Strategic regional water resource solutions: detailed feasibility and concept design

Gate three submission for London Water Recycling Strategic Resource Option

December 2024

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Disclaimer

This document has been written in line with the requirements of the RAPID Gate 3 Guidance and to comply with the regulatory process pursuant to Thames Water's statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solutions presented in this document be taken forward, Thames Water will be subject to the statutory duties pursuant to the necessary consenting process, including environmental assessment and consultation as required. This document should be read with those duties in mind.

Notice – Position Statement

This document has been produced as the part of the process set out by RAPID for the development of the Strategic Resource Options (SROs). This is a regulatory gated process allowing there to be control and appropriate scrutiny on the activities that are undertaken by the water companies to investigate and develop efficient solutions on behalf of customers to meet future drought resilience challenges.

This report forms part of a suite of documents that make up the 'Gate 3 submission'. Gate 3 of the RAPID programme represents a checkpoint on the way to solutions being prepared for consent applications. The intention at this stage is to provide RAPID with an update on activities being undertaken in preparation for consent application submission; activities' progress including programme through to completion; and consideration of specific activities to address particular risks or issues associated with a solution. The regulatory gated process does not form part of the consenting process and will not determine whether an SRO is granted planning consent.

Given the stage of the SROs in the planning process, the information presented in the Gate 3 submission includes material or data which is still in the course of completion, pending further engagement, consultation, design development and technical / environmental assessment. Final proposals will be presented as part of consent applications in due course.

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Contents

Abbreviations

Acronym	Definition
ACCENT	Advanced Chemical and Catalytic Enhanced Nutrient Treatment
ACWG	All Company Working Group
AECOM	Architecture, Engineering, Construction, Operations, and Management
AIC	Average Incremental Cost
AMP	Asset Management Plan
APS	Asset Planning System
AWRP	Advanced Water Recycling Plant
BAFO	Best and Final Offer
BIM	Building Information Modelling
BNG	Biodiversity Net Gain
BVP	Best Value Plan
CAS	Common Assessment Standard
Capex	Capital expenditure
CDM	Construction (Design and Management)
CDR	Conceptual Design Report
CEC	Contaminants of Emerging Concern
CECA	Civil Engineering Contractors Association
CPIH	Consumer Prices Index including owner occupiers' housing costs
CPN	Competitive Procedure with Negotiation
DCO	Development Consent Order – planning under the Planning Act 2008
Defra	Department for Environment, Food & Rural Affairs
DO	Deployable Output
DRA	Direct River Abstraction
DWI	Drinking Water Inspectorate
DWPA	Drinking Water Protected Areas
dWRMP	Draft Water Resources Management Plan
DWSP	Drinking Water Safety Plans
DYAA	Dry Year Annual Average
DYCP	Dry Year Critical Period
EA	Environment Agency
ECI	Early Contractor Involvement
EES	Engineering Estimating System
eDNA	environmental DNA
EIA	Environmental Impact Assessment
EQS	Environmental Quality Standards
EQSD	Environmental Quality Standards Directive
FRAP	Flood Risk Activity Permit
GHG	Greenhouse Gas
GIS	Geographic Information System
GLAAS	Greater London Archaeology Advisory Service
HM	Her Majesty's
HRA	Habitats Regulations Assessment
ID	Internal Diameter

Acronym	Definition
INNS	Invasive Non-Native Species
KGV	King George V Reservoir
LPA	Local Planning Authority
LSE	Likely Significant Events
LTOA	Lower Thames Operating Agreement
LWR	London Water Recycling
MBBR	Moving Bed Biofilm Reactor
Ml/d	Mega litres per day
MMC	Modern Methods of Construction
MOG	Mogden Water Recycling Scheme
MOL	Metropolitan Open Land
MP	Member of Parliament
MSQ	Market Sounding Questionnaire
NAU	National Appraisal Unit
NDMA	N-Nitrosodimethylamine
NIT	National Infrastructure Team
NPS	National Permitting Service
NPV	Net Present Value
NSF	Nitrifying Sand Filters
NSP	Nationally Significant Project as Directed by Section 35 of the Planning Act 2008
NTP	Notice to Proceed
OB	Optimism Bias
Opex	Operating expenditure
PA2008	Planning Act 2008
PAS	Publicly Available Specification
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PIN	Periodic Indicative Notice
PINS	Planning Inspectorate
PMO	Project Management Office
PPA	Power Purchase Agreement
PR	Price Review
Pywr	A generalised water resource network modelling tool written in Python
QCRA	Quantitative Costed Risk Assessment
RAPID	Regulatory Alliance for Progressing Infrastructure Development
REGO	Renewable Energy Guarantee of Origin
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEMD	Security and Emergency Measures Direction
SEA	Strategic environmental assessment
SES	Sutton and East Surrey
SINC	Sites of Importance for Nature Conservation
SOCC	Statement of Community Consultation
SoS	Secretary of State

Acronym	Definition
SQ	Supplier Questionnaire
SRO	Strategic Resource Option
STW	Sewage Treatment Works
SWQRA	Strategic Water Quality Risk Assessment
TBM	Tunnel Boring Machine
TCPA	Town and Country Planning Act 1990
tCO_2e	Tonnes of carbon dioxide equivalent
tCO_2e/yr	Tonnes of carbon dioxide equivalent per year
TGWTW	Thames Gateway Water Treatment Works
TLT	Thames Lee Tunnel
TOC	Total Organic Carbon
TP	Technical Partner
TTP	Tertiary Treatment Plant
TTF	Teddington Target Flow
UCR	Utilities Contract Regulations
UK	United Kingdom
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordinance
WAFU	Water Available for Use
WBS	Work Breakdown Structures
WFD	Water Framework Directive Regulations 2017
WLC	Whole Life Carbon
WRMP	Water Resources Management Plan
WRMP19	Water Resources Management Plan 2019
WRMP24	Water Resources Management Plan 2024
WRSE	Water Resource South East
WRZ	Water Resource Zone
WTW	Water Treatment Works

London water recycling schemes – Overview Schematics

1. Executive summary

Overview

1.1. The London Water Recycling Strategic Resource Option (SRO) comprises three schemes of various size configurations: Teddington Direct River Abstraction (DRA), Beckton Water Recycling scheme and Mogden Water Recycling scheme. The SRO contains a viable set of solution options that includes a range of treatment schemes and conveyance components, to deliver a resilient supply of raw water to the London Water Resource Zone (WRZ) during drought conditions.

1.2. Thames Water has worked collaboratively to refine designs, cost and risks of the schemes, undertake appraisals and develop further the work aligned to the activities set out in Annex 2 of PR19 final determinations: Strategic regional water resources solutions[1] and aligned to RAPID's Gate 3 guidance[2].

1.3. Work progressed has been proportionate per scheme and based on Thames Water's Water Resource Management Plan 2024 (WRMP24).

1.4. Teddington DRA (the Project) remains the preferred scheme as set-out within WRMP24 to assist in achieving the 1 in 200-year drought resilience protection for our customers. The Project is a water abstraction and transfer scheme supported by water recycling. River water would be abstracted from the lower River Thames, just upstream of Teddington Weir, and conveyed through a new short pipe to intercept with the existing Thames Lee Tunnel (TLT). This water would then be transferred to the Lee Valley reservoirs for storage and supply. To compensate for the abstraction, a proportion of final effluent from Mogden Sewage Treatment Works (STW) would be subject to additional tertiary treatment at a new plant on the STW site and then conveyed in a new tunnel to a discharge location just downstream of the abstraction point. The discharge would directly compensate flows taken from the new abstraction upstream. The maximum capacity of Teddington DRA is 75Mld which would provide a deployable output of 67Ml/d.

1.5. Teddington DRA has been the focus of much of the activities progressed through Gate 3. We have progressed our engineering design, environmental assessment, planning, engagement and procurement works as planned and aligned to achieving the key milestone of being 'construction ready' within AMP8.

1.6. Through Gate 3 we have completed the following key milestones for the Project:

- Received a Direction from the Secretary of State for the Environment, Food and Rural Affairs to treat the Project as a project of national significance for which development consent is required.
- Held a non-statutory public consultation on site options through autumn 2023.
- Re-designed key elements of the Project to further reduce potential impacts, informed by feedback of consultation and engagement.
- Addressed Priority Actions set at Gate 2
- Updated the Strategic Water Quality Risk Assessment (SWQRA) which provides the basis for updating existing Drinking Water Safety Plans to include Teddington DRA

[1] PR19-final-determinations-Strategic-regional-water-resource-solutions-appendix.pdf (ofwat.gov.uk)

[2] January-2024-Gate-Three-Guidance-Version-3.pdf (ofwat.gov.uk)

- Provided a community update, including public information events, in autumn 2024, setting out changes made since non-statutory consultation, giving additional technical details and an updated next steps timeline.
- Sought an Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate in autumn 2024.

1.7. Beckton and Mogden Water Recycling schemes are the alternative schemes within WRMP24 and as such we have only progressed activities that we consider proportionate that address actions set at Gate 2, fill gaps and extend environmental understanding of the potential impacts with potential mitigation solutions. We have not progressed planning or procurement activities for these schemes through Gate 3 and have worked closely with the Environment Agency and RAPID to ensure only appropriate activities are completed. As such the concept design for both schemes has not been significantly updated and the Gate 2 Concept Design Reports, published on our website[3,4], remain the latest available and have not been re-produced for Gate 3.

1.8. As set -out at Gate 2, the maximum size capacity of Mogden Water Recycling scheme could be up to 150Ml/d and up to 300Ml/d for Beckton Water Recycling scheme. Both schemes differ from Teddington DRA in that they are considered to be indirect reuse schemes by taking final effluent and treating it through an Advance Water Recycling Plant (AWRP) where the recycled water can be abstracted as a new raw water resource.

1.9. Through Gate 3 we have completed the following key activities for the alternative schemes:

- Continued environmental baseline data collection where appropriate.
- Undertaken environmental modelling activities to address Priority Actions set at Gate 2, address knowledge gaps and test different design scenarios.
- Updated the SWQRA for the schemes based on the latest water quality data.
- Commenced site options appraisal work based on the appraisal methodology consulted on for Teddington DRA for above ground infrastructure sites associated with the Beckton Water Recycling scheme.

1.10. Proportionate activities have been progressed for the alternative schemes through Gate 3 with the focus of this submission is on our preferred solution, Teddington DRA. We will continue to develop these alternative schemes to the end of AMP7 as an alternative to the preferred solution. Funding has been allocated in our business plan for this work to continue beyond AMP7 with scope to be agreed with RAPID at a checkpoint in 2025.

1.11. The London Water Recycling SRO finances have been carefully managed through Gate 3, and assurance of this submission has been completed in line with Thames Water's 3-lines of assurance model as set-out in section 10 of this report, and in the context of RAPID's assessment criteria for robustness, consistency and uncertainty. The SRO and the recommendations made within our submission is supported by the Thames Water Board.

1.12. The priority actions, actions and recommendations made in RAPID's final decision at Gate 2 have been addressed through Gate 3; these are summarised in section 4 and annex D and a signpost table provided in section 13 of this report.

[3] Microsoft Word - Annex A1 J698-LR-DOC-240001-0D Beckton Effluent Reuse Conceptual Design Report (thameswater.co.uk)

[4] Microsoft Word - Annex A2 J698-MR-DOC-220001-0D Mogden Effluent Reuse Conceptual Design Report (thameswater.co.uk)

Key facts – Teddington DRA

Item	Details
Scheme type	Water abstraction and transfer supported by water recycling
Key assets	New water abstraction infrastructure on the river Thames and short conveyance to a connection with the TLT. Tertiary treatment Plant at Mogden STW for treating up to 75Ml/d of final effluent. Recycled water conveyance and discharge infrastructure to the River Thames
Deployable Output (DO)	67Ml/d, dry year annual average
Requirements met by the scheme and plans in which the scheme features	Contribution to water supply security during a 1 in 200 year drought, in accordance with WRSE regional plan and WRMP24 for Thames Water
Date by when the scheme is required	Q1 2033
Year the scheme can be operated	2033
Max utilisation average incremental costs (AIC)	68.9 p/m^3
Carbon impact	Whole life carbon at 47,083 tCo_2e
Proposed Gate 4 submission date	September 2026
Key project risks	• The project requires integration with Mogden STW and TLT critical operational assets. Space to develop at Mogden is very limited and in demand. A strategic options appraisal is considering opportunities to align with the Mogden masterplan to maximise space at Mogden which may result in changes to TTP layout, design and location within Mogden which could impact on scheme costs and programme. • The Project may face a lack of market appetite in comparison to other schemes due to concurrency of other shorter or more cost-efficient procurement processes, therefore creating upwards pressures for the delivery (programme delays, and bidding and target price cost increases). The Environment Agency has proposed additional in-river mitigation measures to protect fish. Any significant re-design of the Project may cause delays to WAFU and increase Project costs. • Loss of open space, metropolitan land and/or impacts upon a SINC associated with the intake and outfall structures and/or shafts may lead to increased cost, delays to consent or special parliamentary procedures

2. Solution Design and Preferred Solution Option

Introduction

2.1. Three schemes make up the London Water recycling SRO taken forward from Gate 2, as follows:

- Teddington DRA: Teddington DRA is a water abstraction and transfer scheme supported by water recycling. River water would be abstracted via a new abstraction facility on the lower River Thames, just upstream of Teddington Weir, and conveyed through a new pipe several hundred metres long to intercept with the existing Thames Lee Tunnel (TLT). This water would then be transferred to the Lee Valley reservoirs for storage and supply. To compensate for the abstraction and minimise any environmental impacts a proportion of final effluent from would be subject to additional tertiary treatment at a new plant on the STW site and the recycled water conveyed in a new tunnel to a discharge location just downstream of the abstraction point. The discharge would directly compensate flows taken from the new abstraction upstream. The maximum capacity of the Project is 75Ml/d.
- Beckton Water Recycling: A proportion of final effluent from the Beckton STW would be treated at a new advanced water recycling plant (AWRP) within the STW site. The recycled water would then be transferred and discharged into the River Lee Diversion above the inlet to King George V Reservoir (KGV) to supplement the raw water supply to the Lee Valley reservoirs. The recycled water conveyance would consist of two tunnels – one from Beckton AWRP to Lockwood Reservoir Pumping Station site and the other from Lockwood to KGV then via discharge into the River Lee Diversion. The maximum scheme capacity would be 300Ml/d which could be developed in 50, 100 or 150Ml/d phases.
- Mogden Water Recycling: A proportion of final effluent from the Mogden STW would be transferred to a new AWRP located near Kempton. The recycled water would be conveyed and discharged into the River Thames upstream of the existing Thames Water Walton intake. The maximum scheme capacity progressed from Gate 2 would be 150Ml/d.

2.2. Teddington DRA has been selected as the preferred scheme in Thames Water's Water Resources Management Plan 2024 (WRMP24). Beckton and Mogden water recycling schemes have been identified as alternative schemes in an adaptive plan.

2.3. This section presents the latest solution design for the preferred solution - Teddington DRA.

Background and objectives

2.4. The National Framework for Water Resources developed by the Environment Agency (March 2020) explores England's long-term water needs. It sets out: (1) the scale of action needed to ensure resilient water supplies are available to meet the needs of all users in the future; and (2) a greater level of ambition for restoring, protecting and improving the environment that is the source of all our supplies. If no action is taken between 2025 and 2050 approximately 3,435Ml/d will be needed for public water supply to address future pressures, with around 50% of the national need being in the south east.

2.5. The National Framework promotes the need for regional planning by regional groups alongside WRMP plans developed by water companies to deliver the right strategic solutions for the nation as a whole. The intention is that regional plans will deliver a step change in resilience and environmental protection by putting aside company boundaries and considering the needs of the whole region.

2.6. These step changes include increasing supplies – by exploring a range of options, such as inter regional transfers, reservoirs, water recycling schemes and desalination plants. The National Framework recognises that even with the most ambitious demand savings, supply side options will be needed to manage the uncertainty associated with demand reductions and to reduce reliance on drought measures that carry environmental risks.

2.7. Thames Water has worked with Water Resources South East (WRSE), a regional group which covers the south east region, through the development of the regional plan and its WRMP24, sharing information in a timely way on potential solution options, policy matters and the technical methods, assumptions and decision making. We have also engaged with our customers to ensure we understand and take account of their priorities and preferences.

2.8. The London Water Recycling Strategic Resource Option (SRO) has been developed to provide a reliable, and sustainable new source of water and is part of a suite of potential new water infrastructure projects across the region.

2.9. Thames Water has worked to refine designs, develop costs, undertake appraisals and develop further the work aligned to the activities set out in Annex 2 of PR19 final determinations: Strategic regional water resource solutions[5] and aligned to RAPID's Gate 3 guidance. Work progressed through to Gate 3 has been proportionate per scheme and in line with Gate 3 guidance focussed on the progression of a single preferred scheme through planning and procurement and aligned to achieving the key milestone of being 'construction ready' within AMP8.

2.10. Since Gate 2, the Secretary of State has confirmed Teddington DRA as being a project of national significance for which a Development Consent Order (DCO) is required. Teddington DRA is therefore progressing towards submission of a DCO application. Aligned with the process and the National Policy Statement for Water Resources Infrastructure we are engaging with a range of local authorities, statutory bodies and other stakeholders to assist and inform the development of the Project. The Project is in the pre-application phase and has completed non-statutory consultation and sought an EIA Scoping Opinion from the Planning Inspectorate.

The preferred solution option

2.11. Selection of the preferred solution option was undertaken through option appraisal by WRSE's revised draft regional plan[6] and Thames Water's WRMP24[7]. WRSE developed multi-metric investment regional system-simulation models and selected the best value plan (BVP) from potential options across the region including the London Water Recycling schemes. Thames Water took the regional work, broke it down to company and water resource zone levels and appraised it to identify whether Thames Water should adopt it, or whether any alterations should be made.

2.12. The programme appraisal process by WRSE and Thames Water to identify the Best Value Plan is shown in Figure 2-1. The investment model was run multiple times in its various modes to consider cost, environmental & society and resilience criteria. In addition, sensitivity tests were carried out to increase robustness of the plan in various scenarios with certain large schemes removed or forced to be included, or assuming different timings around policies such as drought resilience and environmental destination, as well as the success and government support of demand management being a key uncertainty that has been tested. The overall BVP was developed considering these modelling outputs.

2.13. The best value plan was consulted on by WRSE and a response report published, detailing consideration of and response to the feedback was produced[8]. The programme appraisal process was also repeated considering changes in base information and updates to policy to issue the revised draft regional plan and revised draft WRMP24.

[5] PR19-final-determinations-Strategic-regional-water-resource-solutions-appendix.pdf (ofwat.gov.uk)
[6] WRSE Regional Plan Summary August 2023.pdf
[7] Water resources | Regulation | About us | Thames Water
[8] WRSE Draft Regional Plan Consultation Response Document (August 2023) V1.0 (ehq-production-europe.s3.eu-west-1.amazonaws.com)

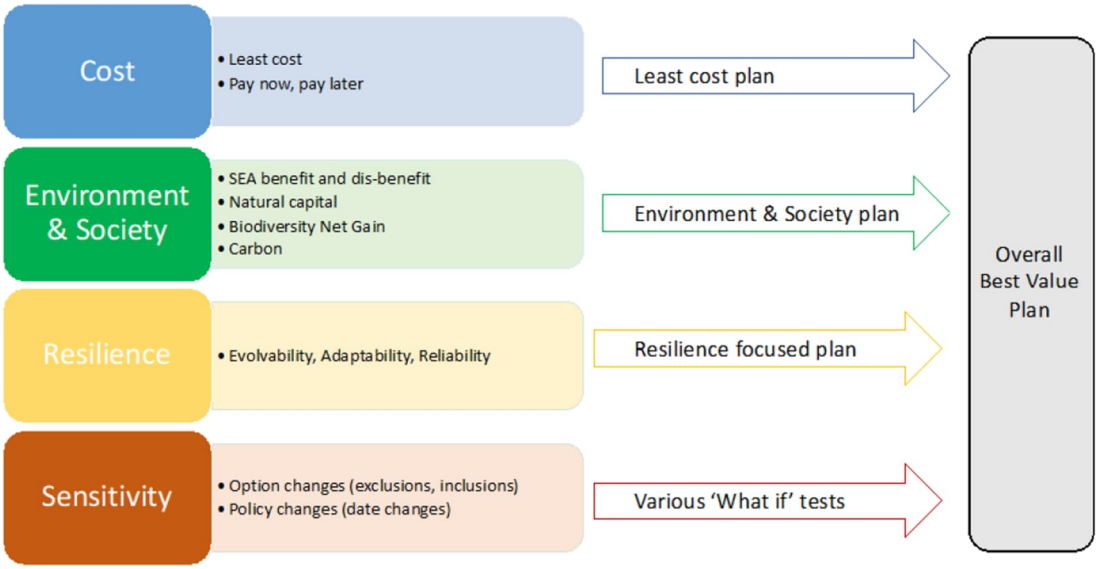

Figure 2-1: The programme appraisal journey

2.14. Rationale for the selection of a 75Ml/d Teddington DRA as the BVP option includes:

- Drought resilience in London needs to be increased to 1 in 200-year by the early 2030s, and to 1 in 500-year by the early 2040s. Teddington DRA is the best value water resources option which can provide enough water to increase drought resilience to a 1 in 200-year level by the early 2030s. The option has both lower capital and operational costs than alternatives.
- A 75Ml/d Teddington DRA was selected both in the model runs for the "least cost plan" as well as for "Environment & Society" and "Resilience" metrics.
- Sensitivity testing, in which Teddington DRA was ruled out, selected a combination of a 50Ml/d licence trade with Affinity Water (enabled by the construction of the Grand Union Canal 100Ml/d option), which in turn requires Minworth water recycling scheme for the source, a 25Ml/d transfer from SES Water, and the development of seven groundwater schemes in south-east London as an alternative to achieve 1 in 200-year resilience by the early 2030s. This plan was found to be £250m more expensive and was considered high risk because it is reliant on the delivery of several individual schemes involved by different companies.
- Sensitivity testing showed that replacement of Teddington DRA with a 50, 100 or 150Ml/d Beckton Water Recycling scheme would result in plans more expensive in Net Present terms combined with increases in carbon emissions and represents a significantly 'more complex project'.

