reference solution were considered and compared with business as usual (BAU) procurement.
- 6.3 To assess the suitability of the DPC procurement model, the criteria set out by Ofwat has been used. At this early stage there is uncertainty over the development timeline and insufficient information on construction cost to accurately assess the value-for money of different models.
- 6.4 The indicative proposed solution at gate one passes the three DPC discreteness tests and is considered suitable for DPC. The working assumption is that the project should be taken forward for further consideration as a DPC project. For the preferred DPC option the risk allocation between parties has been mapped alongside the key commercial risks identified.
- 6.5 In consideration of the various tender models, a two-stage late tender model is proposed. However, should there be a benefit in delivering the project earlier, or should the solution change to include a significant proportion of rehabilitation of existing assets, then a normal standalone major project delivered as part of AMP8/9 BAU procurement should be given further consideration.

## **6.2 Operations and maintenance**

- 6.6 Under a DPC procurement, initial assessments conclude LTWLR should be operated by Thames Water. This is for a number of reasons, including:
- the availability of key multidisciplinary resources in-house;
  - the efficiency of tasking various resources to operate, shutdown and drain the tunnel system in parallel with wider systems operation;
  - the efficiency of maintaining key assets such as the river intake, pumping plant and ventilation systems alongside other Thames Water assets; and
  - the efficiency of programming operational activities, including start up and shut down, alongside other water resource functions.
- 6.7 The long-term liability for major maintenance and renewals would remain with the Competitively Appointed Provider (CAP). The CAP would need to have agreed periods of coordinated shutdowns for renewals and to ensure the assets are returned in the hand back condition at the end of the contract term.

## **6.3 Developing the procurement strategy**

- 6.8 Key next steps to progress the procurement strategy towards gate two include:
- More comprehensive, detailed commercial risk appraisal of the key technical, delivery and operational risks of the scheme, their mitigations, and whether they are best managed by Thames Water or the CAP.
  - Further development of the operational regime and the implications for the preferred procurement strategy.

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- Further investigation of the value-for-money for different procurement models, particularly focusing on supply chain operational capability. This should include scenario-testing (e.g. different drought conditions and frequency, different BAU scenarios, or where other SROs are delayed or don't deliver as expected or significant delays during construction).
  - Market engagement with design, construction, equipment, operations, and finance providers will commence after gate two. However, light-touch, targeted early engagement around specific commercial aspects may be beneficial in advance of gate two.

## **7. Identification of environmental, regulatory or commercial risk and potential barriers**

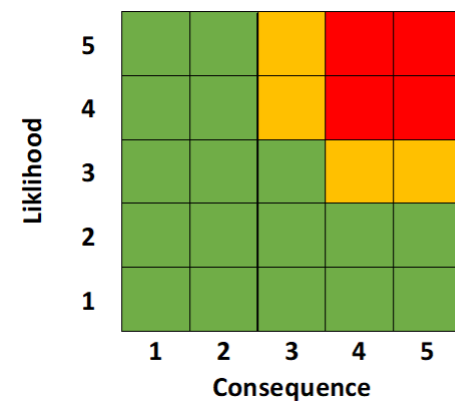
- 7.1 A risk register has been developed for gate one, using the standard format provided by RAPID, and communicated via quarterly reports. The risk register will be further developed as the geographical and temporal definition of the works required are confirmed.
- 7.2 At gate one, the risks and associated mitigation measures are summarised in Figure 7-1 below.
- 7.3 The project team will continue to discuss environmental risks with regulators and ensure these risks are captured within the programme risk register. Progress of technical work to address such risks will be shared proactively. Thames Water plans to establish a regular forum, to ensure a close and productive working relationship between the SRO and environmental regulators.

Figure 7-1: Summary of key risk themes and associated mitigation measures at gate one

Risk Theme	Details	Pre-Mitigation			Proposed Mitigation	Post-Mitigation		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Drinking water quality	Initial risk assessment for gate one confirms that current evidence suggests that increasing abstraction near Surbiton should not change the risk position of the drinking water safety plans compared to the current water sources. However, there is a risk that this conclusion changes as further monitoring is undertaken, particularly in the intermediate tributaries upstream, resulting in a need to manage water quality risks either via blending, changes to treatment process or other solutions.	3	4	Medium	Development of monitoring plans and WQ monitoring to be undertaken ahead of gate two (see Section 10 below) and risk assessment to be kept under review as design develops. Consideration of water quality and INNS growth issues in tunnel and possible need for management interventions or “sweetening” flows.	2	4	Low
Stakeholder	At this stage in the development of the project, with options still being considered, the key stakeholder risks are considered to lie with potential scheme delays due to opposition to the need for the scheme. There may also be local community challenge due to local concerns and constraints regarding construction impact, visual impact of any shaft structures and potential impacts on the River Thames.	4	5	High	The need for the scheme will be confirmed through the additional water resources modelling proposed for the early stages of gate two. However, to address the potential risk of more local concerns with the chosen scheme, we hope to initiate a series of local collaborative meetings to help explain the scheme to local residents and ensure that local issues are understood and incorporated into the final form and design of the scheme, where possible. Other local community issues will be addressed through engagement during the next project stages and then through more formal consultation on the designs as they develop.	3	5	Medium
Environmental	At gate one, the indicative proposed solution is not yet developed to a suitable level to fully understand environmental issues. However, we recognise that impacts and possible risks exist which need to be further developed and explored. Analysis at gate one suggests no ‘show-stoppers’, but we have identified environmental areas that could cause a risk to the successful delivery of the LTWLR scheme. At this stage, although our assessment suggests that all such issues should be mitigatable through design and construction good practice, we believe that the following issues remain and require further investigation ahead of gate two.							
	Delays in obtaining (or failure to secure) changes to abstraction consents from the EA.	4	5	High	We plan to mitigate through targeted investigations, in close liaison with the Environment Agency, ahead of gate two, to establish in principle whether the existing abstraction control arrangements remain valid or whether changes are needed.	2	4	Low
	Uncertainty in the environmental impacts of the scheme, particularly during operational phases and associated with HRA and WFD compliance.	4	4	High	We plan to mitigate through planned desk-based analysis and targeted fieldwork on the key environmental impacts identified by our gate one assessment. We have left sufficient time in the preliminary schedule (Figure 3-1) to enable required investigations and analysis to be completed.	2	4	Low

Risk Theme	Details	Pre-Mitigation			Proposed Mitigation	Post-Mitigation		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Planning and Land	There is currently uncertainty and risk with how the LTWLR would be consented, as discussed in Section 5. LTWLR is not automatically categorised as an NSIP (under the Planning Act 2008) hence would be consented under Planning Permission under the Town and Country Planning Act 1990. This brings risks in terms of local decision making, inability to secure required land acquisition powers and uncertain timescales.	4	4	High	The planning strategy will be kept under review to gate two, informed by initial engagement with the affected LPAs, clarification of the land requirements for the scheme and a better understanding of the local response to the scheme. If required, as section 35 direction would be sought from the Secretary of State to designate the scheme as an NSIP. Early engagement with regulators and local communities will help manage any negative impacts.	4	2	Low

\* Assessment of risk in accordance with a standard 5 x 5 matrix of likelihood and consequence, as illustrated below:



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## 8. Efficiency of expenditure

- 8.1 The cost breakdown for gate one is included with this submission using RAPID's Efficiency of Expenditure template.
- 8.2 Overall, the total forecast spend to gate one is £1.21m (2022/23 prices, AMP7 plus AMP8 costs). This is based upon a forecast at the end of November 2025, adjusted to 2022/23 prices using average annual CPIH. A final account will be provided in spring 2026 following RAPID draft assessment of this gate one submission.
- 8.3 Overall, this is broken down as follows:
- £1.08m (2022/23 prices) has been funded from outside of the RAPID SRO allowance at PR24.
  - £130k (2022/23 prices) has been re-profiled from the SRO allowance (gates two to four) to enable funding of the Environment Agency and Natural England's technical engagement to gate one.
- 8.4 A further £449k (2022/23 prices, excluding Thames Water overhead costs) has been approved for early gate two spend, associated with mobilisation, procurement of a Technical Partner and additional optioneering and modelling to help resolve residual uncertainties. This will be accounted for in the gate two Efficiency of Expenditure submission and is included within the gate two 'spend by AMP' template enclosed with this submission.

## 9. Benefits

- 9.1 In addition to the water resource benefits outlined in section 4, LTWLR may have the potential to deliver further environmental and social value. At this initial gate one stage, we have not developed the scheme in sufficient detail for these benefits to be clearly identified. However, we have tried to identify the initial areas where such benefit could be found, and aligned these to Ofwat's Public Value Principles, as shown in Table 9.1.
- 9.2 We have tried to identify where there is alignment, even at this formative stage, between these shared opportunities that may be realised through the LTWLR's emerging design, and Ofwat's aspirations for how water companies could facilitate the delivery of social and environmental value through their operations and future plans.
- 9.3 It is envisaged that such legacy opportunities for recreational, environmental, social and economic benefits would be identified, explored and developed through collaboration with a wide range of stakeholders and community groups.

Table 9.1: Potential benefits from LTWLR, aligned with Ofwat's Public Value Principles

Ofwat Public Value Principle	Commentary on future opportunity for LTWLR
<b>Companies should seek to create further social and environmental value in the course of delivering their core services, beyond the minimum required to meet statutory obligations.</b>	Consideration of environmental reinstatement at surface (shaft sites) along tunnel route and delivery of BNG and social value (e.g. public recreation facilities) as part of the design of the operational sites.
<b>Social and environmental benefits should be measurable, lasting and important to customers and communities. Mechanisms used to guide activity and drive decision-making should support this.</b>	Potential to include benefits proposals in future scheme consultations, to understand which elements are valued most highly by customers and local communities most directly affected by the scheme. Ensure that benefit proposals are defined and embedded in scheme consents and hence measurable and lasting.
<b>Companies should be open with information and insights on operational performance and impacts (both good and bad).</b>	This SRO is driven by actual operational circumstances experienced in 2022. The insights from this are shared within the gate one report and will continue to be explored as the design of the scheme develops to ensure operational performance and resilience are optimised.
<b>Delivery of social and environmental value outcomes should not come at greater cost to customers without customer support.</b>	The environmental and social benefits from the scheme will be assessed and monetised, as far as possible, as part of the RAPID gate two submission, including Natural Capital Appraisal and carbon analysis. These would be tested with customers through future consultation exercises as part of the consenting of the scheme and potential inclusion within future WRMPs.
<b>Companies should consider where and how they can collaborate with others to optimise solutions and maximise benefits, seeking to align stakeholder interests where possible, and leveraging a fair share of third-party contributions where needed.</b>	There are ongoing collaboration opportunities for the integrated and efficient management of assets in the Lower River Thames. This includes integration with the Environment Agency on the funded rehabilitation of its navigation structures or in the development of the RTS, which form a critical part of the water resource availability in the system, as discussed in Section 4 of this report.
<b>Companies should take account of their capability, performance and circumstances in considering the scope for delivering greater social and environmental value.</b>	Thames Water already provides a degree of recreational access to the WLRs, as part of standard operational activity. There may be opportunities to integrate the new assets required for LTWLR with existing public access arrangements in the area to maximise social and environmental benefits.

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## 10. Drinking water quality

### 10.1 High-level assessment of drinking water quality considerations

- 10.1 An initial evaluation was conducted to identify and assess the potential water quality risks associated with the scheme. The new increased abstraction near Surbiton may impact water quality, with possible implications for the wider system, and may change the risk position of the drinking water safety plans.
- 10.2 As outlined in the indicative proposed solution for gate one, detailed in section 2, the water abstracted near Surbiton would be directly transferred into the Queen Mary reservoir. This will establish a new direct connection with this reservoir that currently does not exist.
- 10.3 Water abstracted near Surbiton has already been considered within the drinking water safety plans for the relevant West London WTWs and associated customer acceptability considerations. The key question is, therefore, considered to be whether there is any material difference between the water abstracted from the Thames at Surbiton compared to the other Thames intakes, particularly those already used to supply the Queen Mary reservoir.
- 10.4 A key difference is that Surbiton is downstream of the confluence of the River Thames and River Mole (and the River Ember tributary, which joins the Mole just upstream of the confluence with the Thames). Hence, an assessment is needed to determine whether the water quality of the River Mole is materially different to that of the Thames. Historically, anecdotal evidence (dating back to the Chelsea and Lambeth Waterworks Companies) suggests that water quality at Surbiton was a driver for the relocation of intakes upstream due to turbidity issues arising from the River Mole.
- 10.5 Available water quality data from all abstraction points within the West London system was analysed, as well as data gathered as part of the SRO programme at Kingston Bridge and Teddington Weir. Key water quality parameters were examined to understand Surbiton's historical performance and to identify instances of poorer water quality compared to other intake points. Cryptosporidium was specifically identified as a hazard that requires careful management of the raw water system.
- 10.6 To note, water quality at Surbiton has been measured significantly less frequently compared to other intake points (only 32 samples over a 10-year period), which limits the level of interpretation and confidence in any conclusions drawn.

### 10.2 Identification of high-level risks

- 10.7 A range of water quality parameters have been assessed at gate one to determine any significant risks (or differences) between the existing intakes to

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the Queen Mary reservoir (and the northern system as a whole) and the intakes to the southern system. The parameters considered are:

- Cryptosporidium
- Pesticides
- Phosphate
- Nitrogen
- Total organic carbon
- pH
- Turbidity

10.8 Data was assessed from three primary sources, maximising the use of existing available data for gate one. These sources are:

- A long-term monitoring dataset collected by Thames Water for the intakes for the WLRs, with over 300 parameters measured (albeit at different temporal scales) between 2005 and 2024.
- Monitoring data from Thames Water's SRO programme, collected between 2021 and 2024, with data from Kingston Bridge and Teddington used to infill the standard Thames Water monitoring data.
- Monitoring data from the River Mole, at 22 sample points, covering 184 parameters between 2010 and 2024.