Teddington DRA design development

Site specific vision and design principles

2.15. The concept design of Teddington DRA has been developed and refined since Gate 2 and following non-statutory public consultation and engagement through Gate 3. The latest design has been developed in accordance with the All Company Working Group (ACWG) publication on Design Principles and we are following a staged design process through the consenting, procurement, construction and operational stages of the Project.

2.16. The approach to design to Gate 3 has been to undertake site optioneering (Stage A), identify a preferred suite of infrastructure sites, test these and the concept design through consultation (Stage B), update the design and seek a Scoping Opinion on a single preferred design (Stage C)

that is considered likely to achieve consent. Table 2-1 summarises the key activities undertaken against the five ACWG design principles themes.

2.17. Through Gate 3 we have appointed a project level design champion and embedded 'good design' within the activities undertaken which has included maximising opportunities within site layout, landscaping, landform, and integrating biodiversity and conservation interests within the design whilst ensuring safety and function.

2.18. We have developed a Project design vision which captures the ambitions for the Project as follows:

"Teddington DRA aims to *create a sustainable and forward-thinking approach to protect customers in Greater London from the effects of drought. The Project addresses London supply challenges by providing a new source of water using innovations in water treatment technology, integrating with existing infrastructure and leaving a positive legacy that offers environmental protection and enhancement*".

2.19. Design evolution is an iterative process and we will develop Project specific principles as the design matures and in response to feedback from stakeholders. Early in 2025 we intend to appoint an independent design panel to review our approach to design and ensure we maximise design opportunities while developing the design for DCO planning (Stage D).

Table 2-1: Teddington DRA, Gate 3 design principles key activities

ACWG Design Principles	Teddington DRA Gate 3 Design Principles Activities
Cross Cutting Design Principles 1. Be specific: Develop project-specific design vision and principles based on an understanding of the objectives of each project and the people and places it will affect.	Design vision for the Teddington DRA has been developed reflecting Thames Water's ambition for the Project, aligned to the ACWG and National Infrastructure Commission design principles. The development of the Project in Gate 3 has been undertaken in accordance with the principles of: Climate, People, Place and Value, further details of which are provided below.
Cross Cutting Design Principles 2. Safe and well: Actively and collectively develop designs that can be built, used, and maintained without unacceptable risks to the health and safety of workers - particularly during hazardous construction and operational activity. Manage risks to members of the public thoughtfully with an approach that balances maximising wellbeing benefits with protection from risks that could cause significant harm.	During Gate 3 further assessments and investigations have been undertaken to inform design development that will help manage risks to workers and the public during the construction and operation of the scheme. This has included intrusive ground investigation, process pilot plant testing, obtaining utility and unexploded ordnance (UXO) information. CDM Principal Designers have been appointed in Gate 3 in accordance with the CDM Regulations 2015. Design development during Gate 3 including amending the tunnelling technique from Gate 2, which proposed pipejacking, to the use of a tunnel boring machine (TBM). This change has reduced the need for intermediate shafts to a single shaft, reducing interactions and associated risks, in the public realm from construction of the Project. Drinking Water Safety Plans have been updated to ensure the customer's and environment's safety is paramount for the design vision.
Climate 1. Nature knows no boundaries: Water is essential to all life and managing our response to climate change is a collective and urgent activity. Projects must be developed to work across companies and/or legislative boundaries to develop sustainable solutions and environmental enhancement for the wider benefit of society. 2. Resource and carbon efficient throughout: Projects shall seek to reuse existing assets, eliminate waste (including waste of water)	During Gate 3 discussions and workshops have been held with the Local Planning Authorities and the Environment Agency which have considered the baseline environment and potential mitigation and habitat enhancement measures. Thames Water is committed to meet 10% Biodiversity Net Gain (BNG), in accordance with the requirements of the Environment Act 2021. A key design principle of the Project involves the co-location of the TTP with existing facilities at Mogden STW. In addition, design development in Gate 3 proposes the further use of infrastructure assets with the TTP maintenance flow being confirmed as utilising the existing final effluent discharge pipeline and outfall at Isleworth Ait.

ACWG Design Principles	Teddington DRA Gate 3 Design Principles Activities
and make efficient use of materials and transport across the whole of the project lifecycle. 3. Resilient and adaptable: Design for anticipated future demand at the appropriate scale. Build in the resilience to absorb and recover from the impacts of the extreme events and incremental stresses likely to arise from climate change.	An updated cost and carbon report is provided in Annex A2 of the Gate 3 submission. This report includes analysis of the design change in the construction of the tunnel and includes a whole-life carbon mitigation assessment carried out based on the PAS 2080:2023 guidance and principles. The capacity of the Project has been determined based on drought conditions/ scenario with the need for the Project accepted by the Secretary of State via the adoption of Thames Water's Water Resources Management Plan 2024. The scheme would provide a secure flow in drought conditions. Both carbon and climate resilience are matters considered within the EIA Scoping Report and proposed to be scoped into the full environmental assessment
People 1. Understand and respond to your Community's needs: Develop a full understanding of the social context that will be impacted by the project over its lifecycle. Design for how local communities will encounter the infrastructure in their everyday lives during both construction and operation. 2. Engage widely, early and meaningfully: Work with stakeholders and local communities to develop their understanding of the importance of nature and water conservation. Develop co-design approaches to aspects of the design of infrastructure and associated landscape where practicable. 3. Improve access and inclusion: Consider how people move around your works. Maximise opportunities to support active travel and improve recreational access to waterside and green spaces that can improve outcomes for wellbeing, health, local economy, social inclusion and education.	During Gate 3 assessments of the baseline environment have been undertaken, which has involved desk-based analysis and surveys. This assessment work is reported in the EIA Scoping Report. Continuous and open communication with stakeholders has been carried out through Gate 3 with a range of stakeholders including local communities. Engagement and consultation with stakeholders and local communities impacted by the Porject has influenced the design. Design changes made during Gate 3, which have been influenced by stakeholder and local community feedback, include a change in the tunnelling technique to reduce the number of intermediate shafts, as well as consideration of an in-river discharge for the recycled water to help minimise potential effects on the aquatic marginal habitat. Engagement with stakeholders and local communities has been varied to help maximise access and inclusion. The consultation and engagement undertaken in Gate 3 has included face to face meetings, on-line meetings, production of newsletters, use of social media and the press and public events.
Place 1. Take care: Develop proposals in the spirit of stewardship looking to both the past and future of each context to understand and develop its landscape, cultural heritage, health and sustainability. Work with partners to secure the long-term success of all measures. 2. Protect and promote the recovery of nature: Focus on the role of landscape, its capacity to accommodate infrastructure and shape places. Work collaboratively and employ holistic, landscape-scale approaches that support and deliver biodiversity net gain as well as multiple other benefits. 3. Design all features beautifully, with honesty and creativity: Our utility infrastructure can be a source of pride and a positive contribution to its context. Develop proposals that reveal and celebrate its importance, provide visual delight and leave a positive legacy.	The majority of permanent land requirements for Teddington DRA is on land currently owned by Thames Water, with minor land acquisition required for activities such as provision of conveyance shafts, which would be entirely below-ground post-construction. The design developments made during Gate 3 have reduced the number of intermediate shafts and sites requiring development in the public realm and that would require land acquisition. During Gate 3, discussions and workshops have been held with the Local Planning Authorities and the Environment Agency which have considered the baseline environment and potential mitigation and habitat enhancement measures. Thames Water is committed to meet 10% BNG, in accordance with the requirements of the Environment Act 2021. During Gate 3 assessments of the baseline environment have been undertaken, which has involved desk-based analysis and surveys. This assessment work is reported in the EIA Scoping Report, which also proposes additional studies including heritage, townscape and visual surveys to help inform further design development including enhancement opportunities to facilitate a positive legacy for the Project.

ACWG Design Principles	Teddington DRA Gate 3 Design Principles Activities
Value 1. Maximise embedded value: Work collaboratively across specialisms and with stakeholders to maximise the benefits of the scheme by being smart with the location and arrangement of elements and design of mitigation within the project scope and budget. 2. Understand how you could provide additional value: Identify opportunities to contribute wider regional benefits outside of the project scope. In particular look for synergies with relevant catchment management plans and proposals that support the delivery and enjoyment of a healthy water environment. 3. Capture and measure embedded and additional value: Have clear narratives about how you are contributing to society beyond the core scope of your project. Quantify these benefits so they can be considered meaningfully in conversations on value, financing and risk. Share your experience and knowledge widely.	Non- statutory consultation on the site appraisals and selection processes was undertaken during Gate 3. A statement of response to this consultation has been published. Ongoing engagement helped shape design changes made in Gate 3 including changes to the location of Project elements such as the intermediate shaft requirements. An updated cost and carbon report is provided in Annex A2 of the Gate 3 submission. As part of the Gate 3 engagement process customer research across Greater London was undertaken by Thames Water. The results of this research has identified a majority view in acceptance of the Project. As part of the Gate 3 design development we are exploring environmental enhancement opportunities and quantifying how the Project can contribute to improving water quality. This work will continue into Gate 4.

Project features and construction

2.20. Teddington DRA is a water abstraction and transfer scheme supported by water recycling. The latest Teddington DRA concept design and how it will be constructed is provided in Annex A1. The key components of the Project are:

- **Tertiary treatment plant (TTP):** TTP would be located in Mogden STW to treat final effluent from the STW and generate up to 75Ml/d of recycled water. The treatment process is likely to include Moving Bed Biofilm Reactor (MBBR) and mechanical filter treatment as a minimum and will be confirmed through Gate 4 following extensive trials from a pilot plant. The location of the TTP is currently assumed to be on a platform above the southernmost storm tanks, however ongoing Mogden masterplan development is investigating wider site integration options that could result in an alternative and integrated plant being located elsewhere within Mogden as part of wider site upgrades.
- **Recycled water transfer:** A new approximately 4.2km long tunnelled conveyance route would be constructed to connect the TTP in Mogden STW to the proposed outfall on the riverbank of the River Thames upstream of Teddington Weir. The tunnel would be bored at a depth of around 20-30m. The tunnel, approximately 3.5m internal diameter (ID), would be driven using a Tunnel Boring Machine (TBM). The tunnel would have four shafts: a drive shaft and a recycled water interception shaft in Mogden STW, a reception shaft near the new outfall, and an intermediate shaft at around the midpoint between Mogden STW and the outfall.
- **River abstraction and transfer to TLT:** The river abstraction would be located approximately 150m upstream of the proposed new outfall. The abstracted river flow would be conveyed to the existing Thames Lee Tunnel (TLT) through a smaller diameter (up to 2.2m ID) pipe installed using a pipe jacking technique. There are currently two potential locations for the connection of the new pipeline into the TLT – one approximately 130m from the river abstraction, and the other approximately 500m.

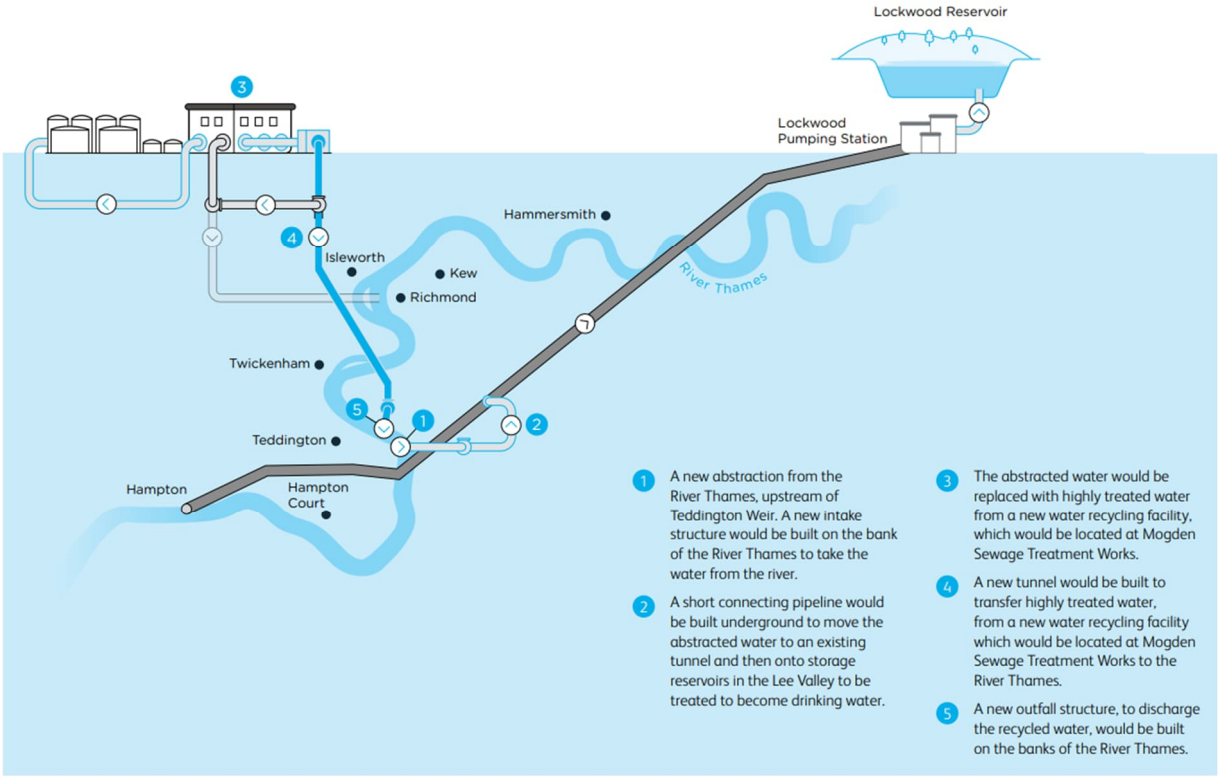

Figure 2-2: Teddington DRA components and concept.

2.21. Construction of the Project would take approximately three years. We have presented within our EIA scoping report[9] how the Project would be constructed. In addition, we have developed a number of factsheets including one covering tunnel boring[10] and produced a tunnel boring animation[11] to support our Project information events.

Operation

2.22. As a drought project it would operate intermittently as required during periods of drought set out in the Thames Water Drought Plan framework. Operation is anticipated to be once every two years on average. The late summer and autumn months being the most common for operation, with August and September having the highest frequency. It is planned that the Project would be utilised and operated as one of the strategic drought schemes and that the trigger of utilisation would be same as the strategic drought schemes in the current Drought Plan (further information on Project utilisation is set out in the sub section below).

2.23. During times when the Project is not required to supply water, it is required to continue to run the TTP at reduced levels to maintain the operability of the TTP and enable timely start-up at the beginning of drought periods. This operational mode is called hot standby mode and would require a low flow of final effluent to be processed through the TTP to produce recycled water. The TTP would operate at a minimum of 15Ml/d to maintain biomass within the MBBR during hot standby mode though the flow rate will be confirmed through investigations such as pilot plant testing currently being undertaken at Mogden STW. The recycled water produced during this period will be discharged through the existing Mogden STW outfall at Isleworth Ait, which

[9] WA010006-000016-WA020002 - Scoping Report.pdf
[10] Teddington DRA - What is Tunnel Boring?
[11] Teddington DRA tunnelling video

is in the tidal reach of the River Thames and therefore would not provide a resource benefit. This confirmed discharge location is a further design refinement made since Gate 2. Further details of operation and maintenance of Teddington DRA are presented in Annex A1.

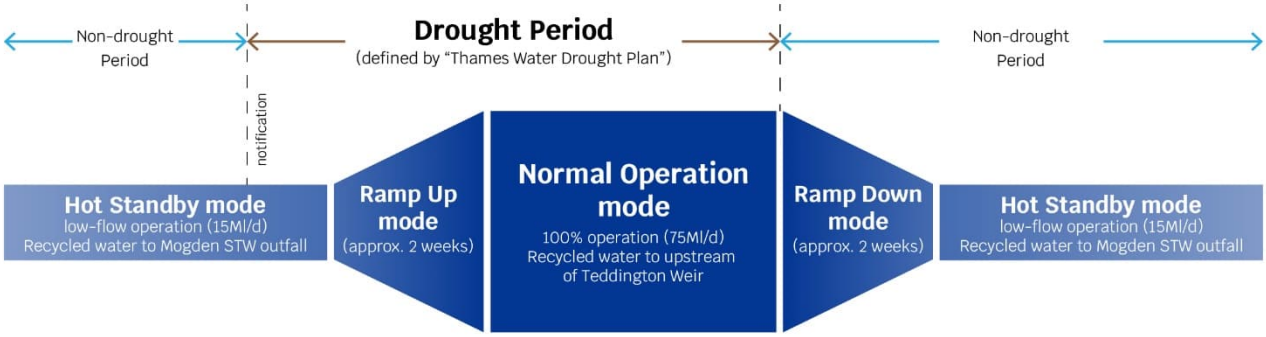

Figure 2-3: Teddington DRA operation

Site selection

2.24. We developed our Project site options through a five-stage appraisal methodology[12] which we consulted on through a non-statutory consultation in autumn 2023. As part of the consultation, we presented the design developed from Gate 2 which included an appraisal of 23 sites in total to locate different components of the above ground infrastructure. This included one location for the TTP at Mogden STW, one location for the intake and outfall structures just upstream of Teddington Weir off Burnell Avenue and multiple intermediate shaft locations and TLT connection locations. The appraisal is summarised in the following report – Teddington DRA consultation brochure.

2.25. As part of this consultation, we presented a recommended suite of site options which we received a large amount of feedback on. As a result, we investigated further our infrastructure needs and construction techniques which influences site selection and following a design review made changes to the design including:

- Constructing a 3.5m ID tunnel between Mogden STW and the River Thames, which is a change from the 1.8m ID pipe originally proposed.
- Construction of the tunnel using a tunnel boring machine rather than by way of pipejacking.

2.26. These changes have enabled us to reduce the requirement for a shaft every 1,000m and removed a total of four shafts from the Project. In addition to this, the change in construction technique results in the ability to remove all tunnel spoil from Mogden STW rather than from each shaft location, thereby reducing the potential construction impacts within local communities.

2.27. We reappraised the site options and held community information events as part of a wider campaign of community updates through October 2024. An EIA Scoping Opinion from the Planning Inspectorate was received in November 2024 based on the latest design. Figure 2-4 shows the Project area for which the components of the Project will sit within.

[12] Site Appraisal Methodology 2023

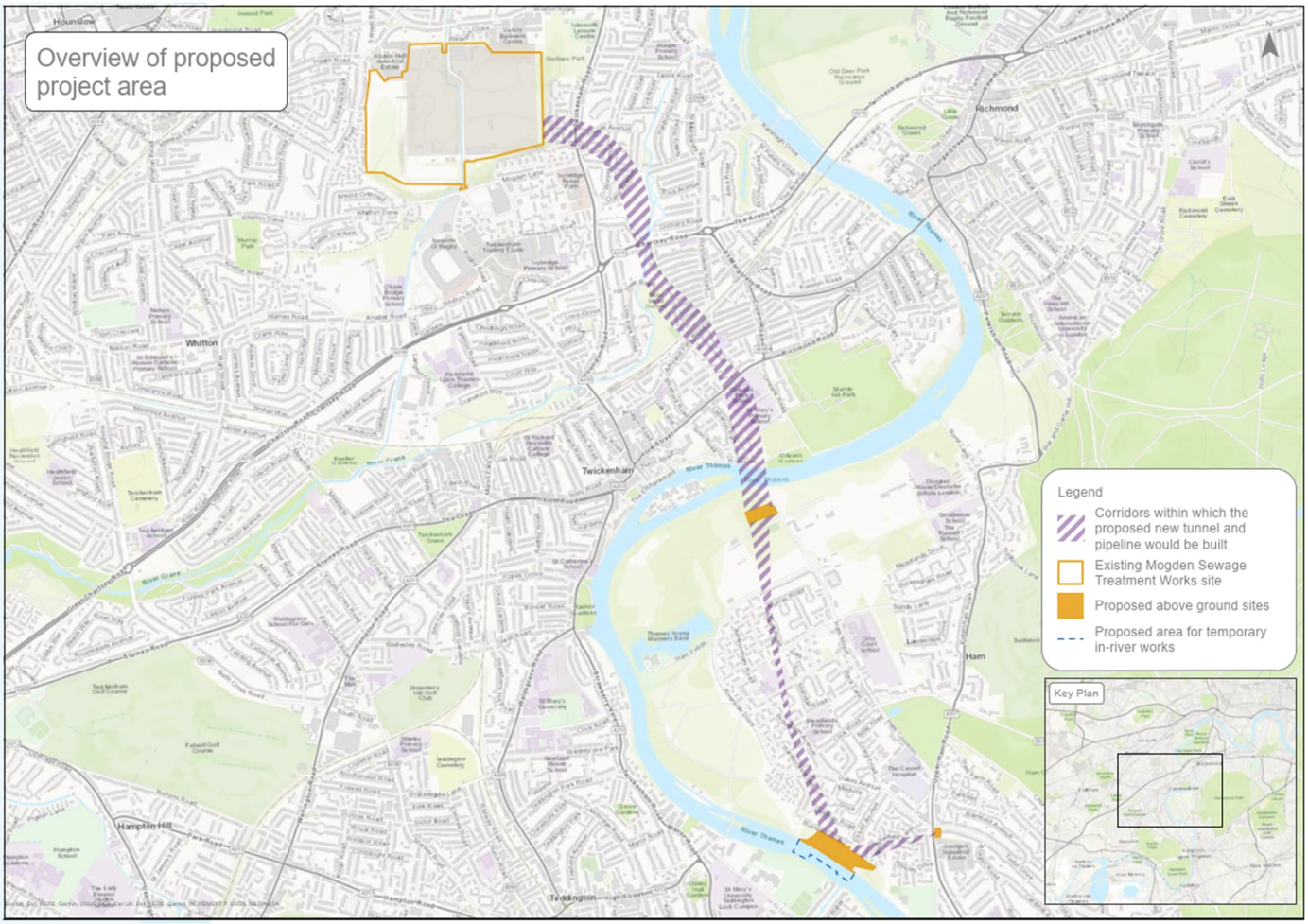

Figure 2-4: Teddington DRA scheme – Overview of proposed project area

2.28. The Project designs will continue to be refined following statutory consultation, ongoing engagement, environmental surveys, pilot plant studies, ground investigation, Environmental Impact Assessment and other investigations and studies.

Security requirements

2.29. The security and protection of the Project is essential to safeguard robustness as a resilience measure and to ensure sustainability to supply. A preliminary assessment of potential risks including man-made and external hazards (such as an act of terrorism) and natural hazards which could threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment was undertaken in Gate 3. The potential key risks identified are summarised in Annex A1 and detailed in our EIA Scoping Report[13].

2.30. The security and emergency measures for the Project will be designed considering the project-specific risks. Mitigation measures would include appropriate design and risk assessment, security and cybersecurity measures, collaboration with authorities, real-time monitoring systems to detect and respond, development of emergency response plans in consultation with local emergency services, and installation of advanced fire detection and suppression systems.

2.31. Critical systems that cause an impact of sufficient scale to fall under the remit of the Network and Information Systems (NIS) Regulations 2018 will be highlighted in the security design.

[13] Documents | Teddington Direct River Abstraction (TDRA) (planninginspectorate.gov.uk)

Security of assets will be designed in accordance with the policies of Thames Water and advice from our security advisors. All designs will comply with the Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction 2022 (SEMD). Where appropriate, security options to obscure or camouflage new assets to make them less obvious will be explored. Engagement will also take place with relevant authorities and interested parties regarding the risks that have been identified and the proposed approach and mitigation measures. Further descriptions on considerations of security requirements and potential measures are presented in Annex A1.

Digital twin strategy

2.32. Thames Water intends to develop a digital twin strategy through 2025 as a part of the Gate 4 activities that will enable digital capabilities to support and test the design, construction commissioning and operation of Teddington DRA. The strategy will align with Thames Water's digital strategy and national guidance such as RIBA Plan of Works, ISO1960 and CDBB Gemini Principles. Throughout Gate 4 and DCO preparation, the proposed system will be tested using the digital twin to support and refine the Project and including existing environmental models of the River Thames and Thames Tideway.

2.33. Adopting the digital twin should bring many benefits, including common data sharing, revision control and consistent standards across stakeholders. Testing through the digital twin could validate various aspects of the Project including spatial coordination, constructability, construction sequencing, material volumes and flow analysis, operability, and cost and carbon estimates. Integration of the Project into the existing assets (e.g. the existing Thames Water's pumping connections, SCADA system and Mogden STW treatment process) may also be tested through the digital twin. Innovative techniques using GIS, remote and mass data-capture, parametric asset modelling and process simulation, will be adopted. The digital twin will evolve from design stage to a "construction support twin", "as-built digital twin" and "operational digital twin" to support validation and decision making in each phase of the Project.

Utilisation

2.34. The London WRZ has a list of supply-side measures in which several strategic drought schemes augment the water resources available to the WRZ. The strategic drought schemes are labelled "Strategic Schemes in Use" and it is assumed that Teddington DRA would become a Strategic Scheme in Use", with the same trigger mechanisms in place to bring it into operation in times of drought.

2.35. The trigger for switching on the existing London Water Resources "Strategic Schemes in Use" is based on the earliest point in time at which London reservoirs start to lose storage at the beginning of a potentially serious drought. It has been assumed that the conditions for the trigger of the Project will be the same as those for the Thames Gateway Water Treatment Works (TGWTW), otherwise known as the Gateway Desalination Plant. The Thames Water Process Team for the TGWTW shared outcomes from their own historical assessments of droughts and the frequency of triggers. Between the period of 1920 to 2013, the plant would have been triggered on 40 occasions. Therefore, in a 93-year period, the plant would have been used, on average, just under once every two years. The late summer and autumn months were the most common for a trigger to occur, with August and September having the highest frequency of trigger events.

2.36. In addition, at Gate 2, water resources models have been used to identify representative periods of strategic schemes in use to represent SRO operation. The WRSE Group's Pywr water resources model has been used, specifically the north area model. The WRSE WRMP24 GR6J stochastic flow series has been used for the current water resources assets, with a 1:200 demand and with drought permits off. The GR6J stochastic flow series comprises 400 stochastic representations of 48 calendar years, which total a set of 19,200 years of river flows and water resources asset utilisation. GR6J is underpinned by alternative versions of current

climate and is considered more appropriate for water resources planning than historic climate and flow series, as referenced above for the Gateway Desalination Plant. The model runs export the dates of strategic schemes in use, from which the environmental modelling teams have identified characteristic patterns, for each of the return periods selected for scenario representations, at key model nodes. Representative years from the stochastic dataset have then been selected that fit well to the characteristic patterns, and as a 47 water resources year ensemble of different return periods.

2.37. As shown in Table 2-5 expected usage would typically be in the months August to November, peaking at 37% of days in September. Outside this period, there would be less regular usage in July and December, with usage very rare in June and January and not anticipated in February, March, April or May. As shown in Figure 2-6 usage would be every other year, on average – with 22 of the 47 water resources years showing scheme usage. At a return frequency of once every five years, usage would be around 99 days (A82 moderate low flow year selected as representative 1:5 from the full 19,200 stochastic flow series). At a return frequency of once every twenty years, usage would be around 166 days (M96 very low flow year selected as representative 1:20 from the full 19,200 stochastic flow series). At a return frequency of once every fifty years, usage would be around 189 days (N17 extremely low flow year selected as representative 1:50 from the full 19,200 stochastic flow series). Usage periods are typically seen to be continuous duration, with intermittent use only rare – observed in only three of the 47 water resources years shown. The modelling determined that strategic schemes could be in use for a duration of up to 189 days (over 6 months) at a return frequency of once every 50 years but would not be likely to continue for the duration of 16 months noted in the historical review period (this 16-month duration was during a historic major environmental drought in the first half of the 20th century).

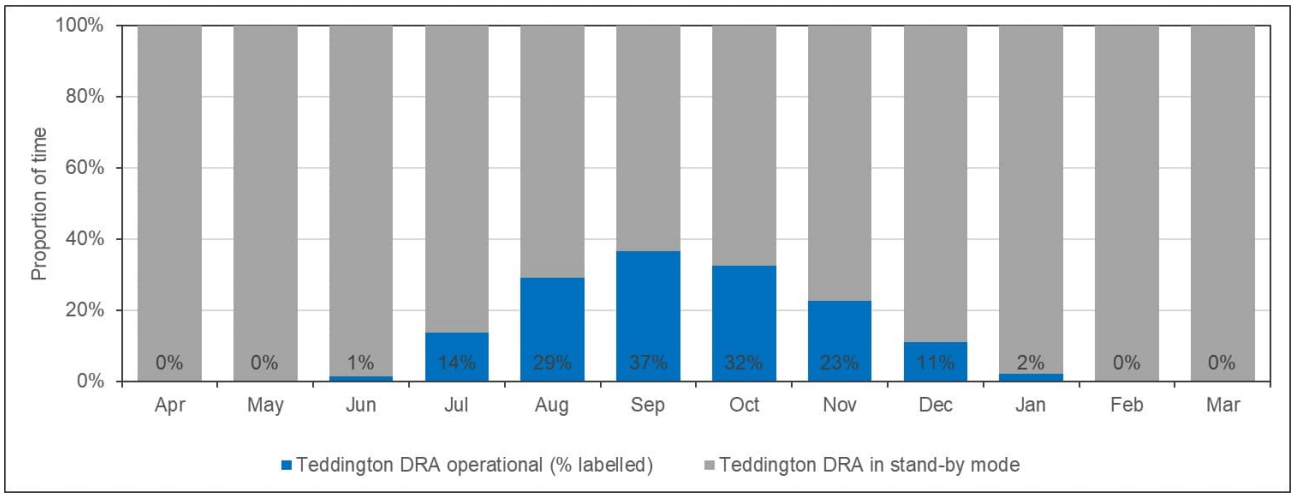

Figure 2-5: Based on Pywr Water Resources Modelling Using Strategic Schemes Trigger, expected usage of Teddington DRA per calendar month

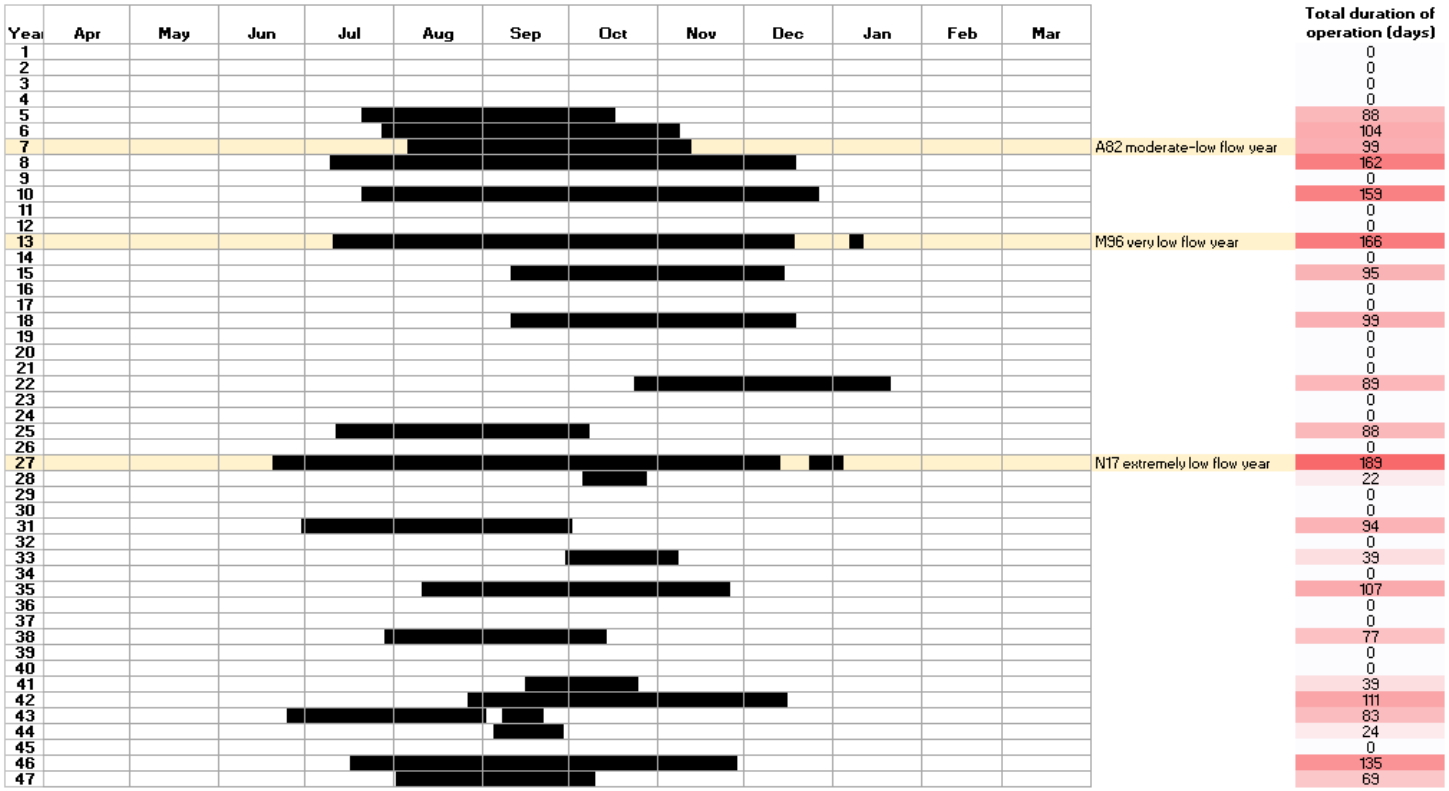

Figure 2-6:Based on Pywr Water Resources Modelling Using Strategic Schemes Trigger, expected duration of usage of Teddington DRA per water resources year

Water resource benefit

2.38. The need for Teddington DRA has been determined through the WRSE regional modelling. The water resource benefit that would be provided by the Project is consistent with Thames Water's WRMP24 and the revised draft Regional Plan. Teddington DRA would be available from Q1 2033 and beyond with the ability to provide a deployable output (DO) of 67Ml/d to the Lee Valley reservoirs.

2.39. Teddington DRA would be operated throughout dry weather periods, when flows in the River Thames currently constrain abstraction. As a result risks remain low that the solution would be negatively impacted by climate change or drought. Details of the estimation of DO can be found in section 7 of WRMP24[14] and in the Section 35 submission for the Project (appendix to Annex G). The DO estimate for a 75Ml/d scheme is 67Ml/d for the DYAA scenario. A DYCP DO is not estimated for the London WRZ and so does not apply.

2.40. The DO modelling has established that the DO benefit for Teddington DRA is the same for 1:2, 1:200 and 1:500-year Level of Service drought scenarios as the Project provides the full capacity yield in all Level of Service scenarios. The DO is less than the scheme capacity because the scheme would be triggered by Reservoir Control curves, and so would not be operational at the very beginning of a drought event (before reservoir storage falls below the control curve), and so this brings the average output down when considering the whole drought event.

[14] https://www.thameswater.co.uk/media-library/home/about-us/regulation/water-resources/wrmp24/technical-report/resource-options.pdf

2.41. An explicit outage allowance for the scheme has not been included in the DO estimate, as an outage allowance for the London WRZ is already included in the WRMP24.

Long term opportunities and scalability

Wider benefits

2.42. The Teddington DRA will provide a new climate resilient water supply for London and long-term benefits for the environment and communities. The potential benefits of the project include:

- A new source of water that does not rely on transfer from other regions, nor is restricted during droughts.
- A resilient and sustainable water supply safeguarding against economic loss that could arise through restrictions on water supply during drought periods and facilitating future housing growth.
- New employment opportunities including jobs, skills and apprenticeships for local people.
- Environmental enhancement through improvements to riverside and wildlife habitats, reconnection of river corridors, planting and landscaping to deliver environmental and biodiversity net gain.
- Improvements to water quality in the Thames Tideway by virtue of removing a proportion of secondary treated final effluent and replacing it with recycled water.
- Opportunity for flow augmentation to the River Thames if required, helping to improve existing habitats downstream of the discharge.
- Educational and community outreach and development of new recreation and amenity opportunities, in collaboration with local stakeholders.
- Potential funding for improvements or replacement of existing eel passes to promote increased connectivity.
- Opportunities to reduce the frequency or need for environmentally harmful drought plans in the future and support future potential legislation changes to reduced groundwater abstraction.

Solution scaling

2.43. The development of the project is assumed to be in a single phase. Gate 2 environmental investigations concluded that the scheme size of up to 100Ml/d would comply with Water Framework Directive (WFD) objectives but has been discounted on the basis of an aggregation of potential effects. Progression of further studies and modelling in Gate 3 has shown marginal increased environmental risks associated with the 100Ml/d option compared to the 75Ml/d option. Overall, these have been shown to be minimal in the work undertaken to date. However, the Environment Agency requires that any option minimises the level of detriment to the River Thames at this location, beyond the required expectations and policy. It has indicated that scheme sizes greater than 75Ml/d would not be environmentally promotable.

2.44. Taking account of these points, as well as feedback received through the public consultation expressing concerns around the environment, health and recreation in relation to the Project, we have made the decision that the maximum size of Teddington DRA should be 75Ml/d which would provide a DO of 67Ml/d as set out in section 7 of WRMP24[15].

[15] Section 7 - Resource Options

Infrastructure resilience to the risk of flooding and coastal erosion

2.45. Teddington DRA does not impact on coastal erosion and there is no pathway to an effect.

2.46. High-level flood risk screening has identified the need for future flood risk assessments and drainage strategies for consenting and licencing purposes. Mitigation is likely to be achievable to ensure Teddington DRA is resilient and flood risk is not increased. Flood risk assessments have been scoped into the future DCO application submission and will be progressed through Gate 4.

2.47. To reduce the Project's vulnerability to climate change during construction and operation, opportunities will be investigated to include designing drainage systems in line with Environment Agency and local Flood Authority guidance, using resilient materials for hotter temperatures, addressing changes in rainfall and ground conditions, and ensuring regular inspections, particularly after extreme weather events.

3. Drinking Water Quality

Introduction and approach

3.1. The Strategic Water Quality Risk Framework was developed by the ACWG and approved by RAPID to ensure safe drinking water quality for the SROs, based on WHO's water safety planning guidelines. The main output of this is the Strategic Water Quality Risk Assessment (SWQRA) which provides the basis for updating existing Drinking Water Safety Plans (DWSPs) to include Teddington DRA. The latest version of the Teddington DRA SWQRA is provided in Annex B

3.2. The SWQRA identifies limiting hazards, assessing their risks across the water supply system for Teddington DRA based on a drinking water safety approach. At each stage from catchment to consumer (i.e. catchment, abstraction, conveyance, treatment, storage, distribution and consumer), pre-mitigated risks were assessed, mitigation measures were proposed, and resultant post mitigated residual risks were identified using methodologies in the ACWG's Framework.

3.3. In the development of the Gate 3 SWQRA for Teddington DRA, relevant existing DWSPs, which will incorporate the components of the Project in the future, were reviewed to identify existing risks to the consumer and considered alongside any new risks introduced by the Project. DWSPs were also referred to in carrying out high-level assessments of the treatment process available to determine their suitability to meet the risks identified in the SWQRA. Where appropriate additional treatment process have been proposed to mitigate these risks.

3.4. The approach and work undertaken through Gate 3 has been shared with the DWI and comments on the SWQRA incorporated within Annex B. As work progresses through Gate 4 and beyond, the Teddington DRA SWQRA will be updated with new water quality data and information incorporated into the various existing DWSPs already in-place.

3.5. Engagement with DWI, EA and RAPID has continued through Gate 3 via technical working groups and dedicated risk assessment workshops and will continue as the Project progresses. Further customer research has also been undertaken through Gate 3 as set-out in paragraph 9.31 – 9.36.

3.6. This section focusses on providing an update to the results of the SWQRA for Teddington DRA as the preferred scheme identified in WRMP24. Annex B provides the latest SWQRA work for all London water recycling schemes.

SWQRA development

3.7. In Gate 3, Gate 2 limiting hazards were reassessed, as well as additional limiting hazards included in the Gate 3 SWQRA based on the new available data and information (e.g., water

quality data, DWSPs and process flow diagrams). Annex B provides details of methodologies, results and future work of SWQRA.

3.8. The Gate 3 SWQRA found that pre-mitigated risk scores at catchment for most of the limiting hazards are high (red) or medium (amber).

3.9. For several of the limiting hazards, the residual risks posed to consumer are low (green). There are, however, limiting hazards for which the residual risks to consumer remain high (red) or medium (amber). Identified key risks and proposed mitigations, which have been discussed with Thames Water's drinking water quality team, are as follows with details set out in Annex B.