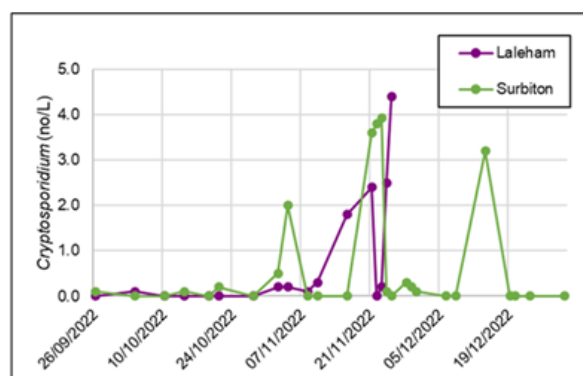
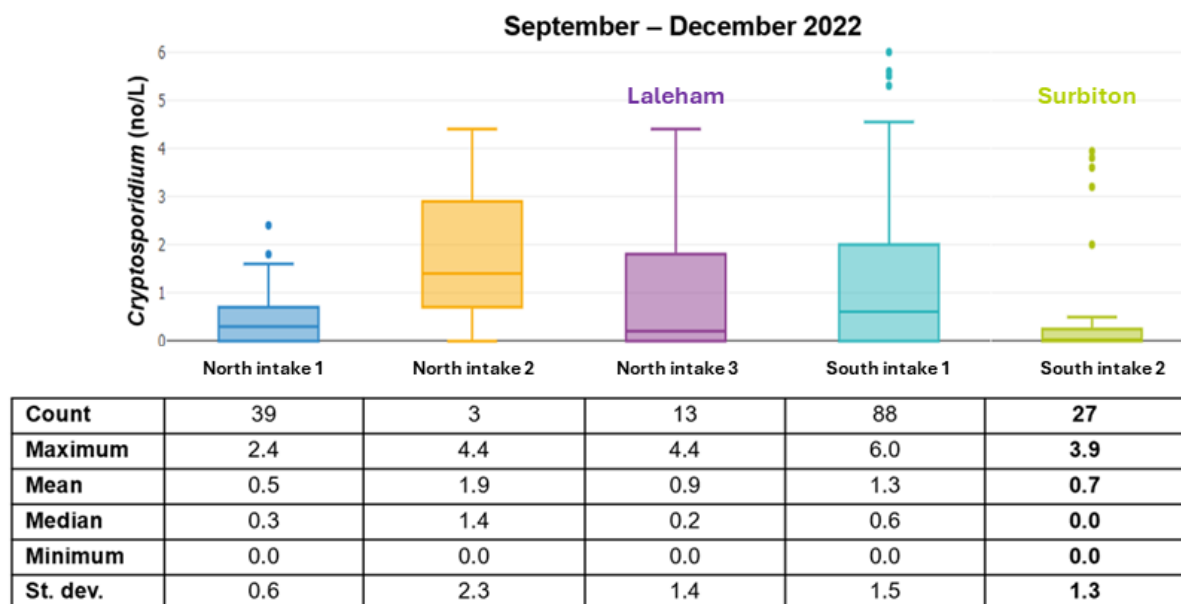
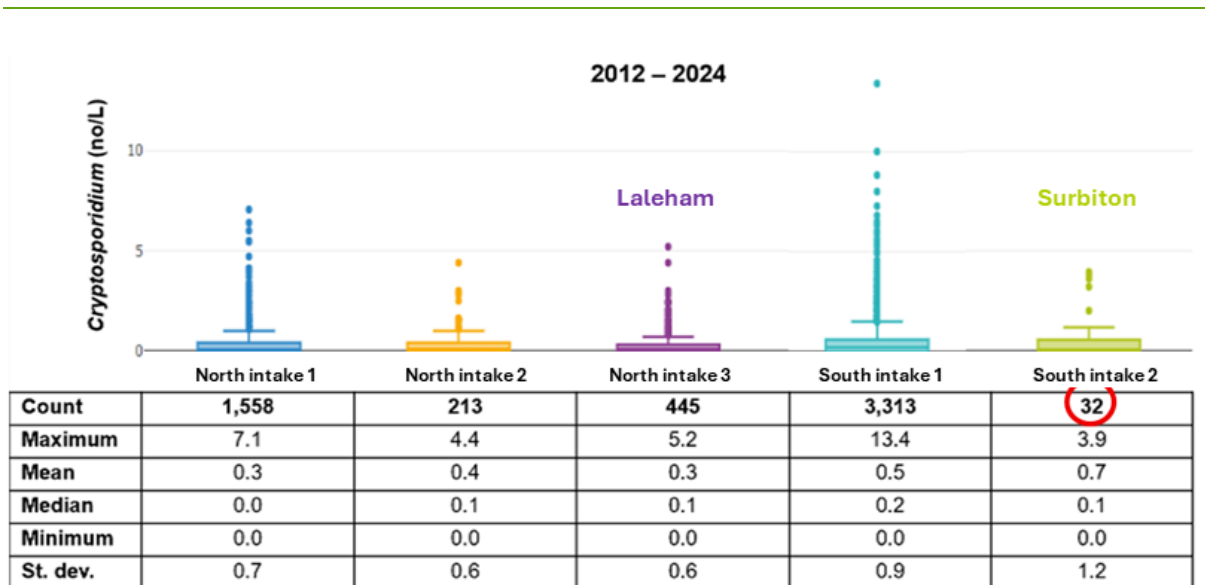
10.9 For comparative analysis, the period from September to December 2022 was used as this contains many coincident monitoring datasets.

### 10.2.1 Cryptosporidium

10.10 Cryptosporidium was assessed for the periods 2012 to 2024 and also the September to December 2024 period, as this corresponded to a period of intensive monitoring at Surbiton.

10.11 Surbiton is very sparsely measured compared to other intakes, with no measurements before 2012, between 2012-2018 and after 2022. There is, therefore, significant residual risk around this limited data at Surbiton. However, the data from monitoring downstream does not suggest a significant risk from Cryptosporidium further downstream.

10.12 The data for the two periods is shown in Figure 10-1 below. There is no significant difference between the Surbiton and Laleham intakes for the measured duration. Surbiton intake has the lowest Cryptosporidium count.



**Side-by-side comparisons for Laleham and Surbiton.**  
*No significant difference ( $t=0.11$ ,  $p=0.45$ ,  $\alpha=0.05$ )*

Figure 10-1: Cryptosporidium monitoring data

## 10.2.2 Pesticides

10.13 In general, pesticide levels are very low throughout the monitoring data at all five of the intake locations for the WLRs. Levels for metaldehyde, Atrazine and 2,4-dichlorophenoxyacetic acid (2,4-D) are below detection levels and levels for Diuron are detectable but very low. The overall data for total pesticides (September to December 2022) is shown in Figure 10-2 below.