- Limiting hazards which pose a risk that consumers could experience a change in perception of their water - these include change in source type assessed as medium risk (amber). The possible mitigation of this risk is ongoing customer engagement and information sharing.
- Limiting hazards related to Contaminants of Emerging Concern (CECs) (PFOS, PFOA, 1,4-Dioxane and NDMA) – PFOS and PFOA were assessed as medium based on limited but currently available data. The SWQRA found the risk for 1,4-dioxane to be high, and NDMA to be medium, based on limited monitoring data. The risk scores assigned reflect the uncertainty from this gap in data. As additional water quality monitoring has been initiated, the risks would be reassessed in Gate 4 with more available data. These CECs are commonly found in wastewater effluent and are difficult to treat in conventional STWs.
- Limiting hazards that have been assessed as a red or amber residual risk based on information in the DWSPs. These include Escherichia coli (E.coli), cryptosporidium, iron, manganese, total pesticides, pathogens, – bacteria, viruses and protozoa, total organic carbon (TOC), ammonium, alpha radioactivity, turbidity, and metaldehyde. These risks are already being mitigated via the current DWSP process and are therefore not considered a risk to these schemes going forward. However, it is noted that the treatment risk should be reviewed at Gate 4 as part of Teddington DRA, based on the future water quality data, to ensure no impact to consumers going forward.

3.10. The SWQRA (Annex B) was issued, and a workshop was held with the Drinking Water Inspectorate (DWI) to consult and present SWQRA findings. Feedback was provided and specific concerns were raised by DWI following this workshop which were taken into consideration and have been addressed.

3.11. Compliance with drinking water quality Regulation 31 is a requirement for materials in contact with drinking water. The conceptual design of Teddington DRA means Regulation 31 is not applicable as the discharge of recycled water into the River Thames is downstream of any abstractions. However, the section between the river intake and the TLT connection may require Regulation 31 approval as TLT discharges into the Lee Valley reservoirs. Any materials used for this section may need to conform to Regulation 31.

3.12. The catchment to consumer approach in the SWQRA process also aligns with the objectives of the Drinking Water Protected Areas (DWPA), which are:

- to meet the requirements of the Water Supply (Water Quality) Regulations 2016;
- to protect supply by avoiding deterioration in water quality in order to reduce the level of purification treatment required; and
- to meet good chemical status and reverse upward trends in pollution of groundwater. Reducing pollution at source is more cost effective than removing pollutants or blending with clean water.

3.13. Overall, the SWQRA shows that the risks to drinking water quality from the limiting hazards identified could be mitigated by the measures proposed. However, with regard to contaminants of emerging concern, it is recognised that global health advisories continue to change and regulations tighten (e.g. for PFAS, USEPA guidance June 2021 and very recent DWI guidance

issued in Aug 2024). Compliance will be very challenging for most of UK new and existing water treatment works.

4. Environmental

Introduction

4.1. This section summarises the environmental work completed through Gate 3 for Teddington DRA. We have extensively engaged with multiple stakeholders including the Environment Agency, Natural England and Local Planning Authorities to develop a robust evidence base and scope future environmental assessments to support design evolution and mitigation development. Our work through Gate 3 has focussed in two key areas, the first to address priority actions set at Gate 2 and the second to progress the scope and understanding of the EIA for the future DCO.

4.2. We have continued to develop an environmental baseline for the Beckton Water Recycling scheme by undertaking seasonal aquatic surveys and monthly water quality surveys based on the methodologies used through Gate 2. We have also continued to model and assess potential impacts and investigate alternative infrastructure options and mitigation measures where required. The outputs from this work have been shared with the Environment Agency through technical working group calls through 2023 and 2024. Summary reports covering our work on the Beckton scheme are intended to be provided in a checkpoint at the end of AMP7.

Priority Action summary

4.3. The RAPID Gate 2 Final Decision for London Water Recycling set 12 Priority Actions that needed to be progressed through Gate 3 with eight relating to Teddington DRA. Table 4-1 summarises the actions taken through Gate 3 to address the Priority Actions set for Teddington DRA. Appendix D expands on the actions taken for the full suite of Priority Actions.

4.4. In summary five Teddington DRA Priority Actions set at Gate 2 by RAPID have been addressed and closed in agreement with the NAU. In agreement with the EA, significant progress has been made on the three remaining Priority Actions, but the very nature of them means they cannot be fully closed until full impact assessment and development of mitigation measures has been completed through the pre-application planning process. It is understood that new Priority Actions will be set for Gate 3 linked to the pre-application planning process.

Table 4-1:Summary of activities taken to address Priority Actions for Teddington DRA

Priority Action	Detail	Summary of Actions to Address Priority Action
2	Teddington DRA: Work with the Environment Agency to assess indicative permit limits and design tertiary treatment works to meet permit requirements. Work with the Environment Agency to discuss permit conditions and other temperature mitigation measures required to protect the environment. Undertake bench and pilot testing of treatment works	The necessary amount of water quality data has now been collected for a permit application and continues to be collected to build confidence in the dataset. Workshops have been held with the National Permitting Service (NPS) to discuss approach, interim findings of the water quality investigations and permit conditions. A draft H1 risk assessment has been undertaken and issued to the NPS in July 2024 to set out indicative permit limits covering all determinands with Environmental Quality Standards (EQS) subject to permitting (WFD Directions and Environmental Quality Standards Directive (EQSD)) as an informal pre-application. Other chemicals may be included once guidance from the National Appraisal Unit (NAU) is available on how to approach chemicals without an EQS. Detailed temperature assessment, supported by modelling has been undertaken, with workshops and draft outputs shared with the NAU

Priority Action	Detail	Summary of Actions to Address Priority Action
		through 2023 and 2024. Discussions through 2024 have focused around temperature and velocity mitigation and possible scheme enhancements. A Pilot plant and bench testing was commissioned in autumn 2024 to investigate the quality of recycled water from a TTP with initial results provided to the NAU Work will continue through Gate 4. This PA has been progressed as far as possible without further guidance from the NAU on PNECs and LODs being available which we understand will be available in early January 2025. A Permitting Technical Note (informal pre-app) was submitted to the NPS 21 July 2024 which sets out the H1 screening and modelling undertaken, the indicative permit limits derived, and identified those determinands that required further guidance from the EA on PNECs and LOD issues. There will be ongoing engagement with the NAU and NPS to develop draft and final permit limits for Teddington DRA once further guidance is available through Gate 4.
3	Teddington DRA: Work with the Environment Agency to scope and progress further work to understand the impacts on Olfactory chemicals from scheme operation and any subsequent impact on migratory fish	Thames Water has progressed work from Gate 2 and incorporated an olfactory suite into the water quality monitoring programme, as well as updating the scope of migratory fish to include twaite shad in agreement with the NAU. The olfactory results available to date have been assessed to identify chemicals reporting concentrations above limit of detection, and identified chemicals which do not have an EQS which require NAU guidance on how these should be assessed in the future. Further work is required through 2025/26 as the scheme progresses through planning and consenting. The requirements to work with the NAU on olfactory chemicals are considered to have been completed with work progressed as far as possible without further guidance from the NAU.
4	Teddington DRA: Improve modelling capability to extend water quality modelling over Teddington weir and into the upper tideway to fully understand any changes to water quality flowing over/down fish passes and into Teddington weir pool and the upper tideway.	The approach to modelling was set out to the NAU early in Gate 3, which was then updated to include NAU comments mid-2023. The river model's representation of Teddington Weir was updated to improve flow distribution through the side weir, radial gates and fish passes. All modelled outputs have been shared with the NAU through autumn 2023. Results show that discharge is fully mixed upstream of the weir. The approach for tideway modelling to be used to model the 'mixed' discharge flow from Teddington weir into the weir pool and into the upper tideway was also set out to the NAU. In addition, bespoke model outputs were used to support detailed analysis of the impact of the discharge on fish species, notably elver local to the outfall structure. Thames Water considers this action to have been addressed and completed.
5	Teddington DRA: Work with Environment Agency fisheries teams to design the intakes and outfalls, specifically to work with us to manage and mitigate any impacts on velocity, fish and the environment of scheme operation and the depleted reach.	Thames Water has held regular meetings and workshops with the NAU throughout 2023 and 2024 to investigate alternative intake and outfall designs and locations with the view to understand the implications of changing velocities and temperatures. We have undertaken further impact assessment and options appraisal work including completing new hydrodynamic modelling to inform assessments. This has been presented to the NAU through autumn 2023 and winter and spring 2024. Through summer 2024, more

Priority Action	Detail	Summary of Actions to Address Priority Action
		localised assessments have been investigated for elver focusing on 'end-of-pipe' changes. Further investigations are ongoing and focusing around additional mitigation and enhancement. The mitigation and enhancement measures identified and generally agreed with the NAU in Autumn 2024, which include a near bank discharge, enhanced eel migration over Teddington Weir, habitat enhancement and operational control to reduce scheme interaction during periods of overtopping of the weir, are considered able to suitably manage and mitigate potential impacts on velocity, fish, depleted reach and the environment. A full review of best available technology for fish screens has been undertaken to appraise best available technology. The methodology for the draft appraisal was shared with the NAU during spring 2024. Significant progress has been made against this Priority Action with detailed investigations undertaken through the Gate to explore different options and designs for the outfall and fish screening options for the intake. Further work is required through Gate 4 to develop further design details and mitigation which also takes in considerations raised through Statutory Consultation. We expect a new Priority Action linked to design development, for the next Gate aligned to the planning and consenting processes.
6	Teddington DRA: Extend assessment of fisheries impacts to include other migratory fish in the freshwater Thames	The scope of the migratory fish assessment was discussed with the NAU fisheries experts during September and October 2023, and agreement reached that Atlantic salmon, sea trout, European eel, European smelt, twaite shad, allis shad, river lamprey and sea lamprey would be scoped into ongoing and future assessments. Thames Water considers this action to have been addressed.
7	Teddington DRA: Work with the Environment Agency to undertake a review of potential environmental impacts and mitigation measures available and then ensure appropriate mitigation measures can be implemented. This is for aquatic environment impacts as a minimum.	Workshops with the NAU identified four key areas requiring early consideration of mitigation options: • discharge water quality; • discharge temperature; • intake/outfall velocities; and • intake fish entrainment. The development of mitigation measures around water quality has focused on the design of the TTP and associated implementation of a pilot plant through Gate 3. The TTP pilot plant was commissioned in summer 2024 to help determine the quality of the recycled water that can be achieved. The scope of the pilot plant and testing determinands and frequency were agreed with the NAU through 2024. Temperature of the discharge has been modelled extensively and complies with national policy, legislation and available guidance. However, we have been working closely with the NAU and fisheries team to develop additional mitigation for the Project to address uncertainties in all potential aquatic impacts. A full review of best available technology for fish screens has been undertaken. The methodology and draft appraisal was shared with the NAU during spring 2024.

Priority Action	Detail	Summary of Actions to Address Priority Action
		Significant progress has been made against this Priority Action with detailed investigations undertaken through the Gate to explore aquatic risks and impacts and develop mitigation measures. The principles of a mitigation and enhancement package of works has been developed to address aquatic risks. Further work is required to develop impact assessments and mitigation measures as the Project progresses through the planning and consenting process in 2025/26. We expect a new Priority Action, for the next Gate aligned to undertaking further investigations, impact assessment and minimising risks through the planning and consenting process.
8	Teddington DRA: Provide further information on how operation of the scheme will interface with the Lower Thames Operating Agreement and Teddington Target Flow TTF to ensure that the environment is not impacted upstream in the River Thames.	The operating philosophy of the Project in conjunction with the LTOA was set out to the NAU on 26 October 2023 and 12 December 2023. The scheme will operate as a Strategic Scheme governed by an operating agreement to be agreed with the Environment Agency, based around operational triggers based on total London storage reservoir levels and River Thames flow. There would be no requirement to amend the current Lower Thames Operating Agreement (LTOA). Thames Water considers this action to have been fully addressed.
9	Teddington DRA: Work with the Environment Agency to scope any further modelling requirements to understand how operation of the scheme may impact on the environment under different environmental conditions – for example consecutive years use or if needed at other times of the year.	An aquatic environmental modelling programme for Gate 3 and pre-application planning stage for Teddington DRA was prepared in March 2023, discussed and reviewed with the NAU and Technical Specialists from the EA and re-issued in June 2023. Modelling includes a range of 'normal case' and 'extreme case' scenarios for operating patterns and conditions. Modelling outputs have been shared with the NAU through technical working group meetings and where required additional modelling added to the scope. Further modelling will be required as we progress with developing the EIA but Thames Water considers this Priority Action to have been fully addressed through Gate 3.

Environmental Impact Assessment

4.5. Thames Water submitted an EIA scoping report to the Planning Inspectorate on 10 October 2024 to seek an EIA Scoping Opinion under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. We received a Scoping Opinion on 22 November 2024.

4.6. The scoping report[16] provides a description of the Project, the site and surroundings. The Project description includes how the Project will be constructed, operated and maintained. The report also sets out the potential for likely significant effects from the Project. It presents the latest baseline information collected and sets out the proposed assessment methodology and approach to be used within the EIA for the DCO application.

4.7. The scoping report sets out the justification for scoping in or out aspects to the EIA and in summary proposed the following to be scoped into further assessment:

[16] Documents | Teddington Direct River Abstraction (TDRA) (planninginspectorate.gov.uk)

- Air Quality
- Noise and Vibration
- Historic Environment
- Terrestrial Ecology
- Aquatic Ecology
- Ground Conditions and Contaminated Land
- Townscape and Visual Amenity
- Water Resources and Flood Risk
- Human Health
- Carbon and Climate Change
- Socioeconomics, Community, Access and Recreation
- Waste and Materials
- Traffic and Transport
- Cumulative Effects

4.8. Major accidents and disasters, and transboundary effects have been proposed to be scoped out of future assessments.

4.9. The Scoping Opinion[17] adopted by the Planning Inspectorate on behalf of the Secretary of State, broadly accepts the proposed scope for the EIA as set out in the scoping report. The adopted scoping opinion had regard to the consultation responses provided by the relevant consultation bodies in accordance with Regulation 10(6) of the EIA Regulations. The scoping opinion agreed with the aspects set out in paragraph 4.7 that were proposed to be scoped into the assessment and agreed that matters such as transboundary effects and the need for the Project should be scoped out of the EIA. The scoping opinion identified a few aspects and matters, including the aspect of major accidents and disasters, which on the basis of the current information the Planning Inspectorate felt should not be scoped out unless further justification is provided to demonstrate that significant effects are unlikely to occur.

4.10. In accordance with the scoping opinion provided further discussions and consultations with stakeholders, including the Environment Agency, Natural England and the host Local Planning Authorities, on the details provided in the scoping opinion will be undertaken. This will include provision of further justification and assessments, where relevant, to help confirm the full scope of the EIA.

Water Framework Directive assessment

4.11. For the Teddington DRA Project, a bespoke WFD Stage 1 Screening and Stage 2 Scoping combined report[18] has been prepared following National Infrastructure Planning guidance[19] and other relevant Planning Inspectorate Advice Notes. This was submitted to the Planning Inspectorate as an annex[18] to the EIA scoping report. The WFD report documents:

- An initial assessment to identify the risks from the Project to receptors within the zone of influence, based on the relevant water bodies and their water quality elements.
- Identification of those waterbodies where a more detailed impact assessment is needed.

[17] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/WA010006/WA010006-000024-WA010006%20-%20Scoping%20Opinion.pdf
[18] WA010006-000023-WA020002 - Scoping Report Appendix F.pdf
[19] https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-the-water-framework-directive

4.12. This work builds on the WFD compliance assessment work for the Project undertaken and documented to RAPID for the SRO in Gate 1 and Gate 2 and incorporates the latest Project design and environmental data. In conclusion, Teddington DRA meets the WFD objectives.

4.13. With regard to the WFD, whilst the Planning Inspectorate noted the inclusion of a draft screening report as an appendix to the scoping report the Planning Inspectorate did not provide comment on this report on the basis that the assessment technically sits outside of the EIA process on which their scoping opinion has been determined.

4.14. A WFD Stage 3 Impact Assessment will accompany the future EIA. It will provide detailed assessment of the water bodies and activities carried forward from the WFD Stage 2 Scoping report provided to the Planning Inspectorate as part of the EIA scoping report. The WFD Stage 3 report will examine tunnel construction activities in the relevant WFD groundwater body; and operational activities potentially impacting the WFD river waterbody linked with the Project's intake and outfall, and the downstream WFD transitional waterbody. Three of Thames Water's reservoirs in the Lee Valley in north London receiving raw water from the River Thames through the Project's intake, have also been scoped in for further WFD assessment.

4.15. In addition to the WFD assessment activities supporting planning there has been significant work to enhance the evidence base, support design enhancement and review mitigation options during Gate 3. This work has been in collaboration with the NAU and Environment Agency and additionally supports a number of the priority actions set out in table 4-1 above.

Habitats Regulation Assessment

4.16. A Habitats Regulations Assessment (HRA) Stage 1 Screening assessment has been prepared following relevant Planning Inspectorate Advice Notes and was submitted to the Planning Inspectorate as an annex to the EIA scoping report[20]. The Stage 1 screening report builds on the work prepared for Gate 1 and 2, informed by a more detailed conceptual design; notably the refinement of the conveyance routes and associated infrastructure (e.g. shaft locations) and additional data, to identify if the Project could lead to Likely Significant Effects (LSEs) on designated habitats sites either alone or in-combination with other projects and plans.

4.17. A stag beetle habitat assessment was undertaken for Ham Lands site of importance for nature conservation (SINC). This confirmed that Hams Lands SINC is functionally linked land which supports Richmond Park special area of conservation (SAC) and the meta-population of stag beetle associated with Wimbledon Common SAC. Without mitigation LSEs to Richmond Park SAC were identified from the Project alone, therefore a Stage 2 Appropriate Assessment will accompany the future EIA. Effects to stag beetle can be mitigated by the introduction of exclusion zones around suitable habitat and/or translocation of deadwood habitats. It is considered that this mitigation would be sufficient to avoid adverse effects to the integrity of the site.

4.18. There will be no LSEs to any other habitats site either alone or in-combination as a result of the Project.

4.19. A separate document 'information to inform Habitats Regulations Assessment' will be submitted with the development consent order (DCO) application for the Project (containing both the Stage 1 Screening and the Stage 2 Appropriate Assessment for Richmond Park SAC).

4.20. With regard to the HRA, whilst the Planning Inspectorate noted the inclusion of a draft screening report as an appendix to the scoping report the Planning Inspectorate did not

[20] HRA screening report

provide comment on this report on the basis that the assessment technically sits outside of the EIA process on which their scoping opinion has been determined.

Protected areas

4.21. There are no pathways from Teddington DRA to impact on National Parks or Areas of Outstanding Natural Beauty.

4.22. The greatest ecological constraints for the Project are associated with:

- The loss of open space and potential impacts upon Sites of Importance for Nature Conservation (SINC); and,
- Development within open space and Metropolitan Open Land (MOL)

4.23. Ongoing assessment and design including consideration of habitat quality and appropriate mitigation is considered likely to identify an appropriate means of delivering the Project within or adjacent to the identified SINCs. This will include consideration of alternative means of construction alongside appropriate compensation where necessary.

4.24. Where open space is to be lost, either temporarily prior to reinstatement or in some small areas permanently, such change to land use is considered appropriate in the context of both the need for the Project and the provision of suitable design and mitigation measures to minimise potential effects.

4.25. It is recognised for both MOL and open space land loss that consideration of the Project alongside planning and land use policy set out at national, regional and local levels, as well as the relevant legal tests in the Planning Act 2008 will be critical. The National Policy Statement for Water Resources Infrastructure comprises the primary policy for this Project and sets out, in section 4.10, clear expectations regarding the consideration of potential impacts on such land. These policy expectations, along with the legal tests referred to above, will play a key role in shaping the Project's justification as well as the approach to mitigating permanent loss of open space and areas designated as MOL. Such matters will also be addressed consistently through the consideration of open space planning policy and guidance at NPPF, London Plan and Borough Local Plan levels.

Other environmental considerations

Biodiversity Net Gain

4.26. The objective of Biodiversity Net Gain (BNG) is to leave the natural environment in a measurably better state than prior to the Project, through habitat creation and / or enhancement. During Gate 3 habitat type and condition survey data were collected for all areas of potential habitat loss giving an up-to-date baseline since Gate 2. This data develops the Project's understanding of the baseline environment and assists the development of the biodiversity baseline. This detail is required to help inform the biodiversity net gain outcomes for the Project.

4.27. During Gate 3 discussions and workshops have been held with the Local Planning Authorities and the Environment Agency which have considered the baseline environment and potential mitigation and habitat enhancement measures.

4.28. The Project will contribute to and enhance the natural environment by providing net gains for biodiversity in line with the requirements set out in the Environment Act 2021 and section 4.3 of the National Policy Statement for Water Resources Infrastructure.