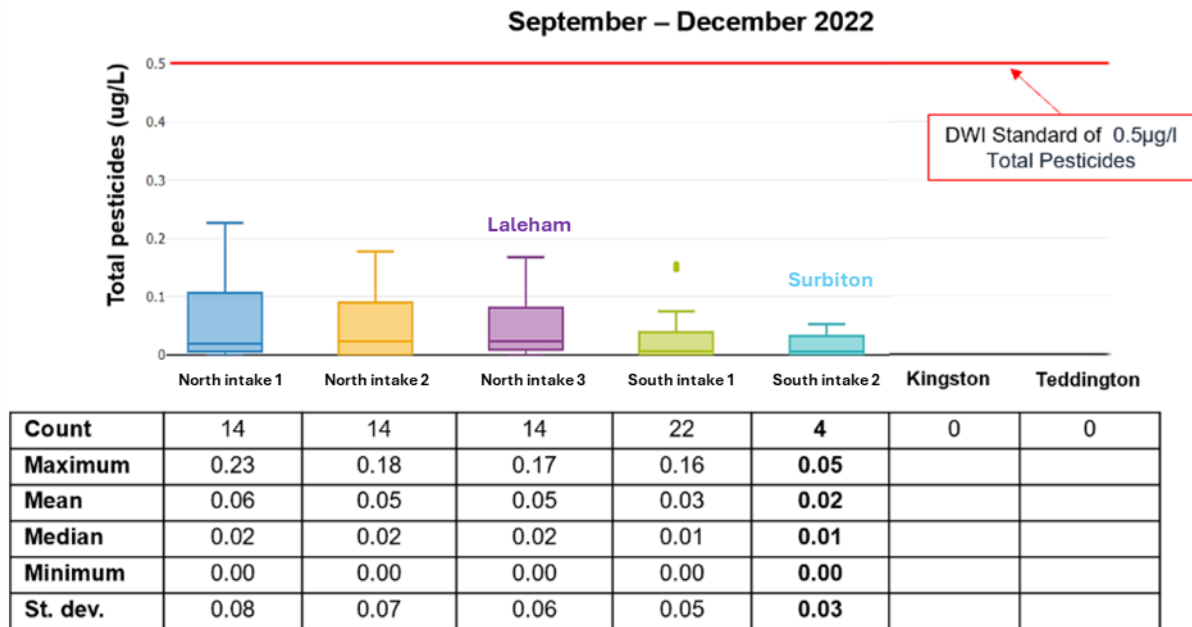


Figure 10-2: Total pesticides monitoring data

## 10.2.3 Nutrients - Phosphate

10.14 In general, phosphate levels were very low (below detection limit) at all intakes between September and December 2022.

10.15 There was no observable difference between Surbiton and Laleham intakes for the measured duration, although data at both locations is relatively sparse. Figure 10-3 shows a side-by-side comparison for the same day (+/- 2 days) measurement at Laleham and Surbiton (from 2012 to 2022).

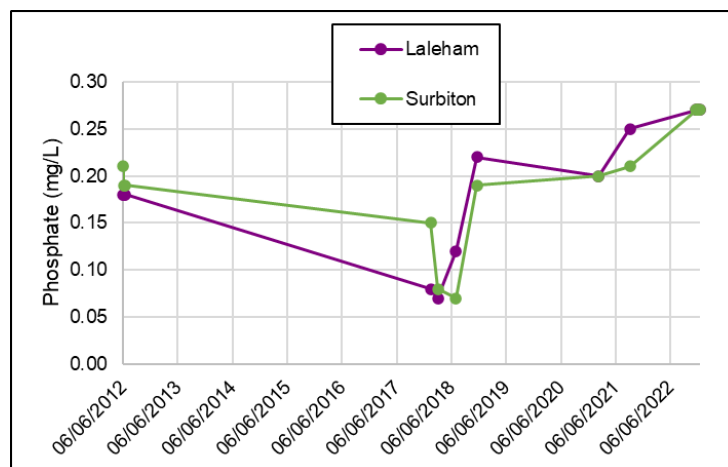


Figure 10-3: Phosphate data at Laleham and Surbiton (2012 to 2022)

## 10.2.4 Nutrients – Nitrogen

10.16 In general, total nitrogen levels (measured as total nitrogen oxidised, TON) were very also low at all intakes between September and December 2022 (see Figure 10-4)

10.17 There was no observable difference between Surbiton and Laleham intakes for the measured duration, although data at both locations is relatively sparse. Figure 10-5 shows a side-by-side comparison for the same day (+/- 2 days) measurement at Laleham and Surbiton (from 2012 - 2022).

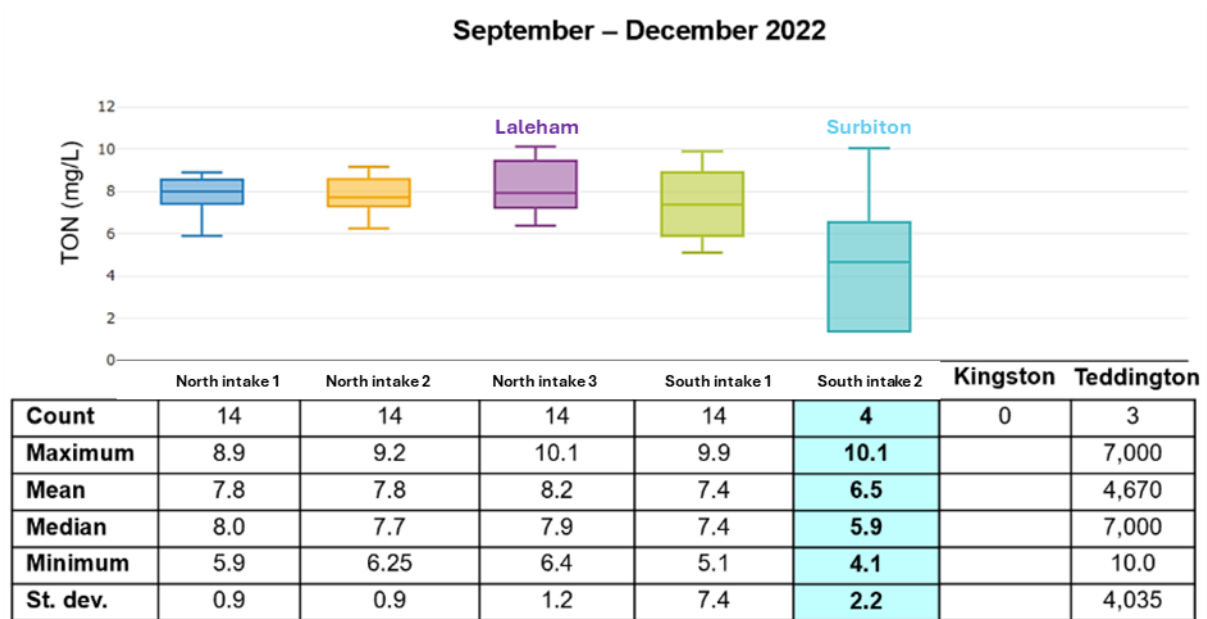


Figure 10-4: Total nitrogen monitoring data

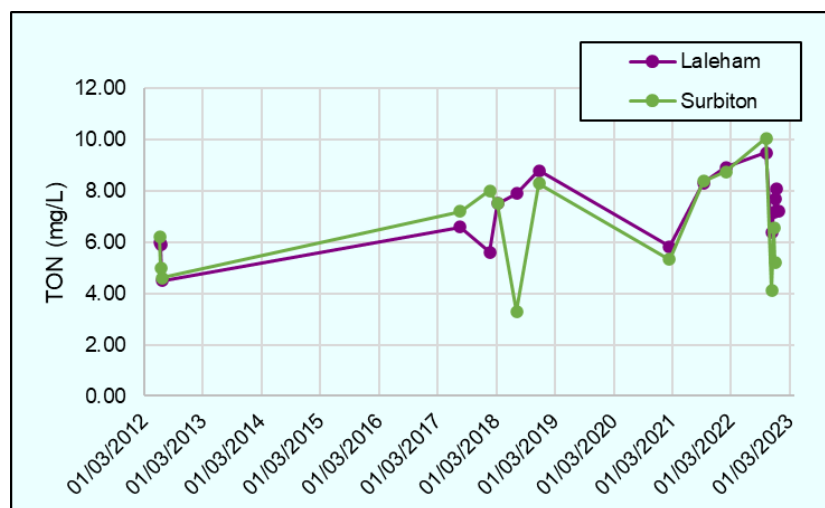


Figure 10-5: Nitrogen data at Laleham and Surbiton (2012 to 2023)

## 10.2.5 Total organic carbon (TOC)

10.18 Unfortunately, there is insufficient data to enable a robust comparison between Surbiton and the other intake locations.