4.29. Further stakeholder engagement will be undertaken to develop potential mitigation and enhancement measures alongside ground truthing surveys to ensure suitability for required habitat creation or river enhancement measures. Thames Water is committed to meet 10% BNG, in accordance with the requirements of the Environment Act 2021.

Environmental regulators statutory planning consultee roles

4.30. Bespoke advice has been provided on discharge permitting for Teddington DRA during Gate 3 from the Environment Agency's National Permitting Service in accordance with their pre-application advice service.

4.31. To fast-track this work, workshops were held with the NPS to discuss approach, including how to assess risk from a non-continuous discharge to a receiving watercourse at times of specific river flow conditions. A risk assessment tool was provided by NPS to screen water quality determinands. The water quality monitoring programme that commenced in Gate 1 now has enough evidence to satisfy the preferred amount of samples according to Environment Agency permitting guidance and a robust assessment of risk has been undertaken. Interim findings of the risk assessment included identification of those water quality determinands which would likely associate with discharge permit conditions for Teddington DRA and an initial indication of that permit value. This informal pre-application was reviewed with feedback provided. Following review with the NAU, these water quality determinands have been adopted as the list of determinands which require mitigation prior to discharge through the AWRP, with the design of the AWRP to be informed by the pilot plant.

4.32. To date the risk assessment covers determinands with EQS subject to permitting (WFD Directions and Environmental Quality Standards Directive). The NAU has undertaken to provide guidance to SROs on which emerging chemicals to include in a risk assessment for permitting. As the operating principles of a Teddington DRA scheme are refined, the risk assessment and likely permit values will be updated, leading to a formal permit application within Gate 4.

5. Carbon

Assessments of the whole life carbon cost of the solution

5.1. Table 5-1 summarises the estimated whole life carbon (WLC) emissions for Teddington DRA, with further information provided in annex A2. The capital (embodied) carbon and operational carbon were estimated using Thames Water's Carbon Engineering Estimating System (EES) which holds over 6 million carbon values against Thames Water's common asset structure. WLC emissions were then estimated, taking into consideration capital carbon emissions and operational carbon emissions for 80 years of operations. WLC cost was calculated using the factors provided in the HM Treasury Green Book.

5.2. The WLC emissions account for capital carbon emissions associated with the proposed treatment and conveyance scheme assets, which includes emissions associated with the transportation of assets and waste materials to and from site and emissions associated with construction activities. The WLC assessment also accounts for operational emissions associated with energy (electricity) demand and chemical consumption as well as emissions associated with replacement of equipment over the life cycle of the Project. Replacement emissions have been accounted for in alignment with the ACWG standard asset life expectancy. Note however, this Project is not expected to operate as consistently as typical water industry assets and therefore replacement of equipment is unlikely to as frequent, ultimately reducing the overall WLC of the Project.

5.3. The Teddington DRA TTP proposes primarily mechanical and electrical assets which will require replacing more frequently than civil assets. Thus, across the 80-year scheme lifecycle, mechanical and electrical assets are expected to be replaced three times. The conveyance element of the Project is not expected to need replacing within the 80-year lifecycle. Thus, replacement emissions constitute a greater magnitude of the WLC of the TTP when compared to the conveyance element of the Project.

5.4. Greenhouse gas (GHG) emissions associated with electricity demand have been determined based on the UK Treasury Green Book projected grid electricity emissions factors, which are

projected to 2100. It is assumed the plant will become operational from 2033 and therefore average grid electricity emissions factors for this first year of operation have been used. The electricity demand/consumption of the Project has been prorated based on projected annual plant operation durations/periods across the Project's lifecycle, applying date specific grid electricity emission factors. Thames Water have pledged to reduce operational carbon emissions and a key driver in achieving set targets is reducing the use of fossil fuels and the purchase of low- or zero- emissions (renewable) electricity via a Renewable Energy Guarantees of Origin (REGO) contract or Power Purchase Agreement (PPA).

5.5. Table 5-1 summarises the Capital, Operation and Whole Life Carbon estimates for Teddington DRA. The WLC Cost has been determined using the UK Treasury Green Book Central Carbon Values for 2024.

Table 5-1: Carbon estimates for Teddington DRA (excluding replacement of assets at the end-of-life stage)

Scheme Name	Scheme Sub-Option components		Capital carbon (tCO_2e)	Operational Carbon (tCO_2e/yr)[21]	Whole Life Carbon (tCO_2e)	WLC Cost (£M) (Central Values)
Teddington DRA scheme	Tertiary Treatment Plant (TTP)	75 Ml/d	3,963	133.4	20,929	£5.63
	Conveyancing	Abstraction & Thames Lee Tunnel Connection	3,948	3.4	4,062	£1.09
		Mogden STW - Teddington Tunnel	21,775	-	22,092	£5.94

5.6. The Gate 3 assessment of Teddington DRA indicates an overall reduction in WLC emissions across the two sub-components (TTP & Conveyance) when compared to Gate 2. The updated TTP design comprises lower capital carbon emissions primarily due to the reduced scope and updated treatment selection. The Gate 3 treatment selection results in a lower capital emission and electricity demand thus reducing the overall WLC.

5.7. A number of mitigation measures and reduction opportunities recommended in the Gate 2 assessment have been adopted in the Gate 3 design, which has reduced the annual energy demand of the Project. The Project design was updated to redirect the TTP sweetening flow from the Hot Standby mode to the existing STW (see Section 9.1 for further details) which substantially reduces annual energy demand and ultimately emissions. Additionally, the discharge and conveyance route have been designed to achieve positive pressure, reducing the pumping requirements and ultimately electricity usage and emissions. A further measure to be is investigated a renewable energy opportunity for inclusion of installation of a hydro turbine which can generate electricity resulting from the flow of water via the conveyance route, the next project stages will confirm what can be implemented.

5.8. However, it can be observed the total conveyancing sub-component WLC emissions have increased compared to the previous Gate 2 report. The Gate 3 conveyance route and design

[21] Based on the first year of operation

was updated following significant feedback made during the public non-statutory consultations on site options which has resulted in a change of conveyance design and increased construction material (see Section 2.15) which has increased the associated capital carbon emissions of the Project.

5.9. To maximise alignment with Publicly Available Specification (PAS) 2080 and the Water UK Net Zero 2030 Routemap, the emissions hierarchy, of avoid, switch and improve, is followed when deciding which approach to prioritise to mitigate emissions. This prioritises in order of demand reduction, efficiency gains and renewable energy integration before pursuing offsets to remove residual carbon emissions.

5.10. A hot spotting exercise was completed during Gate 3 to identify the high carbon emissions intensity activities proposed for each sub-component. For the TTP, it was established the process platform construction related activities and inclusions contribute the largest proportion of capital emissions. Measures to reduce these construction quantities, following the PAS2080 hierarchy, will greatly improve the WLC emissions of the Project. Opportunities for supply chain engagement to derive alternative suitable low carbon materials will help to mitigate emissions associated with unavoidable required construction.

5.11. The capital emissions associated with tunnelling and installation of transfer mains constitute over 90% of the total conveyance sub-component capital emissions. Future design stages should explore opportunities to reduce the quantity of materials used and identify low carbon materials through early supply chain engagement to decrease WLC associated with the Project.

5.12. Capital carbon emissions represent the majority share of total GHG emissions in the short term, and focusing on reducing capital carbon will likely yield significant reductions across the early stage of the Project's operational life. A focus on 'designing out' carbon can reduce both capital and operational emissions, in particular for process building heating and plant efficiency. As mentioned above, replacement emissions account for majority of the TTP WLC emissions. With an optimised operation and maintenance plan, the asset life of many of the mechanical and electrical items proposed within the TTP can be prolonged, ultimately reducing repair, maintenance and replacement emissions across the lifecycle.

5.13. Whilst emissions associated with the transportation of materials and construction activities jointly only account for 10% of the WLC emissions associated with the conveyancing, this represents a great opportunity to mitigate and reduce the total emissions of the Project. The Gate 3 assessment has assessed expected vehicle movements required for the movement of new infrastructure and spoil/waste removal, thus setting a baseline for improvement and reduction opportunities.

5.14. Table 5-2 below summarises the potential carbon mitigation approaches identified in Gate 3 for Teddington DRA, providing a high-level ranking of their potential impact on emissions reduction, including potential influence on reduction of scope 2 and scope 3 carbon, and alignment with the emissions hierarchy.

Table 5-2: Summary and ranking of potential carbon emission reduction approaches for Teddington DRA

Approach to mitigate carbon emissions	Emissions Hierarchy Category	Potential for emissions reduction	Ability for Thames Water to Influence	List of options
Energy management & efficiency (highest priority)	Emissions reduction	High	High	- Improved pump efficiency - Metering - Smart control systems - Catchment level analytics

Approach to mitigate carbon emissions	Emissions Hierarchy Category	Potential for emissions reduction	Ability for Thames Water to Influence	List of options
Operational Resource Efficiency and Chemical Supply	Emissions reduction	High	Low[22]	- Supply chain contracts - Reduced resource use
Embodied emissions reduction	Emissions reduction	High	High	- Low carbon concrete - Low carbon steel - Recycled materials - Locally sourced materials
Engineering design	Emissions reduction	Moderate	Moderate	- Conveyance routes - Land use - Process building size and heating requirements
Operation and maintenance optimisation	Emissions reduction	High	High	- Enhanced maintenance on M&E assets to reduce replacement frequency - Optimised operational parameters - Reduced media replacement
Construction emissions	Emissions reduction	Moderate	High	- Reduced transport - Vehicle energy use - Renewable onsite power - Temporary buildings
Renewable energy on site	Renewable energy	High	Moderate	- Solar - Hydro Turbines - Energy Storage Systems
Procured Renewable Energy	Renewable energy	High	High	- Sleeved PPA - Synthetic PPA - Private Wire PPA - REGO-backed Green Tariffs
Insets	Offset	Low	Moderate	- Grassland restoration - Tree planting
Offsets (lowest priority)	Offset	Low	High	- UK Emissions Trading Scheme - Voluntary Offset Market

6. Programme and Planning

Introduction

6.1. This section focusses on providing an update for Teddington DRA as the preferred scheme identified in WRMP24. We can confirm that the Project is on-track to be *'construction ready within AMP8'* with key milestones already achieved within the pre-application DCO process.

6.2. The route to planning consent has undergone change since Gate 2. At Gate 2 it was reported that Teddington DRA may benefit from an ability to seek planning permission under the Town

[22] The capability of Thames Water to influence the emissions associated with specific chemicals is low at this time due to supply chain constraints. The proposed design considers efficient chemical usage and therefore the opportunity to influence this further is limited.

and Country Planning Act 1990 (TCPA). It was also reported that the project's relationship with the Planning Act 2008 (PA2008) and the Development Consent Order (DCO) process could be tested if desired through the submission of a request for a Direction to be made by the Secretary of State (SoS) under Section 35 of the PA2008 (a S.35 Direction) to confirm whether or not the project should be treated as a project of national significance for which a DCO must be sought.

6.3. As set out in Annex H, the emerging recognition within Gate 3 of the range of consents and land assembly requirements that would be associated with the Teddington DRA Project informed a decision to examine the views of the SoS by requesting a S.35 Direction. In December 2023 the SoS confirmed that it was his view that the Project should be treated as being of national significance and that in turn a DCO must be applied for before the Project can be delivered.

6.4. As a consequence of this outcome, the Project must be consented under the provisions of the PA2008. In turn, all milestones and workstreams associated with the Project were refreshed, reset or retained to reflect the need for a DCO to be secured, along with consideration of land assembly and secondary consents matters. The programming and planning work has therefore been prepared with regard to the Project as a DCO project.

Project plan

6.5. We developed a series of project stages and outcomes as set out in our Gate 2 report[23] that conceptualises the delivery of Teddington DRA into a series of linked stages from Gate 2 through to Water Available For Use (WAFU) in the water resource year 2033-2034.

6.6. Key activities for Gate 3 align with RAPID's Gate 3 guidance and include developing and implementing the planning and lands strategy, developing design and environmental understanding and commencing the DCO planning and procurement processes. Key activities for Gate 4 include developing further the engineering and environmental understanding and submission of a DCO application for the Project.

6.7. A high-level programme covering the key planning steps to DCO submission (the period of Gate 3 and Gate 4) was submitted to the Planning Inspectorate in July 2024[24]. The latest programme is shown below in Figure 6-1, with key planning milestones as follows:

- Project EIA Scoping Opinion: November 2024.
- Project Statement of Community Consultation: Q1 2025.
- Project Statutory Consultation: Q2 through to Q3 2025.
- Submission of application for DCO: Q3 2026.
- DCO Granted Q4 2027.

[23] LWR Gate 2 report

[24] Teddington Direct River Abstraction (TDRA) - Project information (planninginspectorate.gov.uk)

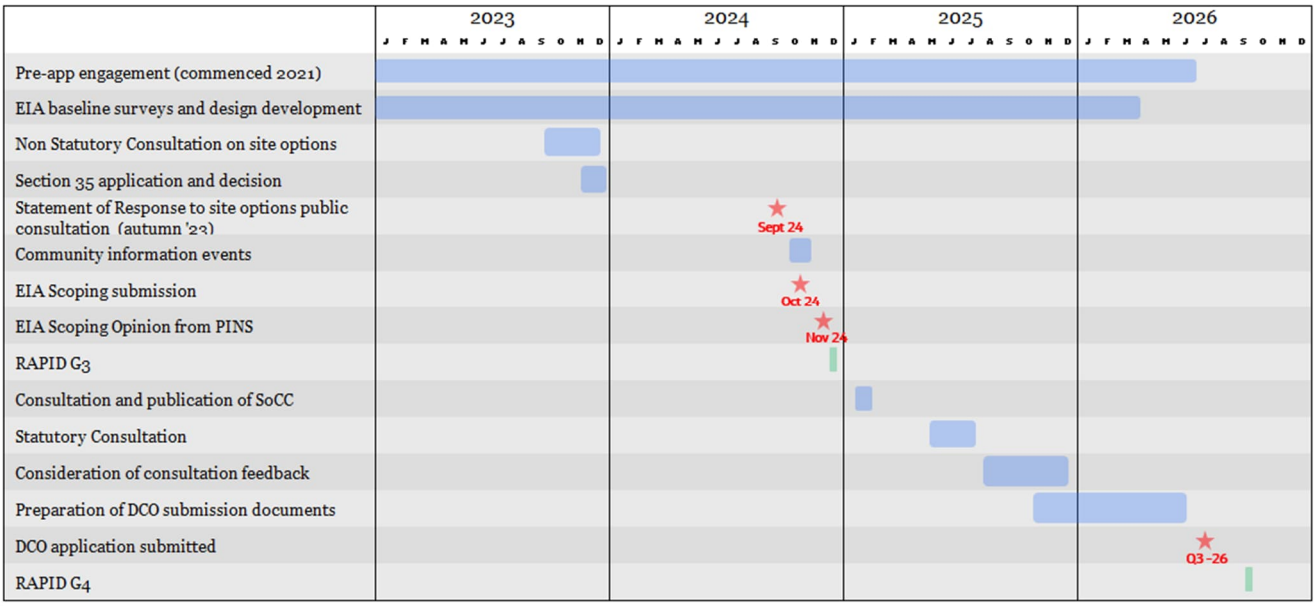

Figure 6-1: Teddington pre-application programme (Oct 2024)

6.8. In addition to the DCO planning programme additional project stages are required covering procurement, construction and commissioning of the Project.

6.9. Procurement activity has already commenced (see Chapter 7) and will continue through 2025 with the aspiration to award a design and build contract early in 2026.

6.10. WRMP24 sets out the requirement for the Project to be available for use from 2033. To achieve this date the following additional milestones need to be achieved which are also shown in the wider delivery programme in Figure 6-2:

- Procurement launch for Teddington DRA: Q1 2025.
- Contract award notice: Q2 2026.
- Detailed design begins: Q4 2026.
- Start of construction: Q1 2029.
- Start of commissioning: 2031.

Programme assumptions and dependencies

6.11. The key assumptions and dependencies that apply to the Project are described in Table 6-1.

Table 6-1: Summary of key programme dependencies and assumptions for Teddington DRA.

Assumption or Dependency	Programme impact
At least two years of baseline survey data collection will be required to inform the EIA for critical receptors.	Data collected under Gates 1,2 and 3 would contribute to providing multiple year datasets with core baseline years being 2024 and 2025. Any requirements for data to inform the DCO application in 2026 or beyond could result in programme delays
Programme is based on holding one statutory consultation for a period of up to 12 weeks and no additional consultations prior to DCO application in Q3 2026	Feedback from engagement / consultation will shape the design and mitigation of the Project and appropriate time is required post event to consider this feedback. Additional consultation would extend the pre-application process and delay DCO application by at least three months.

Assumption or Dependency	Programme impact
Assumes adequate GI data is collected through 2024 to inform design options and Project procurement. Pre-procurement GI will minimise risk however a lack of it will increase risk and therefore cost	GI works commenced in Q3 2024 to inform design will not finish until after Gate 3 Information will be fed into Project procurement at key data drop points. Delays to GI from for example delays in permission from landowners presents a risk to programme.
The consented Project will be as per the design set out in the EIA scoping report submitted in 2024.	Material changes to the scope of the Project may require a further scoping opinion and further consultation and result in programme delays by at least three months
Primary consents and permissions for the Project will be deemed through the DCO except for Environmental Permitting.	Additional standalone consents may delay programme
All planning requirements set within DCO consent are discharged within six months following DCO award	Any delays to construction commencing Q1 2029 will directly impact WAFU date
Teddington DRA would be delivered in-house and procurement would commence 2025 with contract award by Q2 2026. It is assumed there would be significant interest from the market to tender the Project	Supports delivery of Teddington DRA but delays to procurement or insufficient market interest may delay WAFU
Abstraction and discharge licences would require separate applications and would be consented prior to Project construction. All pertinent issues addressed within Environmental Statement prepared for the DCO application. Abstraction is permitted as a separate abstraction to the M2	Required to be in place prior to DCO consent to avoid project delay. Changes in the permitting of the Project may impact WAFU
Detailed design and further GI works completed within 12 months of contract award. Enabling works overlaps	Fixed period assumption. All required GI works completed by 2027 (12 months after contract award)
Construction of the Project takes up to three years with opportunities to accelerate.	Fixed period of main works
Construction of Teddington DRA is not impacted by drought or storm conditions and connection to existing infrastructure occurs when pre-planned	The use of Mogden storm tanks or TLT transfer during planned outages for connection could delay the construction programme by up to one year
Commissioning takes up to one year prior to WAFU. Commissioning overlaps with construction	Fixed period of commissioning based on projects elsewhere

Key risks and mitigation measures

6.12. A Project risk register has been developed and this is shared with RAPID through quarterly dashboard reporting cycles (most recently in September 2024). A number of programme assumptions have been made in preparing the project plan and together with key planning, procurement, environmental and engineering risks could result in delays or increase in Project cost. Key risks are summarised in Table 6-2 below. These are actively managed by the project team and Thames Water.

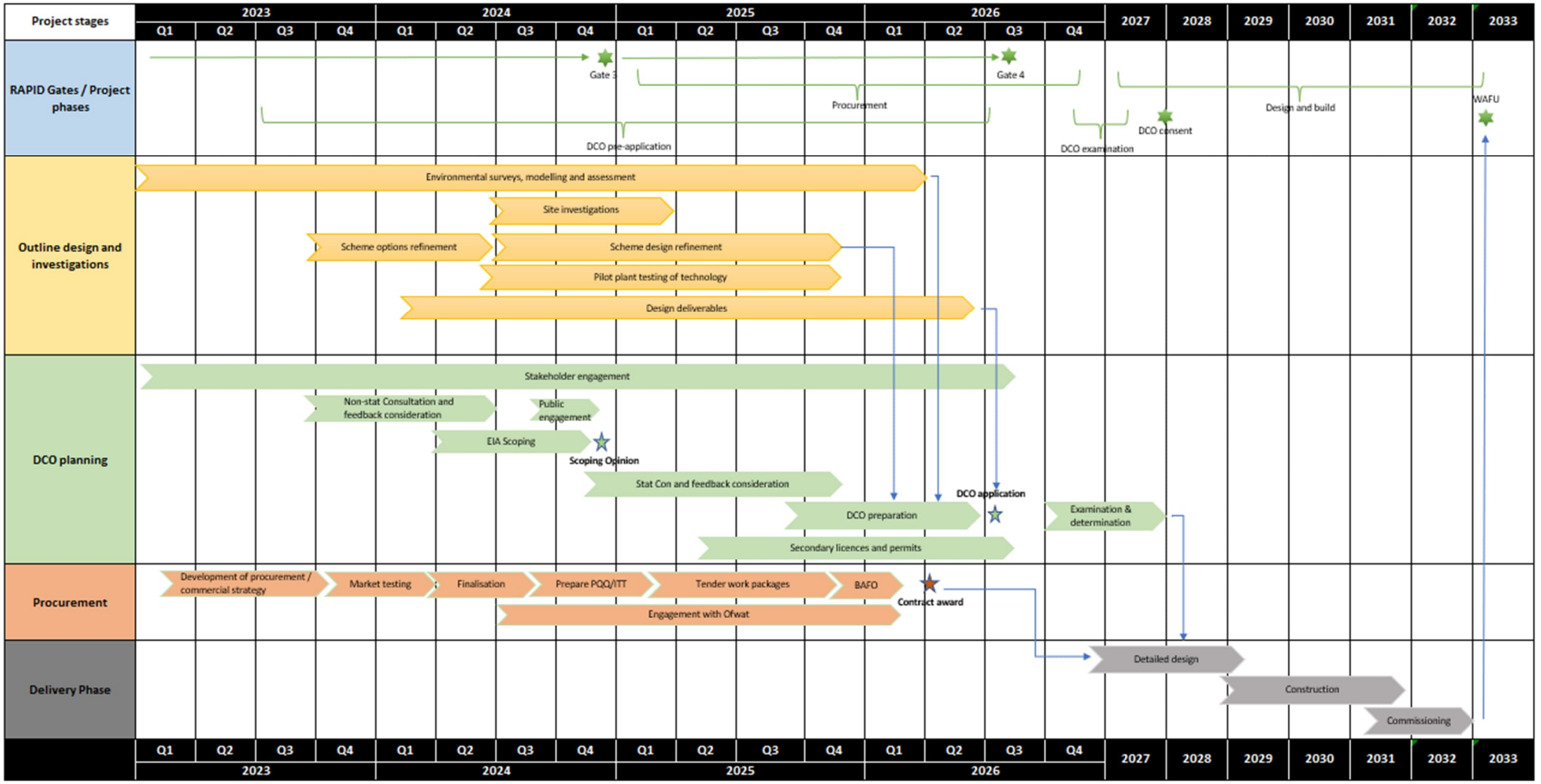

Figure 6-2: Indicative delivery plan for Teddington DRA with a WAFU in 2033

Table 6-2: Key Project risks and mitigation measures

Risk ID	Risk category	Risk description	RAG	Mitigation plan	Post-mitigation RAG
LER_103 TEDD_	Stakeholders	Project delays due to significant objection from stakeholders resulting in additional work being required in the pre-application stage. A lack of customer acceptability may also result in delays with additional work required to address	Red	Engagement and consultation plans have been developed to ensure all stakeholders are engaged with as the project progresses. Non-statutory public consultations and subsequent further public information events have been held. Thames Water understands local communities and customers concerns about the Project and is working hard to address. Resources have been appointed to ensure coordinated and consistent engagement across all stakeholders and communicate responses to challenges and queries raised at these events, together with demonstrating how requirements are met. Further work undertaken on customer acceptability	Red
TEDD_0106	Engineering Environmental Assessment Planning	The project requires integration with Mogden STW and TLT critical operational assets. The construction activities and permanent integration may result in additional operational and programme risks. The TLT tunnel is critical for the Lee Valley stored water system and there is a risk that planned shutdowns to establish a connection are delayed if continuous supply is required during the period scheduled. Space to develop at Mogden is very limited and in demand. Site masterplanning is exploring opportunities to maximise space at Mogden which may result in changes to TTP layout, design and location within Mogden	Red	Engagement with TW Engineering and Systems teams established to develop a solution acceptable to all interfacing parties. Consideration and allowance for enabling and integration works included in the scope and associated delivery programme which will be further detailed and reviewed during Gate 4 as part of further constructability reviews. Asset surveys have been undertaken with TLT inspection by Tunnels Team. Further work planned in Gate 4 to consider required sequence of construction, with further engagement with internal teams. SRO team integrated within wider site optioneering and masterplanning	Red
TEDD_0140	Planning	The DCO process could be subject to legal challenge, resulting in delays to the Project's delivery programme. Costs would be incurred in supporting the judicial review process and potential stand-down of procurement and design activities until review is complete. WAFU date could be impacted.	Amber	Project team will maintain legal compliance and ensure due diligence is applied in the production of the DCO submission. A legal team supports and advises the Project team to ensure compliance with process.	Amber
TEDD_0123	Commercial - Procurement	The Project may face a lack of market appetite and or competition in comparison to other bigger and more expensive schemes.	Red	The Project has conducted early market engagement activities which will help mitigate the threat. The procurement strategy and commercial arrangements are being developed in response to market engagement responses. Further engagement with market/ supply chain is planned during Gate 4.	Amber

Risk ID	Risk category	Risk description	RAG	Mitigation plan	Post-mitigation RAG
TEDD_0004	Engineering	Existing Power Supply at Mogden may not be sufficient for the TBM and we may need additional connections and supply which has a long lead time. Alternatively, we may need temporary power supply. Increased costs and potential critical path delays would be experienced due to lead time for grid upgrade, should this be required.	Amber	The project team has engaged with Thames Water and established power availability given existing infrastructure at Mogden. Monitor future commitments between present and 2031 to mitigate potential threat. In Gate 4 we will continue to engage with the Statutory Undertaker to ensure security of supply within project timescales.	Amber
LER_0056/0107	Engineering Environmental Assessment	The EA has proposed additional in-river mitigation measures to protect fish. Significant re-design of the Project may cause delays to WAFU.	Red	Thames Water is working closely with the NAU/EA on appraising different measures and evaluating any benefit they may bring. Thames Water has undertaken various appraisals and made recommendations to refine the design. Further work is required through Gate 4 to finalise the measures to be incorporated into the design	Amber
	Planning Environmental Assessment	Loss of open space, metropolitan land and/or impacts upon a SINC associated with the intake and outfall structures and/or shafts may lead to increased cost, delays to consent or special parliamentary procedures	Red	Development of the design is integrated with environmental and planning teams to minimise land take. Design is subject to a review by an independent design panel and mitigation and re-provision is being investigated.	Amber
TEDD_0141	Engineering Commercial-Procurement	Ground Conditions - Unforeseen ground conditions due to lack of sufficient detailed GI data, which may result in more onerous tunnel depths or construction techniques. Increased construction costs and increase to the construction programme due to slower production rates, adoption of an alternative construction methodology.	Amber	Further progress site surveys and ground investigations to validate the engineering assumptions related to ground conditions in current design and therefore provide greater certainty in the construction methodology and delivery programme. Ground condition uncertainty may increase risk and increase capex costs	Amber
SROP_0068	Planning	WRMP24 faced with Judicial Review with decision impacting the SRO programme	Amber	The WRMP24 was approved late August 2024 with the Secretary of State giving permission to Thames Water to publish its WRMP, therefore providing endorsement of the SRO programme from Government and the needs case for the Project. Watching Brief while the Project progresses with Gate 3 submission	Amber

Proposed gate four activities and outcomes

6.13. In accordance with the RAPID Gate 4 guidance the Gate 4 submission for Teddington DRA is planned for September 2026, 56 days after the DCO application submission date. The plan up to Gate 4 focusses on achieving the key milestones listed in paragraph 6.7 and the activities set out in table 6-3.

Table 6-3: Key activities and tasks during Gate 4

WBS	Key activity
Programme and Project Management	Strategic and project level management (including portfolio management)
	Technical, independent and board assurance
Feasibility assessment and concept design	Update conceptual designs including developing a preferred consenting design following statutory consultation
	Develop detailed designs for assessment, consultation and submission
	Process design development including site masterplanning
	Cost estimating, risk reduction and development of mitigation
	Hydraulic modelling and process design
	Drinking water safety plans
	Hydrogeology and geotechnical studies
	Structural and safety assessments/ calculations
	Implementation of the transportation, utilities and third-party strategies
	Flood and drainage risk assessment
Environmental assessment	Preparing for and undertaking Statutory Consultation
	Technical engagement and consultation
	Regulator input and advice
	Preparation of Preliminary Environmental Information Report
	Development of DCO application documents (including the Environmental Statement, supporting appendices and maps and figures)
	Environmental modelling, assessment and reporting including carbon and sustainability, design code principles, design and access
	Development of environmental masterplan and environmental controls
	Development of secondary permits and licences agreements
Data collection, sampling and pilot trials	Environmental surveys based on EIA scoping
	Development of digital services (digital twin, Building Information Modelling (BIM) etc)
	Water quality bench testing / pilot trials
Procurement strategy	Preparation of procurement documents
	Progression with procurement steps, early contractor engagement and procurement of a preferred contractor with contract award before Gate 4
Planning	Preparation of DCO documents, plans and maps
	PINS and LPA engagement
Stakeholder engagement	Engagement and consultation activities
	Statutory Consultation including consultation on a SoCC
	Development of Statements of Common Ground
	Customer engagement activities

6.14. We are in the process of defining a comprehensive list of DCO submission documents. The list will reflect the standard documents under the Applications: Prescribed Forms and Procedure (APFP) Regulations (2009), documents set-out under the National Policy Statement for Water Resource Infrastructure, documents committed to through EIA scoping and statutory consultation, and other documents considered best practice to support the application.

Planning and land

Planning strategy

6.15. In December 2023 the Teddington DRA project was confirmed by a S.35 direction (see appendix to annex G) issued by the SoS under the PA2008 as being a project of national significance for which a DCO must be sought. As a consequence of this outcome, the Project as defined both for the purpose of that direction and the subsequent purpose of the project EIA scoping process can only be granted consent for development under the PA2008: the TCPA route to planning consent no longer applies for the Project in this scope.

6.16. A key driver for the Project undergoing testing through the PA2008 S.35 direction process was the growing understanding through Gate 3 of the range of complex land ownership, assembly, planning consent, utilities management and mitigation provisions that would need to interface to facilitate Project delivery. Set against the continued early 2030s requirement for WAFU for the Project and need for the Project which informs that WAFU date, seeking confirmation on the exact status of the Project's route to consent became essential to aid programme clarity. This is particularly key where permanent infrastructure is proposed to be left on or in land currently under the control of third parties, such as the recycled water discharge outfall, the raw water abstraction intake or the connections to the TLT. With the exception of land assembly matters, these complex matters also manifest themselves within the Mogden STW site where the TTP is to be sited.

6.17. Having been confirmed as a project of national significance and notwithstanding the ability to deliver a proportion of the Project within and from its own Mogden STW site, Thames Water will draw upon the provisions afforded to it under the PA2008 to assemble the necessary rights and agreements to install the pipelines, tunnels and associated infrastructure necessary to deliver the Project. This will include taking access to and constructing within land owned by third parties. Where necessary, reliance upon those provisions will include pursuing acquisition of appropriate rights and controls over land via compulsory acquisition.

6.18. It is feasible for the range of parallel consents and approvals required for the Project to be obtained either as part of or otherwise in parallel to the DCO and for a number of these to be in place prior to the related activity being implemented. The Project delivery programme (Figure 6-2) shows that sufficient time exists to secure the necessary DCO and secondary / non-DCO licences and consents required to confirm Project delivery and land assembly within the timescales available to facilitate Project delivery.

6.19. Figure 6-3 below summarises the key stages associated with preparing and applying for a DCO. An explanation of the process can be found in our factsheet '*What is a Development Consent Order*' on our website[25].

[25] Development Consent Order Factsheet

Figure 6-3: Key DCO Stages

Land strategy

6.20. A land strategy has been developed by Thames Water which provides a framework through which the land and property requirements of the full Project lifecycle are identified and delivered from its optioneering through to its operation. Key aspects of this strategy include:

- Informing and advising on land matters during the lifecycle of the Project from optioneering to operations.
- Access to land for surveys and investigations both pre- and post-DCO submission.
- Land referencing and the preparation/completion of required DCO documents.
- The acquisition of land, rights in land and restrictions in land, to deliver all construction and operational requirements.
- Access and handover of land for construction.
- Access and handover of land to the operator.
- Production of estate plans which will define the land, rights, obligations and restrictions associated with the operational infrastructure.
- The management of associated budgets across all lifecycle stages
- Project risk mitigation as required.
- Adherence to Project and corporate authorities and obligations.

6.21. In broad terms, the land strategy encourages the negotiated purchase of land and rights in land ahead of seeking to exercise compulsory acquisition powers to acquire such land and rights. Whilst the DCO application will include compulsory acquisition powers, these powers are only proposed to be used when voluntary purchase efforts are not successful.

6.22. The strategy emphasises early and proactive engagement with landowners to acquire land and rights by agreement before considering resorting to compulsory purchase. This involves holding information events, issuing letters, arranging focus group meetings and maintaining regular and proactive communication with affected parties. The aim is to minimise opposition and foster cooperation, thereby reducing the need for compulsory acquisition.

6.23. The general approach to delivering the land strategy for the project is set out in Annex G.

6.24. RAPID's recent correspondence with Thames Water and other SROs and water companies has set out an expectation that common methods and principles will be developed to ensure consistency and transparency across land acquisition programmes.

6.25. In response, Thames Water, along with others, has established an ACWG sub-group focussed on developing a common set of principles for SROs across the water sector and will seek to adopt those common principles when agreed. This will share knowledge and best practice in land acquisition used for similar projects through Gate 4 and beyond.

Licensing and other consents

6.26. Substantial changes to the operation of water resource management on the River Thames is expected as a result of new SROs, changes to existing licences, changes in flood management and new bulk transfers of water between water companies. Although at this early stage of Project delivery the details of all regulatory consents and permissions have not been finalised. Preliminary work has been undertaken for the purposes of providing assurance to regulators

that the various SROs can be licensed in the future and that there are no showstoppers in that licensing.

6.27. Thames Water's licensed abstractions (M2 Licence) are managed under an existing operating agreement[26] – the LTOA and an associated control diagram which sets out protocols for abstracting water from the river under different flow conditions. The operating agreement also includes requirements to manage abstraction in order to allow navigation of the river by boat users[27] and to support environmental and water quality requirements in the upper Tideway.

6.28. We have worked with the EA to identify the permitting requirements for Teddington DRA. The EA's view is that the abstraction is permitted as a separate abstraction to M2 (i.e. new abstraction licence). The operation of the Project would be based on a simple 'take and put' basis with a licence condition to link the abstraction quantity to the volume discharge (i.e. no net change in flows). The scheme would be captured as an additional operation under the LTOA and associated control diagram.

6.29. In addition to the above other permits are likely to be required, including a flood risk activity Permit (FRAP) where there are works on, over under or within eight metres of the river, appropriate permits and licenses where dewatering is required during construction and suitable provisions for the management and transportation of wastes generated during construction.

Strategy implementation, development and engagement

Planning activities

6.30. Over the course of Gate 3 Thames Water has implemented processes and procedures as part of the planning and land strategy for the Project to meet key outcomes.

6.31. This has comprised the progression and completion of work associated with the site issues and options appraisal process to identify the potential site opportunities that could facilitate the delivery of the Project. Spanning Q1 – Q3 of 2023, this process was informed by initial technical stakeholder feedback regarding the approach to be taken to locating, sizing and specifying the recycled water discharge and raw water abstraction for the Project. It also involved initial land referencing work to identify both by number and type the range of land interests and titles associated with land either at surface or sub-surface levels with which the Project could interact.

6.32. Combined with desk and site based environmental, planning and engineering appraisal work Thames Water was able to build on these initial outcomes to prepare information for consultation with the local community and wider technical and political stakeholders, which was presented through a non-statutory consultation process held between 17 October – 11 December 2023.

6.33. Consistent with the Gate 2 planning strategy, which recognised the existing status of the Project as one for which planning permission under the TCPA could be sought, alongside the ability to test and seek direction for the project to be treated as one that should be determined under the PA2008, a request was submitted in Q4 of 2023 to the SoS under S.35 of the PA2008 to consider this further.

6.34. Implementation of this element of the Project's planning strategy built upon the increased understanding of how the Project could progress from concept through to potential delivery. This has included the carrying out of ongoing site and issues appraisal work and through the

[26] Under Section 20 of the Water Resources Act 1991
[27] As required under the Thames Conservancy Act, 1933

engineering and design issues that would influence how the project could operate and perform.

6.35. This further examination of the complex nature of the Project provided greater knowledge regarding the land ownership and assembly, planning consent, utilities management and mitigation provisions that would need to interface to facilitate scheme delivery, alongside the continued understanding of Project's significance as a drought resilience project for London, which in turn informed the application made via S.35 of PA2008.

6.36. As the Project progressed from its non-statutory consultation and into Q1 of 2024 it was able to draw from two further critical influences:

- The feedback from the non-statutory consultation;
- Confirmation from the SoS under S.35 of the PA2008 that the Teddington DRA Project should be treated as a Nationally Significant Project for which a DCO must be applied for.

6.37. A key outcome from the non-statutory consultation has been a comprehensive design and Project review process. This has looked at the approach to how recycled water can be produced, how it can be conveyed to its points of discharge, and how the Project can deliver compliant abstraction of raw (river) water and in turn convey this for storage.

6.38. Whilst it remains the case that optioneering work continues with regard to identifying a preferred means of connecting the recycled water to the Thames and the raw water conveyance to the existing Thames Lee Tunnel, the review of consultation outcomes and engineering design issues has led to:

- a change in recycled water conveyance pipeline construction technology from pipejacking to the use of a tunnel boring machine (TBM);
- a commensurate change in recycled water conveyance pipeline size from a 1.8mID pipeline to 3.5mID tunnel;
- a reduction in the number of intermediate shafts associated with the recycled water conveyance from five to one;
- a reduction in recycled water conveyance length from ~4.5km to ~4.2km;
- the identification of a new tunnel drive shaft and materials handling area within Mogden STW;
- adjustments to the recycled water treatment technology from nitrifying sand filters (NSF) to moving bed biofilm reactor (MBBR);
- the inclusion of suitable space for working areas and potential development within the River Thames to accommodate ongoing design outcomes relating to the raw water abstraction and recycled water discharge infrastructure; and,
- confirmation that the sweetening flow (15Ml/d of recycled water) generated through hot standby of the TTP during non-drought conditions will be discharged through the existing final effluent channel to Isleworth Ait.

6.39. Confirmation that the Project be treated as an project of national significance for which a DCO must be applied for has also led to adjustments to the Project's planning and land strategies and also to its delivery programme, in particular:

- all planning consent work and processes now follow the provisions of the PA2008 as administered by the Planning Inspectorate (PINS) in respect of applying for a DCO;
- all land assembly work will be undertaken in accordance with the provisions of the PA2008 and will be structured to be incorporated into the application for the Project's DCO;
- the Project's programme has been adjusted to work towards the core pre-application milestones of EIA Scoping, Statutory Consultation and submission, and to reflect the anticipated timescales that will be implemented by PINS and the SoS post submission.

6.40. Annex G provides a copy of the S.35 submissions and decision that have informed the above. Annex F includes the Project's Statement of Response to the non-statutory consultation held in 2023.

6.41. Engagement with the host planning authorities for the Project has taken place throughout 2024 under a joint pre-application planning engagement process. This has provided updates and briefings to the LPAs and their subject matter experts on the Project, its key issues and emerging design changes, and provided a means through which engagement could be expanded to facilitate discussions through 2025.

Land activities

6.42. The land strategy emphasises early and proactive engagement with landowners and a programme of work which is front-loaded towards preparing the DCO documents and updating documents as work progresses. Work through Gate 3 has included:

- Desktop based land referencing;
- Preparation of letters and Land Interest Questionnaires (ahead of them being issued);
- Development of a Property Cost Estimate (PCE) for the proposed new alignment;
- Setting up a dedicated email address through which landowners can contact the Land Team directly;
- Engaging with a number of affected landowners prior to the Project's non-statutory consultation in 2023 and information events in 2024.

6.43. Ahead of the non-statutory consultation in 2023, Thames Water wrote to landowners potentially affected by the Project inviting them to attend the consultation to seek further information as to how the Project might affect them.

6.44. Again, ahead of information events in October 2024, Thames Water wrote to landowners newly affected by changes to the Project's proposed alignment corridor, again, inviting them to attend and seek further information as to how the Project might affect them. At these events, Thames Water provided a dedicated space for affected landowner discussions and ensured the Land Team was on hand at all events to discuss the Project with those landowners potentially affected by the proposal.

6.45. As a result of design changes made through Gate 3 (see paragraph 6.37 and 6.38) Thames Water has revisited land acquisition cost estimates which have been used to develop the solution costs set-out in chapter 8 and annex A2.

6.46. The land acquisition costs assessed include:

- A reduction in land required permanently and temporarily at surface level;
- Land required permanently for subsoil only;
- Land rights required permanently and temporarily;
- No-land-lost contingencies potentially arising pre-application, during and after construction.

Planning and lands risks

6.47. Key planning and land risks are captured in table 6-2. It remains the case that whilst elements of the Project are complex and therefore exposed to varying degrees of risk, no planning or land assembly risks have been identified that are not capable of being mitigated through ongoing technical and environmental assessment work or early and ongoing Project engagement.

6.48. At the Project level, the most significant planning constraints associated with Teddington DRA are:

- The loss of open space and impacts upon a SINC associated with the intake and outfall structure;

- Shaft construction within open space and Metropolitan Open Land (MOL);
- Integration of construction works and operation of the TTP at Mogden STW.

6.49. Ongoing assessment and design including consideration of habitat quality and appropriate mitigation is considered likely to identify an appropriate means of delivering development either within or adjacent to the identified SINCs. This will include consideration of alternatives means of construction alongside appropriate compensation where necessary.