10.19 However, that limited data shows very little variance between Surbiton, north intake 1 and south intake 2. The data that was available is shown in Figure 10-6



below.

Figure 10-6: TOC monitoring data

## 10.2.6 pH

10.20 There was no observable difference in the pH measurements at the intake locations. The data that was available is shown in Figure 10-7 below.

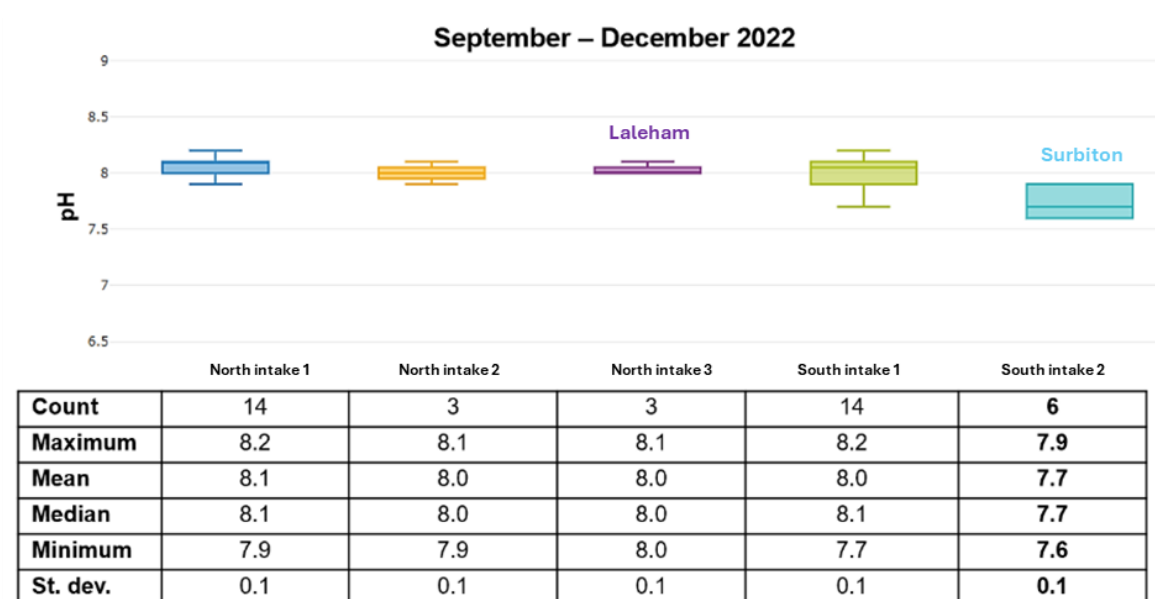


Figure 10-7: pH monitoring data

## 10.2.7 Turbidity

10.21 The lowest observed turbidity data at the five intakes was measured at Surbiton. The data that was available is shown in Figure 10-8 below.

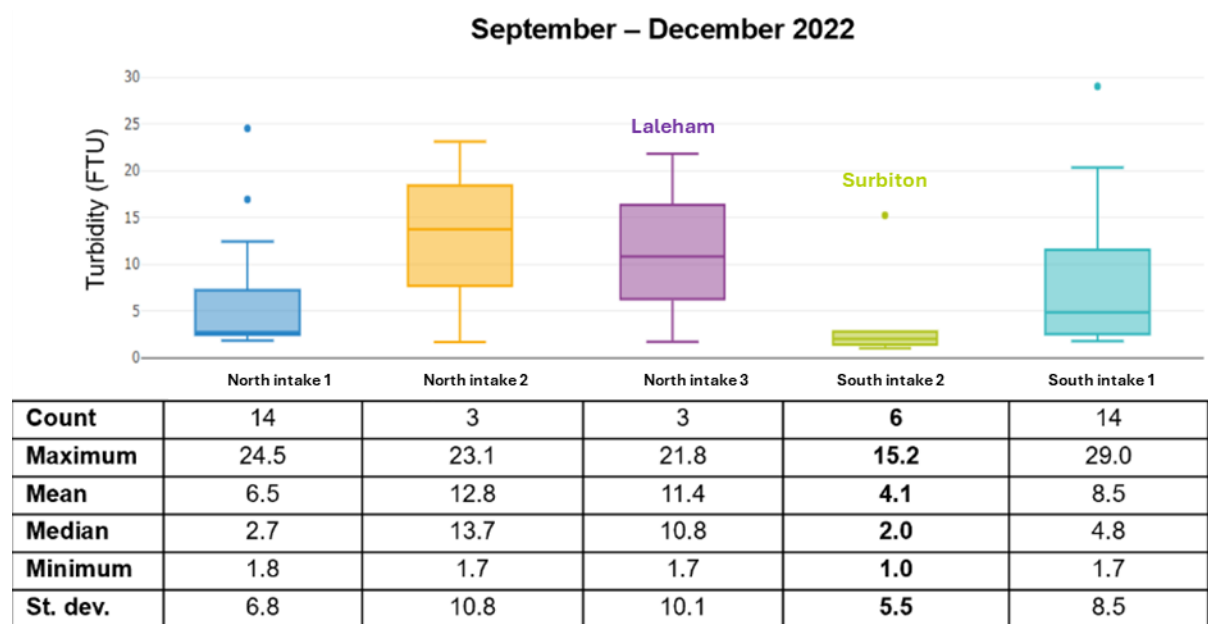


Figure 10-8: Turbidity monitoring data

## 10.2.8 Preliminary conclusions for gate one

10.22 Overall, based upon the limited data that was available, there appears to be very little difference in the water quality parameters at the five intake locations.

10.23 There have been limited measurements at Surbiton on which to base this preliminary water quality risk assessment. There is, therefore, residual uncertainty with these findings which will need to be reviewed and refined following the collection of additional data during the next stage of the project.

10.24 However, based upon the data that is available, the visual comparison suggests that there is:

- No obvious difference in the water quality between Laleham and Surbiton for the durations measured.
- No obvious difference using the comparison of means for similar date measurements.
- As expected, the water chemistry parameters are very similar between the two intake points.
- No difference in the *Cryptosporidium* values measured and insufficient measurements for the other microbial indicators.
- Levels of nutrients (phosphates and total nitrogen) are similar, but there are very limited measurements for carbon.
- The Walton intake has the poorest water quality of all the intake points but does not appear to have any impact downstream (i.e. at Surbiton).