6.50. It is also considered that a case to demonstrate that both the loss or temporary loss and reinstatement of areas of MOL can be made where that proposal is for operational purposes associated the Project.

6.51. Where open space is to be lost, either temporarily prior to reinstatement or in some small areas permanently, it is again considered possible to justify such land use in the context of the Project and the need that the Project will meet, and the provision of appropriate design and mitigation measures to minimise the effect.

Next steps

6.52. Work is currently being undertaken to prepare for the Project's statutory consultation, due to be held in Q2 and Q3 of 2025. The first step is to prepare, consult and publish a Statement of Community Consultation (SOCC). This will set out how we will consult with the local community. Preparation for the Project's Preliminary Environmental Information Report, which will form a core component of the consultation, is also underway.

6.53. A preliminary list of DCO application documents has been drafted and will continue to be reviewed ahead of DCO application production later in 2025 with the current DCO submission planned for Q3 2026.

7. Procurement and Operation Model

Preferred procurement procedure

7.1. Procurement activity through Gate 3 has focussed on Teddington DRA. The aim of the procurement is to award a design and build contract to a main works contractor which provides the most advantageous tender and delivers a value for money solution and that is compliant with Thames Water's requirements.

7.2. Procurement activity in the water industry in the UK is regulated under the Utilities Contract Regulations (UCR) 2016. The UCR is due to be replaced by new legislation, the Procurement Act 2023 which has received royal assent but has not yet been implemented. The current expected date for the Procurement Act 2023 (the Act) has recently been delayed from 24 October 2024 to 24 February 2025.

7.3. HM government has clarified that any regulated procurement activity commenced in advance of the Act's commencement date will continue to be governed by the existing regulations (in the case of the Teddington DRA main works, this will be the UCR 2016) until that particular procurement is concluded. There is a recognised risk that any delay to the start of the Teddington DRA main works procurement may result in the procurement being undertaken under the auspices of the Act.

7.4. The procurement programme for the Project main works contract is scheduled to commence in advance of the Act's implementation date and will therefore be governed by the UCR 2016.

7.5. The UCR 2016 provides a number of procurement procedures which have particular applications depending on the nature and complexity of the requirement and the conditions of the supply chain in terms of availability, appetite and maturity.

7.6. Table 7-1 provides a brief outline of the applications and constraints of the available procurement procedures.

Table 7-1: Outline of the applications and constraints of the available procurement procedures

UCR 2016 Procedure	Main application
Open procedure	Participants are invited to tender for the opportunity. All participants are assessed against pre-established criteria. Best suited where requirements are fairly straightforward and solutions / outcomes are not complex. Can be resource intensive as no shortlisting activity "prequalification" is allowed. All applicants submit tenders for assessment. No negotiation is allowed. Due to the large workload of assessing tender submissions from every interested party, and the inability to negotiate on tenders make this procedure unsuitable for Teddington DRA main works procurement.
Restricted procedure	Participants are invited to register interest in a tender opportunity, subject to a selection /shortlisting activity which will produce a pre-determined number of successful applicants to be invited to submit a tender. Best suited where requirements/ solutions are understood and are not complex, but where there may be a sizeable number of market participants. As only shortlisted tenderers submit tenders, there is less impact on the evaluation and selection resources. No negotiation is allowed during this process. The complex requirements of the Project's main works and the inability to negotiate under the restricted procedure makes this procedure unsuitable for main works procurement.
Competitive procedure with negotiation	This procedure is intended for use with complex requirements where the contracting authority expects, through the use of negotiation, to be able to improve the quality and value for money proposition of tender submissions prior to a final award decision. This process is similar to the restricted process, in that it employs a shortlisting phase to down-select interested parties into a short-list of tenderers, the number of which balances tender costs and competitive tension among the short-listed tenderers. Negotiation must conform to the principles of fair and equal treatment, non-discrimination and reasonable behaviour. Once negotiations are concluded, a final tender is submitted by the tenderers after which there can be no more negotiation. This procedure best addresses the complex requirements of the Project's main works procurement while allowing for negotiation to unlock additional value for money from tenderers prior to a final submission. **This is the procedure being recommended for the Project's main work procurement.**

7.7. The procurement strategy will utilise the Competitive procedure with Negotiation (CPN) as it is the procurement route which is best suited to the complex requirements of the Project's main works and which allows Thames Water to use negotiation where required to potentially unlock further tenderer commitments towards a value for money outcome prior to a final submission.

7.8. In the event that a sufficiently competitive and high-quality tender is submitted in the first round of tenders, the CPN allows contracting authorities to waive the requirement for further negotiation and a final submission (subject to having declared that such an eventuality may be utilised by Thames Water in the tender documents). This flexibility to potentially save time in the event a suitably high-quality tender is submitted, makes the CPN more attractive over the Competitive Dialogue, which does not allow for a contracting authority to waive the negotiation phase.

7.9. Thames Water will produce a Negotiation Plan as part of its procurement documentation and include it in the information shared with the shortlisted tenderers who are invited to participate in the CPN.

Commercial strategy

7.10. Thames Water has engaged with the market on a number of instances which are detailed later in this section. In engagements completed to date, the market feedback has revealed a preference for splitting the Project's main works requirements into two distinct elements or

"packages", generally reflecting a differentiation in the type of works and specialist disciplines required. Thames Water has taken that market preference on board and is proposing to split the main works procurement into two packages, being:

- Package 1 – The TTP located at Mogden STW, (the TTP package); and
- Package 2 – The shafts, conveyance tunnel to discharge, the discharge structure, abstraction facility and the smaller tunnel and connection to the TLT, (the tunnelling package).

7.11. This packing strategy for the main works procurement will allow the greatest choice and flexibility to select specialist contractors for each package. Each package will be structured to enable a strong competition focussed on the specialisms required to deliver each package's requirements. Thames Water will not preclude tenderers from bidding for both packages.

7.12. The contract strategy will be for a two-stage design and build contract for each package with the early contractor involvement option to be considered for each contract. A decision point or 'Notice to Proceed' (NTP) gateway at the end of the Early Contractor Involvement (ECI) Stage 1 will be available to us to utilise, or not, at the conclusion of the design stage. This will help ensure that the parties focus on reaching agreement on the Target Price of each of the Package's build prior to commencing construction.

7.13. We intend to procure the main works contractors for each package in advance of the DCO consent. This strategy gives time for early contractor involvement to generate the expected value, both in terms of optimising the existing DCO reference design (always within the constraints of design submitted for examination during the DCO process); providing insight into buildability and logistics around designs and layout; supporting Thames Water during the examination phase of the DCO process through providing construction-related input where necessary focussed on mitigating risks raised by stakeholders, for example on noise, lorry movements, tunnel related subsidence etc. The ECI approach is well established and recognised benefits include:

- The creation of an integrated delivery team at an early stage which has a strong focus on the client's objectives.
- The early development of relationships between the ECI team and stakeholders to support the planning of the works.
- Integrating design and construction to optimise buildability.
- More time made available to develop innovative approaches to improve productivity, efficiency and deliver better value for money.
- Earlier consideration of construction stage risks and more time to develop mitigation strategies.
- Earlier planning and development of resource and supply chain requirements to ensure their availability when needed in delivery.
- Greater opportunity to develop solutions which minimise environmental impacts and support carbon targets.
- Alignment with industry and Government best practice advice on project delivery methods.

7.14. The key principle of this approach is that appointing the main works contractor(s) early in the project development process helps clients to harness their technical expertise prior to embedding key project decisions. Early contractor involvement prior to completion of construction designs, submission of planning consent and commencement of construction gives us some validation and better insight into the Contractor's approach. It also enables team integration, transparency and collaboration and trust which are critical success factors to delivery. For clarity, the two stages of the ECI model for Teddington DRA are post-contract and commence on conclusion of the procurement stages.

7.15. During Stage 1 the ECI contractor is required to:

- Engage and build productive working relationships with Thames Water, its Technical Partner (TP), the other package contractor and other parties in the project team.
- Plan implementation of commitments made for Stage 1 and Stage 2 within its tender submission "tender promises", review the project schedule and identify any opportunities and risks.
- Review the project budget and identify any opportunities and risks.
- Review the DCO submission and discuss any queries with Thames Water and its TP or propose any modifications including identification of any opportunities in the event of delay to DCO consent.
- Review the TP design and identify any opportunities and risks not already identified.
- For the tertiary treatment facility (package 1), propose any safeguarding of the existing plant and any mitigation measures to reduce the probability of interrupting operations.
- Review the project risk register and propose mitigation measures and opportunities.
- Review the surveys undertaken by Thames Water or the TP and identify any further surveys required to mitigate risk.
- Review and understand Thames Water policies and procedures and their application to the works.
- Assume design responsibility through adoption of the TP's design from which the construction design is developed.
- Undertake any surveys and enabling works outside the scope of the DCO with Thames Water agreement to facilitate progress and mitigate risk.
- Develop and agree a mobilisation plan for Stage 2 (delivery).
- Plan for resourcing including contingencies if DCO consent, secondary consent discharge or construction (due to e.g. seasonality) is delayed.
- Develop a plan for stakeholder engagement.
- Develop a plan for site establishment.
- Develop a plan for logistics including with statutory authorities.
- Develop a plan for traffic management including shafts in residential areas.
- Develop a plan for procurement of materials, equipment, TBM and other long lead items.
- Develop a forward pipeline for subcontractor procurement and secure Thames Water acceptance.
- Participate constructively in any "checkpoints" or progressive confidence building activities in relation to establishment of the Target Price and programme that Thames Water specify as required before NTP is issued.
- Participate in teambuilding activities proposed by Thames Water and propose team integration approaches.
- Participate in the Target Price setting process as set out by Thames Water including regular updates on progress.

7.16. The key deliverable for completion of Stage 1 will be the contractor's Target Price submission being within Thames Water's budget addressing buildability, productivity and innovation supported by a convincing works methodology and subcontractor procurement plans. An incremental approval approach as well as transparent engagement between Thames Water, its TP and the interface arrangements between Contractors for package's 1 and 2 will aim to mitigate the commercial risks.

7.17. The contractor will only be instructed to proceed to construction of the project in Stage 2 after Thames Water governance approves the Stage 1 proposal. This includes the agreement of an acceptable Target Price. During Stage 2 the contractor will implement the planning

undertaken in Stage 1 in accordance with its proposed methodology for executing the works. A benefit of Stage 1 is that a delivery team will be well-placed to collaborate and respond positively to inevitable challenges that will arise in a project of this complexity.

7.18. An additional mitigation measure we will include is the right to terminate the contract in the event that there is no agreement on the Target Price at the end of Stage 1. In such an event, we would take the existing design and use it as the basis to tender the delivery stage via a replacement contractor secured in a new competition. This approach acts as an incentive for the ECI contractor to remain focused on delivering a value for money proposition in agreement with Thames Water even after it has been awarded the contract, but also provides a contingency measure in the event that the parties cannot reach agreement on the Target Price. It is not Thames Water's intention to make use of this option, but it will remain available if required.

7.19. Thames Water is still developing the incentivisation strategy but key principles underpinning this development are:

- For each package, a target cost contract will be utilised with a pain:gain share split of 50:50 between Thames Water and the ECI contractor.
- To avoid 'windfall' profits, the amount of gain available to each contractor will be capped at 100% of their fee amount (or profit therein) as calculated on the basis of the agreed Target Price. (e.g. if the contractor's fee at the Target Price set at NTP would be £3m, the maximum amount of incentive permitted to each contractor under gain conditions would be capped at £3m)
- In a situation where the sum of the actual prices exceed the Target Price (i.e. the contract is in 'pain' mode), there is no intention to cap the value of the contractors share of the costs of such 'pain' but it is likely that contractors will seek a subcap for "pain" sitting within the overall cap on liability. The market has hardened in this area and limits of liability are often now "red lines" for contractors' participation.

7.20. We will engage further with the market as the principles develop to ensure an acceptable balance between security for Thames Water and for mitigating cost risk for the contractor whilst ensuring continuing appetite by the market for the Project's main works package.

Market engagement to date

7.21. To support the development of the Project's procurement strategy, the Thames Water SRO Supply Chain Team has conducted market engagement to introduce the Project to the market and to seek feedback on the project's proposed procurement strategy.

7.22. Thames Water published a Periodic Indicative Notice (PIN) announcing the commencement of a market engagement for the Teddington DRA, inviting interested suppliers to register for a market engagement event on 24th January 2024.

7.23. A subsequent Market Briefing document and Market Sounding Questionnaire (MSQ) was issued on 12 July 2024, seeking feedback on the revised construction approach proposed for the Project.

7.24. 61 delegates from 41 supplier organisations attended the initial market engagement event from a cross section of the market. The event sought to introduce the Project and the current proposed approach to procurement and contracting in order to develop visibility in the supply chain.

7.25. A questionnaire (MSQ) was issued following the event, calling for feedback on the proposed procurement and commercial approach. Recipients included all organisations who registered for the event. The MSQ was also cascaded via the Civil Engineering Contractors Association (CECA) to its memberships for a more inclusive and wider reach.

7.26. Detailed information on the market engagement activity is available separately, but key elements are summarised below:

- There appears to be a good level of market appetite to deliver the work both at a direct (Tier 1) level and across the whole value chain. 45 out of 49 respondents (91.8%), expressed interest in the Project, of which 18 respondents indicated direct appetite. Further key elements are based on the responses of the 18 respondents that indicated direct appetite for the role of contractor.
- A number of packaging variations were provided for comment. The option proposing separating the TTP scope (Package A) from the Conveyance / Discharge / Outfall scope (Package B) and the Abstraction Pipework / Connection scope (Package C) was the preferred option for the majority of respondents, with 13 out of the 15 respondents (86.7%) who provided an answer to this question. The remaining three respondents did not submit a preference to this question.
- Among the 18 respondents who indicated direct appetite, six out of 18 respondents expressed interest in delivering Package A, now referred to as package 1(TTP package) in whole. 10 out of 18 respondents expressed interest in delivering both Package B (Conveyance/Discharge/Outfall) and Package C (Abstraction Pipework/Connection) in whole. In response to this feedback, package 2 (tunnelling package) now comprises the combination of packages B and C. The remaining two respondents had no particular view in this regard.
- 95% of respondents supported the use of NEC4 for contracting the services and works.
- A 'Pre-Consent Contractor Involvement' approach was either ‘supported’ or ‘strongly supported’ by 16 out of 18 (88.9%) respondents.
- A majority of respondents (13 out of 18) were undecided as to whether they would enter a consortium arrangement to deliver any of the scope.

7.27. The subsequent market engagement in July 2024 was the result of identification of potential benefits that could be realised by changing the construction methodology to a bored tunnel approach. The MSQ aimed to obtain feedback from the market on how this would impact their appetite position, their potential market formation, their view on impact to construction duration and whether they identified any risks or opportunities as a result of the new methodology.

7.28. Feedback was sought from all 49 organisations who had previously submitted responses in the initial January activity. 38 organisations (78% response rate) provided detailed feedback in the form of a completed MSQ:

- Asked how the changes outlined in the update document have impacted the suppliers’ appetite, 12 respondents said that their appetite had increased, three said that their appetite had decreased, and 22 said their appetite was unchanged.
- Two suppliers with direct appetite intend to bid as single entities, four suppliers, also with direct appetite, intend to bid as part of a consortium, with the remaining suppliers undecided at that time.
- Several value engineering opportunities were suggested, with support remaining for some form of early contractor involvement.

7.29. As part of the Market Briefing document, the updated procurement programme was shared with the market.

7.30. Thames Water may elect to engage further with the market where time allows as it develops and finalises its heads of terms and incentives mechanics.

Detailed procurement timetable

7.31. The procurement of the Tunnelling package will be prioritised to seek to maximise the opportunity for ECI ahead of the submission of the DCO application. The procurement of the TTP package will be scheduled later to balance resource workload and noting that ECI benefits to be secured in the TTP package are not expected to be as significant as in the tunnelling package. Table 7-2 sets out the key milestone activities and indicative dates for the tunnelling package procurement including ECI. The procurement of the TTP package is expected to commence circa Q3 2025 and a detailed procurement programme will be prepared in due course.

Table 7-2: Draft procurement timetable for the tunnelling package

Activity (tunnelling package)	Duration	Indicative start date	Indicative end date
Preparation of Supplier Questionnaire (SQ) "prequalification" pack and Contract Notice documents	10 weeks	07/10/2024	13/12/2024
Approval of SQ pack and Contract notice documents	7 weeks	16/12/2024	14/02/2025
Launch procurement / Contract notice issued	1 day	17/02/2025	17/02/2025
SQ out to market period	6 weeks	17/02/2025	28/03/2025
Evaluation/shortlisting/ approvals	11 weeks	31/03/2025	13/06/2025
Shortlisting Notification / feedback sessions	2 weeks	16/06/2025	27/06/2025
Prepare Tender pack	10 weeks	03/02/2025	11/04/2025
Approval of tender pack	10 weeks	14/04/2025	20/06/2025
Initial Tender period	8 weeks	30/06/2025	22/08/2025
Initial assessment	6 weeks	25/08/2025	26/09/2025
Negotiation	3 weeks	29/09/2025	17/10/2025
Prepare Best and Final Offer (BAFO) tender docs (optional)	3 weeks	20/10/2025	07/11/2025
Period for tenderers to complete their BAFO response	6 weeks	10/11/2025	05/01/2026
BAFO Evaluation	6 weeks	05/01/2026	13/02/2026
Final Approval	6 weeks	16/02/2026	03/04/2026
Standstill and Contract Award	2 weeks	06/04/2026	17/04/2026
Contract award notice	1 day	20/04/2026	20/04/2026
Contract signature period	2 weeks	20/04/2026	01/05/2026
Key person Mobilisation	8 weeks	04/05/2026	26/06/2026

7.32. The indicative dates stated above remain subject to change as Thames Water continues to develop and refine the procurement strategy and approach. Delays to scope development or approval to proceed may also cause changes to the programme.

Maximising competition

7.33. Thames Water is utilising market engagement and commercial knowledge to build appetite for the main works packages. We will seek to balance market appetite for risk with fair allocation of responsibility between the parties and to seek to understand how the various commercial levers available can help ensure that a robust, healthy level of competition exists for the main works packages.

7.34. We will conduct the procurement via the CPN procurement procedure for each package, using the shortlisting stage to down select the minimum of three, maximum of four highest scoring applicants for each package to be invited to tender for each package.

7.35. By restricting the number of tenderers for each package to a maximum of four, it ensures that, all being equal, each tenderer has a 25% chance of winning the tender. It is recognised that the lower the chance of winning, the less appetite prospective tenderers have in participating. This number balances the chances of winning for the tenderers and ensures that we have a sufficient pool of tenderers to generate healthy competition and competitive tension between the tenderers. A maximum of four tenderers gives some protection from the risk of tenderer withdrawal during the tender process.

7.36. Additional elements which Thames Water intends to employ to ensure robust appetite and competition for the packages are:

- Use of standard pre-qualification Selection Questionnaire (SQ) documents, so that Applicants can quickly and easily prepare their submissions of interest. This lowers the cost of bidding for tenderers as well as reducing workload and timescales, which also benefits smaller or medium sized enterprises which may not have dedicated bid team resources.
- Consider using the Common Assessment Standard (CAS) developed by Build UK as the basis for the SQ selection criteria. This standard is already endorsed by Cabinet Office (via Procurement Policy Note 03/24) for public contracting authorities for works contracts, many potential tenderers will already have pre-prepared documentation to respond to this criteria and the use of CAS should offer a level of efficiency to the market.
- Via engagement, we understand that the market has a preference for target cost type contract, its structure and mechanisms and principle of both parties acting in a spirit of mutual trust and co-operation.
- Thames Water will develop challenging but fair incentive mechanisms to reflect the appropriate level and allocation of risk between the parties and encourage collaboration between them to focus on the client's objectives and success factors.
- Negotiation will be employed in the tender process to encourage and develop improvements in both technical and commercial offerings from tenderers. There will be no down-selection process during the tender stage.
- Tenderers are allowed to bid for one or both packages in the main works procurement but will need to have pre-qualified for each package separately.
- We will clearly demonstrate that we are conducting the procurement according to the principles of equal treatment, non-discrimination, fairness and reasonable behaviour. This will include provision of background information to the Project to help mitigate any real or perceived advantage due to prior knowledge or exposure to the Project that any contractor currently working for Thames Water may have.
- Thames Water will allow tenderers (and their supply chain members) to be non-UK based but will ensure that all tenderers are tested for reasonable, effective and sustainable operational locations that meet the need of each package.
- Thames Water notes the specialisms in certain areas and will mandate that exclusivity arrangements between bidder and specialist members of the supply chain are not allowed.
- Thames Water is developing its commercial heads of terms and expects to engage in further market engagement to ensure that Thames Water builds a commercial package that fairly balances risk between the parties, and which is reasonable and proportionate to each package.