10.25 As discussed above the principal difference between the Surbiton intake and the other intakes is that the Surbiton intake receives water from the River Mole

catchment. Therefore, if a pollution incident were to occur in the River Mole catchment it could impact the Surbiton intake and not the others. There is a risk of high turbidity at the Surbiton intake, especially during high summer rainfall events in the Mole and Ember catchments, which has been observed during historical monitoring, which should be investigated during subsequent project stages.

- 10.26 As part of the next phase of work we will review the River Mole catchment to identify whether there are any significant pollution sources.
- 10.27 Overall, based on the limited data available, there does not appear to be any material differences between the quality of the water from the Surbiton intake and the other intakes. This would suggest that increasing abstraction from Surbiton should not alter the risk profile of the drinking water safety plans relative to the existing water sources.
- 10.28 Therefore, it is not anticipated that additional treatment will need to be incorporated into the scheme at this gate.

### 10.3 Forward Plan

- 10.29 In order to improve the availability of water quality data we propose to undertake a range of monitoring and sampling activities ahead of the gate two submission. Further survey requirements will be developed during gate two and will be proportionate to the scope of the option and risk. However, a preliminary assessment of the water quality monitoring requirements for gate two are included in Table 10.1 below. These will be subject to a more detailed scoping exercise after gate one, and discussion and agreement with representatives from the DWI.

*Table 10.1: Proposed water quality monitoring strategy for gate two and beyond*

Location	Comment / strategy
Surbiton	<p>Increase the frequency and range of parameters sampled for at Surbiton in line with the sampling at the other River Thames intakes, with particular focus on ensuring that there is long-term (multi-year and multi-season) data coincident between Surbiton and the other intakes.</p> <p>Sampling will be a combination of monthly spot samples for certain parameters and continuous monitoring using water quality sondes, where possible.</p> <p>The monitoring network (and parameter suite) will be developed as an early task for gate two and discussed and agreed with the DWI.</p> <p>This network will be integrated with the previous and existing monitoring under the other Thames Water and Affinity Water SROs affecting the lower Thames.</p>

River Thames (other monitoring sites)	Continue monitoring the River Thames as part of the cross-SRO monitoring programme which also covers T2AT and LWR schemes. This sampling programme will be reviewed and revised if necessary to ensure that there is sufficient coverage to provide confidence for this scheme.
Rivers Mole and Wey	Review the River Mole/River Ember catchments to identify any significant potential sources of pollution. Initiate a water quality sampling network, as required, to address any existing gaps in the current monitoring data. Sampling will be a combination of monthly spot samples for certain parameters and continuous monitoring using water quality sondes, where possible.

10.30 A Strategic Water Quality Risk Assessment (SWQRA) will be undertaken for gate two, using the available monitoring data enhanced with project specific data captured between gate one and gate two. This risk assessment will follow standard methodology for the SROs and will be undertaken in close liaison with the DWI. The exact timeline for this risk assessment will be developed in the early stages of gate two, aligned with the completion of the optioneering and concept design work, and integrated with the monitoring strategy, to maximise the use of any new data.

## 10.4 Consumer engagement

10.31 The initial review of the available water quality data has not identified any material differences between the water from the Surbiton intake and the other intakes, so we do not anticipate any water quality differences between the waters that could lead to issues around consumer acceptability. No new water treatment works are proposed or changes to existing treatment processes.

10.32 Because of this lack of discernible change, at this stage, no specific targeted consumer engagement to address perception and acceptability risks is planned for gate two. More general stakeholder and consumer engagement will be required to inform of the development of the scheme, as outlined in Section 3, but no targeted research associated with water quality changes. This will be kept under review as the design progresses towards gate two and will be informed by the outcomes of the SWQRA noted previously.

## 10.5 Internal engagement

10.33 The water quality compliance team within Thames Water have been consulted with regard to the findings of this initial risk assessment.

10.34 The relevant internal teams have also been engaged by the wider SRO team. Initial discussions have taken place with the SEMD team regarding the scheme design, and a preliminary SEMD compliance assessment form has been completed. The NIS team has been made aware of the project and critical issues for consideration in subsequent design stages have been discussed. Further

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assessment of security requirements will be built into the future outline design as the scheme progresses.

## **11. Environmental considerations**

11.1 The gate one submission has included preparation of a Strategic Environmental Assessment (SEA), Habitat Regulations Assessment (HRA), Water Framework Directive (WFD) Assessment and an Invasive Non-Native Species (INNS) Risk Assessment.

### **11.1 Habitats Regulations Assessment (HRA)**

11.2 HRA input for this gate one submission initially comprised of a Stage 1 Screening Assessment to identify whether the indicative proposed solution had potential to cause Likely Significant Effects (LSE) on any European sites or associated Functionally Linked Land. This identified that the potential for LSE could not be ruled out for the South West London Waterbodies Special Protection Area (SPA) and Ramsar site, due to the relative proximity to the indicative proposed solution (circa 1km at its closest point) and the qualifying features of the SPA/Ramsar (birds).

11.3 A subsequent Stage 2 Appropriate Assessment was undertaken, which concluded that the indicative proposed solution would not result in adverse effects on the integrity of any European sites during the construction phase. However, this preliminary conclusion was based around a potential mitigation strategy that limited construction activity during periods critical for over-wintering birds, which may not be practical for all aspects of the construction programme. This will be reviewed and reconsidered during subsequent project stages, as the design develops and understanding of the potential impacts on designated features of the European Sites is improved. Therefore, this preliminary conclusion of no LSE may need to be revised and / or additional mitigation measures identified.

11.4 During operation, adverse effects on the South West London Water Bodies SPA and Ramsar site qualifying species could not be ruled out at this stage, given the early stages of option and design development.

11.5 It is important to note that HRA operates on a precautionary basis, where LSE can only be ruled out once information has been seen that confirms the absence of an impact pathway to a qualifying feature. On this basis, further information on the operational effects is required, particularly in relation to changes in water quality, groundwater levels, and flows. Progress will be made in collecting this data for gate two. Such additional information may provide evidence that there is no potential for LSE on European Sites even in the absence of mitigation. Further work is also required at gate two to understand the potential for in-combination effects on European Sites with other plans and projects.

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11.6 The draft assessment was provided to Natural England for comment, ahead of the gate one submission, and its comments incorporated.

## 11.2 Water Framework Directive (WFD) assessment

11.7 The All Company Working Group (ACWG) has created a standardised framework for conducting WFD assessments for SROs<sup>5</sup>. The WFD assessment identifies where there is a risk of deterioration in status for any water body. During the assessment, mitigation measures are considered to protect the status or potential of these water bodies. The assessment takes into account the WFD future objectives to ensure that a proposed development does not prevent affected water bodies from achieving their status objectives.

11.8 Two stages of assessment are completed under the ACWG WFD approach, an initial Level 1 basic screening/scoping and a Level 2 detailed impact screening.

11.9 For the indicative proposed solution at gate one, the assessment identified 18 water bodies that could potentially be affected. Six of the 18 screened water bodies were carried forward for Level 2 detailed screening. The water bodies carried forward for Level 2 assessment following Level 1 screening are:

- 'Thames (Egham to Teddington)' (GB106039023232) – river water body
- 'THAMES UPPER' (GB530603911403) – transitional water body
- 'Lower Thames Gravels' (GB40603G000300) – groundwater body
- 'Chobham Bagshot Beds' (GB40602G601400) – groundwater body
- 'Queen Mary Reservoir' (GB30642639) – lake water body
- 'Queen Elizabeth II Storage Reservoir' (GB30642813) – lake water body

11.10 The conclusions of this assessment, along with a summary of the proposed future investigations, are outlined in Table 11.1 below.

11.11 The findings of the draft WFD assessment were provided to the Environment Agency for comment, ahead of the gate one submission. Its comments will be considered and addressed as part of work to gate two, with noted issues including:

- New or increased risk of entrainment to fish and eel through the new intake near Surbiton.
- The abstraction location is in the same river reach as the proposed Teddington DRA SRO and which represents a cumulative impact requiring further consideration to confirm.
- Increased abstraction from Surbiton may mean that the upper Tideway will receive reduced flow, albeit within the current licensed limits, which could impact its WFD status.
- While the LTOA may continue to be in place, the effect of introducing the scheme is that there is likely to be a shift in the frequency and duration at which the Teddington 'target' flow is met. This has the potential to impact a

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<sup>5</sup> ACWG (2020) WFD: Consistent framework for undertaking no deterioration assessments

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wide range of factors within the associated water bodies through changes to the hydrological regime.

Table 11.1: Summary of WFD Level 2 screening conclusions and recommendations

Water Body	Key findings at gate one	Potential mitigation measures	Recommendations
'Thames (Egham to Teddington)' (GB106039023232)	Potential minor localised risks on biology (invertebrates and macrophytes and phytobenthos combined), due to the increase in surface water abstraction at Surbiton and associated increased risk of fish and eel entrainment.	<ul style="list-style-type: none"> <li>Adoption of measures to reduce the risk of fish and eel entrainment i.e. construction of intake screens for fish</li> <li>It is planned that this scheme will continue to operate under the existing Lower Thames Operating Agreement (LTOA) with other SROs (such as Teddington DRA) being used to ensure appropriate environmental flows over the Teddington Weir are maintained.</li> </ul>	<ul style="list-style-type: none"> <li>Hydrodynamic modelling to explore impacts on flow, sedimentation, hydromorphology and water quality.</li> <li>In-combination assessment of changes in flow from this scheme and other SROs.</li> <li>Review of all baseline ecological and water quality WFD data, to identify where additional data collection and assessment is needed.</li> <li>Development of further detail of how the option will be operated to better understand flow related impacts.</li> <li>Further assessment on impacts related to fish and eel entrainment</li> </ul>
'THAMES UPPER' (GB530603911403)	As with the Thames (Egham to Teddington) water body, the Level 2 assessment identified minor localised risks on biology (invertebrates and macrophytes and phytobenthos combined), hydrological regime, priority hazardous substances, priority substances, specific pollutants and other pollutants due to the increase in surface water abstraction at Surbiton.		
'Lower Thames Gravels' (GB40603G000300) and 'Chobham Bagshot Beds' (GB40602G601400)	Minor temporary localised risks to quantitative and chemical dependent surface water body status and GWDTEs tests, chemical drinking water protected area test and general chemical test. These risks relate to the potential need for temporary dewatering for the construction of the tunnel and associated shafts, which may lead to reductions in groundwater levels (impacting on nearby river flows or groundwater levels which support GWDTEs). In addition, the permanent presence of the tunnel and	Sealing of tunnel and shafts after construction to ensure no pathways for surface water flows into aquifers or leakage into the structures will, although minor localised changes in groundwater level are possible.	Hydrogeological assessment of potential implications of construction on groundwater flow.

Water Body	Key findings at gate one	Potential mitigation measures	Recommendations
	shafts may lead to minor localised changes in groundwater level.		
<p>'Queen Mary Reservoir' (GB30642639)</p>	<p>A potential risk of deterioration for Perfluorooctane sulphonate (PFOS) and polybrominated diphenyl ethers (PBDE). Both the donor water body (Thames (Egham to Teddington)) and the receiving water body (Queen Mary Storage Reservoir) are at the lowest status (Fail) for these elements.</p> <p>A potential risk of deterioration was also identified to biological elements (Macrophytes and Phytobenthos combined and phytoplankton). This is due to the potential for increased risk of Invasive non-native species (INNS) from the donor water body. Initial INNS assessment indicates the presence of Caspian mud shrimp, floating pennywort and Nuttall's waterweed in the River Thames, but not in Queen Mary Reservoir.</p>	<p>If further water quality or INNS risk assessment suggests a risk to WFD status then pre-treatment, screening, blending or other control measures may need to be considered.</p>	<ul style="list-style-type: none"> <li>• Hydrodynamic modelling of impacts of abstraction/discharge changes occurring in the water body on water level, sedimentation and bathymetry.</li> <li>• Monitoring and assessment of potential changes in water quality from the transfer of water</li> <li>• Review of all baseline ecological and water quality WFD data, to identify where additional data collection and assessment is needed.</li> <li>• Further assessment of water quality and INNS risks.</li> </ul>
<p>'Queen Elizabeth II Storage Reservoir' (GB30642813)</p>	<p>Potential risks due to the increase in surface water abstraction in the Queen Elizabeth II Storage Reservoir (to transfer to Queen Mary reservoir), leading to a change in water level and sedimentation.</p> <p>Biological quality elements are not measured for this water body however any impacts on water level and sedimentation could impact on biology in the water body.</p>	<p>Consider abstraction pattern to minimise changes in water level and sedimentation.</p>	

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## 11.3 Invasive Non-Native Species (INNS) assessment

- 11.12 INNS input for this gate one submission has comprised an initial risk assessment. This confirmed that no elements of the indicative proposed solution would connect isolated or previously unconnected catchments, or previously unconnected water bodies. It is noted that although reservoirs already draw water from the River Thames, the provisionally preferred option would create some new connections directly between reservoirs, which could result in the transfer of INNS upstream within this part of the Thames catchment.
- 11.13 As the indicative proposed solution would involve the transfer of raw water between catchments and locations that are hydrologically connected, the Environment Agency's Position Statement on managing the risk of the spread of INNS through raw water transfers<sup>6</sup> suggests that the Environment Agency will decide whether mitigation will be necessary. This will be investigated further at gate two. For gate one, the approach to INNS has aligned with the Position Statement, in that despite the fact the relevant waterbodies for this solution are connected, the potential for this project to increase existing INNS transfer risks has still been assessed.
- 11.14 The draft assessment was provided to the Environment Agency for comment, ahead of the gate one submission. Its comments will be addressed as part of work to gate two, with the main issues highlighted being:
- As the transfer to Queen Mary reservoir is from some distance further downstream on the River Thames compared to the current transfers to this receptor, and is at a point where there is perhaps greater risk from marine/estuarine INNS which have some (or considerable) tolerance to freshwater, or indeed freshwater species which may become established on the lower river, then the new abstraction and transfer could potentially facilitate the movement of INNS. Although these two locations are theoretically hydrologically connected, there are a number of barriers which would prevent INNS transferring upstream between the Surbiton location to the existing connection from the Thames to Queen Mary reservoir. Such barriers could be bypassed through the new intake and transfer arrangement.
  - A further risk that merits more consideration is the additional catchments (e.g. Rivers Mole and Wey) that could be connected to the northern reservoirs by the scheme.

## 11.4 Strategic Environmental Assessment (SEA)

- 11.15 An initial assessment of the indicative proposed solution has been undertaken against 14 SEA objectives, which have been derived from those used in WRMP24. This concludes that the construction phase of the indicative proposed solution

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<sup>6</sup> Environment Agency (2022). Position Statement. Managing the Risk of Spread of Invasive Non-Native Species Through Raw Water Transfers.

would result in negative effects, but which could be reduced although not eliminated following implementation of mitigation. Further work at gates two and three will be required to carefully site shaft locations to minimise the impacts on biodiversity, recreational amenity and the local community, as well as identify appropriate enhancement.

- 11.16 Once operational, the indicative proposed solution would result in positive effects, namely through providing drought and water supply resilience, with some negative effects remaining such as any operational carbon emissions, as well as any residual effects on landscape and visual amenity and flood risk where a precautionary assessment at this stage has assumed these cannot be mitigated.
- 11.17 A potential risk has been identified about the proximity of the Riverside South Conservation Area and Metropolitan Open Land designations, which prevented a proposed housing development on the redundant filter beds at Surbiton gaining planning permission previously. It should be noted that the indicative proposed solution is not located in either of those designations, whereas the proposed housing development was located in both designations. Regardless, it is recommended that further specialist heritage input is sought during gate two to understand whether the proximity of these designations poses a constraint to options at Surbiton.

## 11.5 Summary of key environmental risks

- 11.18 The screening undertaken for gate one is summarised in Table 11.2 below, based upon the key receptors at risk and the proposed work required to investigate each for gate two.

*Table 11.2: Summary of key environmental risks and proposed work for gate two*

Receptor	Key risk	Driver(s)	Proposed work at gate two
<b>South West London Waterbodies Special Protection Area (SPA)</b>	Potential for construction and operational impacts on qualifying features, without appropriate mitigation	Habitats Regulations compliance	Refinement of HRA screening, once optioneering completed and preferred concept design is refined; consideration of detailed mitigation proposals
<b>Queen Mary reservoir</b>	Potential for lower quality water or INNS transfer, without appropriate mitigation	WFD compliance, INNS species controls	Refinement of water quality and INNS risk assessment following confirmation of scheme design and development of preliminary mitigation strategy
<b>Local aquifers</b>	Potential impacts on GW levels due to construction	WFD compliance	Hydrogeological assessment of potential implications of

Receptor	Key risk	Driver(s)	Proposed work at gate two
	phase dewatering or presence of tunnels		construction on groundwater flow and level.
<b>River Thames (Egham to Teddington)</b>	Potential for water body scale impacts due to fish or eel entrainment, without appropriate mitigation	WFD compliance, Impacts on protected species	Consideration of fisheries impacts and resulting requirements on intake screen design at Surbiton
<b>Upper River Thames transitional water body</b>	Potential for impacts associated with changes to freshwater flows into the Tideway (alone and in-combination with TDRA), without appropriate mitigation	WFD compliance, Impacts on protected species	Further modelling to confirm changes to freshwater flows over Teddington weir, in combination with TDRA, and resulting hydro-ecological impact assessment
<b>Terrestrial sites (Surbiton, shaft locations, Littleton)</b>	Potential for impacts on various environmental receptors, without appropriate mitigation	Various	Further refinement of the SEA appraisal following confirmation of scheme design and development of preliminary mitigation strategy
<b>Riverside South Conservation Area and Metropolitan Open Land designations</b>	Potential for impacts due to new intake at Surbiton	Various designations for land conservation and protection	Further consideration of the planning and consent strategy, and associated risks, following confirmation of scheme design

## 11.6 Future environmental assessment

11.19 Section 3 of this report shows the indicative programme for future gates, including planning and construction. The exact environmental survey requirements will in part be determined by the evolving scheme design and following confirmation of the consenting route. It is considered that as a minimum ecology surveys will be completed for all areas subject to above ground impact, as well as archaeological desk studies for any areas of below ground disturbance. Further survey requirements will be developed during gate two to be proportionate to the scope of the option and risk. However, a preliminary assessment of the monitoring and survey requirements for gate two are included in Table 11.3 below. These will be subject to a more detailed scoping exercise after gate one, and discussion and agreement with the Environment Agency, Natural England and other key stakeholders (e.g. County Council archaeological and environmental health leads), as required. This

should be read in conjunction with the preliminary water quality monitoring proposals outlined in Table 10.1.

- 11.20 It should also be noted that the final survey programme that is implemented will be integrated with that already undertaken across Thames Water’s SRO programme, particularly associated with TDRA and the SESRO projects, to avoid duplication. The surveys may be subject to land access constraints.

*Table 11.3: Summary of preliminary environmental monitoring proposal for gate two*

Survey type	Proposed target areas	Timing / Frequency
<b>Aquatic: macrophytes</b>	River Thames, Surbiton reach	2026 + 2027 / seasonal
<b>Aquatic: fisheries and eels</b>	River Thames, Surbiton reach	2026 + 2027 / annual or bi-annual
<b>Aquatic: invertebrates</b>	River Thames, Surbiton reach	2026 + 2027 / seasonal
<b>Aquatic: INNS</b>	River Thames, Surbiton reach Rivers Mole, Ember and Wey Queen Mary reservoir	2026 + 2027 / seasonal
<b>Terrestrial: overwintering birds</b>	South West London Waterbodies Special Protection Area (SPA) and functionally linked land	2026 + 2027, overwintering period
<b>Terrestrial: Phase 1 habitats survey</b>	Terrestrial sites along the extend of the indicative and alternative solutions	2026 / one per site
<b>Terrestrial: Initial protected species</b>	As above, informed by Phase 1 habitats survey and protected species potential	2027 survey season / species specific
<b>Archaeology, Desk-based assessment</b>	Terrestrial sites along the extend of the indicative and alternative solutions	2026, no timing constraint
<b>Archaeology, Geophysical survey</b>	Terrestrial sites along the extend of the indicative and alternative solutions	2026/7, no timing constraint
<b>Other environmental (landscape, air quality, noise etc.)</b>	N/A – to be undertaken after gate two to inform EIA baseline; desktop only for gate two	N/A

- 11.21 Engagement presentations and meetings were held with the Environment Agency before the submission of the gate one report. This engagement provided insight into the preliminary conclusions reached at gate one, ensure a ‘no surprises’ approach and to initiate discussions regarding proposed monitoring and assessment approaches for future project stages. Copies of the key environmental assessments have been provided to the Environment Agency and

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Natural England, with their comments reflected in this submission and key areas of concern to be considered further at gate two.

- 11.22 As noted previously, close technical engagement with environmental regulators is planned during the next stage of the project.