Procurement risks and mitigation

7.37. The table below sets out the risks and issues related to the preferred delivery route.

Table 7-3: Key procurement risks and mitigation

No.	Risk	Mitigation
1.	Implementation of the Procurement Act 2023 (the Act) has been delayed to 24 February 2025. This is a new legal framework for conducting regulated procurement, including that done by utilities. The delayed start date means that the main works procurement will be undertaken using the existing UCR 2016 legal framework, but delays to procurement starting could result in Thames Water having to change the procurement process and documentation to align with the Act.	Thames Water has developed a procurement programme which commences the procurement process for the main works in advance of the Act's delayed start date. Thames Water will monitor progress of the development of the procurement documentation to deliver according to the programme. In the event that a delay becomes inevitable, then Thames Water can amend the procurement documentation to comply with the Act.
2.	Scope development delays could impact the procurement programme if there is insufficient detail to allow market participants to make a decision on whether to express interest in participating in the procurement opportunity.	Thames Water has contracted with a technical partner (the London Water Recycling (LWR) TP) to provide capability and capacity to develop the main works scope and related documentation as part of its service offering. This provides a flexible resource that can be increased if necessary to speed up development of scope and mitigate some delays.
3.	Selection of the ECI contractor for each package is done in advance of a final agreed design which would allow a reliable and comprehensive outturn price to be developed at tender stage in a traditional way	This is addressed by a combination of the selection process for the appointment of the contractor together with the incorporation of controls, safeguards and cost development procedures into the procurement and the provisions of the contract. The selection and contract award processes need to consider the track record, experience, policies, culture and demonstrable organisational capability and quality of key people. The overall aim being to identify the tenderer who gives most confidence that they will develop the optimal solution and deliver it as efficiently and safely as possible within time and budget and to the required quality.
4.	Lack of resource capacity to develop the technical documents required for inclusion in the procurement pack.	The LWR TP contract is a flexible source for a range of professional services that would act as subject matter experts in developing technical documentation to be included in scope or supporting documentation. The LWR TP scope makes provision for the TP to be called upon to provide such resources at reasonably short notice if required to augment that to Thames Water capacity.
5.	Risk of uncompetitive pricing by tenderers bidding inflated rates ahead of agreement of Target Price.	Thames Water will use benchmarking and possibly independent cost reviews to identify where such activity may be indicated.

No.	Risk	Mitigation
6.	Tender prices exceed cost estimates, delaying procurement procedures whist affordability is reviewed.	ECI approach does not gather a full tender price but will require comprehensive cost data and a robust pricing process in line with the NEC guidance for developing robust target prices. It will be later in the ECI process when the price is finalised. The ECI approach provides more reliable cost estimates before a commitment to construction is made and has the contractor on board earlier to help with risk mitigation and the development of improved buildability and value engineering proposals.
7.	Lack of competition contributing to uncompetitive prices.	Market engagement has shown that there is a strong appetite for the contract packaging and for the proposed procurement strategy supported by the vast majority of the market.
8.	Disruption to works programmes caused by client changes and late agreements on stakeholder requirements.	ECI allows relationships to be built between the parties with the stakeholders to help avoid late changes to requirements informed by a better understanding of the consequences.

8. Solution Costs and Benefits

Introduction

8.1. The costing approach adopted for Gate 3 is aligned to the ACWG methodology. An assessment of capital expenditure (Capex), operating expenditure (Opex), costed risk and optimism bias (OB) costs for Teddington DRA were completed using this approach.

8.2. Design updates were only scoped and costed for the Teddington 75Ml/d Tertiary Treatment Plant and its conveyance schemes as the preferred solution during the Gate 3 assessment. There were no design updates made to the Beckton and Mogden schemes and as such their costings were not captured.

Solution cost estimating

8.3. The main scope of work centred on updating the Teddington DRA Gate 2 costing as a baseline to reflect the Project as developed in the conceptual design for Gate 3. This ensured stakeholder comments were addressed whilst capturing scope changes since the gate 2 submissions. To develop the Capex/ Opex cost estimates, the following activities were undertaken:

- Review of the feasibility design information currently available.
- Initial update of the costing tool's (F909) cost curves and library using excel macros (received from Thames Water), including update of the contractor and client overhead multipliers.
- Pricing of standard items by Thames Water using their latest cost updates.
- Use of secondary cost data(s) from original equipment manufacturers and available in-house cost data(s).
- Quantitative Costed Risk Assessment (QCRA) using a Thames Water risk scoring matrix (a developed version of the ACWG template matrix) agreed in risk workshops with stakeholders, including running Monte Carlo simulations on the agreed risk register to develop the project's risk profile and cost.
- Development of OB using the ACWG OB working tool and taking cognisance of the updated scope in line with the HM Green Book requirements and ACWG cost consistency methodology.

8.4. Derived Capex and Opex estimates were processed through Thames Water Asset Planning System (APS) to generate an updated set of costs with additional client overhead added. The costs were also grouped into their ACWG asset categories aligned to their respective asset life(s) to aid predictive modelling of asset failures and replacements. These set of costs were then used in the Average Incremental Costs (AIC) calculation tool to generate the project's Net Present Value (NPV) and whole life costs. The AIC tool provided by the ACWG aligns to the Treasury Green book methodology, with a declining schedule of discount rates for an 80-year life cycle.

8.5. All costs were derived with reference to FY24/25 using Construction Output Price Indices (OPIs) as a preferred inflation index. This was then deflated to FY22/23 which is the Gate 3 price base year for Teddington DRA. This is in line with Thames Water PR24 submission, with Consumer Prices Index including owner occupiers' housing costs (CPIH) used for the deflation.

8.6. The estimated Capex, Opex, NPV and AIC for each of the options at the minimum and the maximum capacities are shown in table 8-1 and table 8-2. Details of costing methodologies, assumptions, exclusions and estimated costs, including cost profile information can be found in Annex A2.

8.7. The Gate 3 Base Capex for the Teddington DRA scheme is higher than the Base Capex derived for the Gate 2 submission with a variance of 36.6%. The difference in cost is due to major

changes with the scheme designs as adopted for Gate 3. Some of the changes include tunnelling proposal using a TBM for a 3.5m diameter requirement as against pipe jacking for 1.8m diameter requirement as previously proposed in Gate 2. Changes in number of shafts required, depth and associated requirements, including changes to the TTP process set-up and intake structure pricings etc are some of the changes driving the cost changes in Gate 3. Additionally changes increased the estimated development cost to progress the scheme through RAPID stage gates and confirmed DCO process.

8.8. Owing to the descoping of various pumps within the Teddington DRA scheme for the Gate 3 evaluation, Opex reduced by 74% in comparison to Gate 2 Opex due to reduced power requirements. Some of the pumps descoped include the Raw water abstraction pumps and discharge pumps for flow from the downstream shaft to the outfall. Furthermore, due to superseding the NSF requirement in Gate 2 with MBBR in Gate 3, thus having an impact on the derived chemical costs relative to flow. Abstraction license fee captured in Gate 2 was also reduced as it was confirmed during one of the Gate 3 risk sessions that such fee will be in their tens of thousands rather than hundreds of thousands previously captured in Gate 2.

Table 8-1: Capex and Opex for Teddington 75Ml/d TTP and conveyances (2022/23 base date) with DO of 67Ml/d

Cost Element	Units	Teddington 75Ml/d TTP + Conveyances
CAPEX		
Base Capex	£m	£ 305.0
Costed Risk	£m	£ 47.1
Optimism Bias	£m	£ 77.6
Total G3 Capex	£m	£ 429.7
Total G2 Capex	£m	£ 293.4
Change G1 to G2	%	46.5%
OPEX		
G3 Fixed	£m/yr.	1.0
G3 Variable	£/ML	36.7
G2 Fixed	£m/yr.	0.7
G2 Variable	£/ML	186.3
Change (Min Flow)	%	-11.7%

Note 1) CAPEX and OPEX for all project elements were combined to obtain values as follows:
Teddington DRA – 75Ml/d yield: 1 phase of 75Ml/d treatment stage and the Mogden to Teddington tunnel and from River Abstraction to TLT connection sub-options

Note 2) Cost base is 2022/23 for Gate 2 and Gate 3. Gate 2 costs inflated using industry BCIS construction indices.

Note 3) Notable design changes between Gate 2 and 3 as follows:
Use of a TBM for the conveyance from Mogden to Teddington rather than pipe jacking. Reduction in Opex from not running the sweetening flow through the tunnel and not having pumps to lift the flow from the tunnel to discharge. Replacement of the NSF with MBBR for the TTP.

Table 8-2: NPV and AIC for Teddington 75Ml/d TTP and conveyances (2022/23 base date) with DO of 67Ml/d.

Teddington DRA	Units	Teddington 75Ml/d TTP + Conveyances
Min Flow (Gate 3)	MLD	15.0
Min Flow (Gate 2)	MLD	16.8
Total planning period option benefit (NPV WAFU)	Ml	472,561
Total planning period indicative capital cost of option (CAPEX NPV)	£m	338.9
Minimum Flow		
Total planning period indicative operating cost of option (OPEX NPV)	£m	20
Total planning period indicative option cost (NPC)	£m	311.5
AIC	p/m³	65.9
Gate 2 AIC	p/m³	63.1
Maximum Flow		
Total planning period indicative operating cost of option (OPEX NPV)	£m	33.8
Total planning period indicative option cost (NPC)	£m	325.4
AIC	p/m³	68.9
Gate 2 AIC	p/m³	77.9

Assumptions and exclusions

8.9. The design life of civil structures in the ACWG guide, such as buildings and tanks in the TTP, is 80 years. For the tunnels and pipelines, their design life is 100 years. The lifetime of mechanical, electrical and control equipment varies around 10 – 20 years. Maintenance requirements for the water recycling schemes include items listed in Annex A2.

8.10. The asset life expectancies assume that the assets are maintained based on a maintenance programme to keep them operational for the expected asset life. Since the treatment facilities are intended to be operated intermittently, the maintenance regime of the mechanical equipment needs to be considered carefully with reactive and planned operational maintenances. Periods out of use can affect the asset life of equipment such as pumps/membranes.

8.11. Most of the Capex items were estimated using Thames Water's Engineering Estimating System (EES) cost curves through the F909 estimation tool. The EES cost curves were derived from historic projects, which had been implemented within Thames Water's operational regions. The costs derived from this data base are benchmarked and validated through Thames Water's Performance Review processes.

8.12. Budget quotations from UK Suppliers were used for the costing exercise for some of the treatment processes such as the Mechanical Filter, MBBR, Abstraction Screen, Pumps etc. This is to ensure that current market rates are used in the estimation especially for requirements without available cost curves.

8.13. The Teddington TTP derived Capex was benchmarked against other water recycling schemes and desalination projects overseas. The Gate 3 derived Capex for the TTP shows a lower cost with a variance of 13% against the benchmarked projects. It should however be noted that

there are differences in treatment process requirements between the TTP and the reference projects, thus the benchmarking exercise is for indicative purpose and not representative.

8.14. Tunnelling rate used for the conveyances were reviewed against rates from the UK Research and Innovation, British Tunnelling Society and Infrastructure and Projects Authority. This was to ensure that the unit rates used for the estimation are fit for purpose and was within acceptable cost tolerances.

Best value and solution benefits

8.15. WRSE carried out best value analysis to develop the Best Value Regional Plan. Details of WRSE's best value evaluation methodologies including metrics can be found in the Method Statement: Best Value Planning (WRSE, January 2022)[28]. The Thames Water WRMP is cascaded from and fully aligned with the WRSE Regional Plan, and so the same best value metrics have been considered in both plans. Further information on determining the preferred solution is in Section 2 of this report.

8.16. Different options' costs, relative to one another, are key factors in considering which options should be considered Best Value, and so included in our WRMP. Each of the SROs may be subject to elements of design/scope change and there are inherent uncertainties in the option costing processes, meaning that cost estimates may go up or down through the option development process. Acknowledging this, work was undertaken in the course of producing WRMP24 and WRSE Regional Plan in which the sensitivity of option selection decisions to cost change was tested. The WRSE investment model was used to investigate this, due to the complexity of the planning problem which is posed. Teddington DRA is selected in the WRSE "Least Cost" plan, as well as the Best Value plan. WRSE investment model runs were undertaken to identify whether the Teddington DRA scheme would still be selected in a "Least Cost" plan, were its cost to be incrementally increased.

8.17. In the first stage of this testing, the cost of the project was increased until it was no longer selected. The first alternative set of options which was selected instead of the Teddington DRA was a relatively large selection of groundwater schemes, accompanied by transfers from Affinity Water and SES Water. This alternative set of options is not seen as a viable alternative, as it is too high risk, requiring the delivery of multiple novel schemes and the Grand Union Canal SRO, and being contingent on the successful delivery of demand reduction by Thames Water, Affinity Water and SES Water. Each of these dependencies brings risk, which is seen as unacceptable overall. As such, this alternative set of options was excluded from selection in the short-term, and the cost increment was increased until an alternative to Teddington DRA was selected. It was found that Teddington DRA would need to cost between £844m and £929m (in 2022/23 prices, indexed according to the BCIS CE Cost Index, i.e., in a "like for like" cost basis as presented in the Gate 3 reporting) for a different solution (Beckton Recycling) to be included within a "least cost" plan.

9. Stakeholder Engagement

Introduction

9.1. During Gate 3, we have undertaken widespread engagement with regulators, technical, political, statutory and local community stakeholders, landowners and customers. We have worked collaboratively and shared information in a timely way to help inform the development of the design of the Project.

[28] https://www.wrse.org.uk/media/sy1bu4to/method-statement-best-value-planning.pdf

9.2. In autumn 2023 we held a non-statutory consultation on site options followed by community updates and a response to the consultation.

9.3. In summer 2024 we issued the first quarterly newsletter providing the public with regular updates on Project progress and continue to provide regular updates on the Project through a variety of communication channels.

9.4. This section summarises the key engagement and consultation undertaken through Gate 3.

Public consultations

Draft Water Resource Management Plan consultation

9.5. The Teddington DRA project was included in Thames Water's draft Water Resources Management Plan consultation from 13 December 2022 to 21 March 2023. The consultation prompted a high level of interest in the proposals for Teddington DRA, with events held in Richmond, Twickenham, and a Project specific online webinar to provide stakeholders with the opportunity to learn about the Project and put questions to the Project team.

9.6. The consultation received **1,687 representations**, with many having a focus on the Project. The feedback received emphasised the need to conduct further stakeholder engagement locally with the community and politicians to provide more detail and help avoid misconceptions around the Project, along with more information on what Thames Water is doing to help tackle future drought scenarios.

9.7. Feedback and how the project considered the responses was detailed in the *Draft Water Resource Management Plan Statement of Response – August 2023*. This also included details of the consultation and a list of consultees.

Non-statutory consultation on Teddington DRA site options

9.8. A first Project-specific non statutory consultation for Teddington DRA was conducted from 17 October to 11 December 2023. Comments were sought on the potential site options for infrastructure, including the TTP, intermediate shaft locations, and abstraction and outfall sites. Views on the connection to the Thames Lee Tunnel were also sought, as well as the site identification process overall.

9.9. During the consultation, four public drop-in events were held in different locations surrounding the project area, Twickenham, Teddington, Kingston and Twickenham Stadium near Mogden STW. The events were attended by **743 people** in total.

9.10. We received 2,312 representations to the consultation, from people, businesses and organisations. We received feedback about the site options specifically and about the potential construction and operational concerns of the Project for local communities and people that use the local area and river. We also received feedback more broadly about Thames Water such as the need for the Project, water resource planning, investigations into alternatives and a lack of trust in Thames Water and regulators that the Project would not be properly regulated, operated or monitored.

Figure 9-1: Summary of the activities undertaken for our non-statutory consultation

9.11. As a result of the feedback, we investigated opportunities to refine the design and directly address the feedback received. As set-out in Chapter 2 we:

- Changed the construction technique from pipejacking to tunnel boring to allow quicker construction, a more direct route and for tunnel material to be removed from Mogden STW rather than along the route at intermediate shaft sites.
- Increased the size of the tunnel to 3.5m ID from 1.8m ID to be able to remove a number of intermediate shafts along the conveyance route and reduced the above ground impacts to local communities.
- Confirmed the recycled water produced through the hot standby mode would be returned through Mogden STW and into the existing final effluent channel to Isleworth Ait rather than through the conveyance to the River Thames.

9.12. Further information on the consultation, stakeholder concerns and a detailed response from Thames Water to the feedback raised can be found on the Thames Water website:

- Teddington DRA summary brochure 2023
- Teddington DRA consultation report 2023
- Teddington DRA statement of response to the 2023 consultation

Statutory Consultation

9.13. Statutory consultation on the Project is planned to commence late spring 2025 and run through summer 2025.

9.14. Preparation for the statutory consultation is in progress, with the Statement of Community Consultation (SoCC) due to be consulted on with local authorities and published through the early part of 2025.

Engagement with RAPID

9.15. During Gate 3, regular engagement with RAPID has been undertaken, including the submission of quarterly reports and regular check-in calls. A key focus of the engagement has been on the actions set at Gate 2. A table of these actions and the Project's progress is detailed in Table 4-1.

Engagement with National Appraisal Unit (NAU) and regulators

9.16. Following on from engagement in Gate 2, regular technical meetings on various topics have been held with the NAU, Environmental Agency, Natural England and the Drinking Water

Inspectorate (DWI) to provide updates on the Project, assessments, and findings, along with receiving comments and actions.

9.17. Through this engagement, we were able to develop solutions where possible to issues raised by the technical representatives. This involved feedback on issues around water quality concerns, SWQRAs, outfall and abstraction design, and fish screening requirements. A key focus of the engagement has been on the Priority Actions set at Gate 2 and addressing and reducing other key risks.

9.18. Following Gate 3 activities, as the project moves closer to its DCO submission, engagement with the NAU will be taken over by the EA's National Infrastructure Team (NIT). Meetings with the NIT started in July 2024, providing them with the opportunity to develop an understanding of the Project and issues discussed and raised by the NAU and actions the Project has undertaken to address the points raised.

Local planning authority engagement

9.19. The relevant local planning authorities (LPAs) for the Project are the London Borough of Hounslow, London Borough of Richmond upon Thames, and Kingston Council. Engagement with the host LPAs for the Project has taken place throughout 2024 under joint pre-application planning engagement process. At Gate 3, six meetings had been held through this process covering the following broad range of matters:

- Meeting 1: Project overview and explanation of programme (January 2024)
- Meeting 2: Project updates and explanation of water quality survey work (March 2024)
- Meeting 3: Project design changes and explanation of approach to EIA scoping (May 2024)
- Meeting 4: EIA Scoping and subject matter approaches (June 2024)
- Meeting 5: Subject Matter issues and methodology feedback, EIA and ongoing engagement (September 2024)
- Meeting 6: Project updates, EIA Scoping Report (November 2024)

9.20. In particular, work between meetings 3 and 4 led to a series of 'Subject Matter Expert' meetings held during July and August 2024 with representatives of the three host Local Authorities covering planning, environment, environmental health, recreation, heritage and transport functions. These meetings, which targeted discussions around the emerging proposed approaches and methods for the assessment of impacts associated with the Project addressed the following environmental topics:

- Air Quality
- Noise and vibration
- Ground conditions
- Water quality
- Flood risk
- Ecology
- Townscape
- Cultural heritage
- Transport

9.21. These subject matter meetings provided valuable input and knowledge to the drafting process for the Project's EIA scoping report which in turn was a focus of discussion at meeting 6.

9.22. As the Project moves into 2025 and Gate 4 it is anticipated that meetings will continue in a similar manner, addressing core matters related to the consenting process and to technical matters pertinent to the design and assessment of the Project. As part of work to support this Planning Performance Agreements are being prepared and discussed with a view to these helping guide the programme of meetings between Thames Water and each of the three LPAs.

Other engagement

Autumn 2024 community information events

9.23. In September 2024, we published a further update information on the Project[29]. This was focused on communicating the latest design and our design changes since the non-statutory consultation in Autumn 2023.

9.24. A suite of materials was produced to support this provision of information which included:

- a summary brochure explaining the project and the design changes;
- a series of factsheets;
- a video explaining the TBM process; and,
- a mapbook with maps of all the sites proposed for the Project.

9.25. In October 2024, four public information events were held at Isleworth, Ham, Kingston and Twickenham. The events were attended by **730 people**.

9.26. A specific focus of the information events was to inform potentially affected landowners and local stakeholders of the latest design and changes made. At the events there was significant representation from the Project's lands team, and also separate rooms to discuss matters in private with landowners. In total 1,508 landowners were contacted by letter to invite them to attend the events.

9.27. While feedback was not specifically sought on the proposals during the events, comments were received by the attendees which were documented and circulated post the event to the Project team for consideration.

Other technical engagement

9.28. Beyond the provision of information and engagement listed above, engagement sessions have been undertaken as and when required with other key stakeholders through 2023 and 2024, including Thames 2100 Teddington to Maidenhead Catchment Partnership, Port of London Authority, Greater London Authority, Natural England, Historic England and Greater London Archaeology Advisory Service (GLAAS).

9.29. Information on the Project was shared with these organisations, and specific comments relating to their interests were sought on a variety of matters.

9.30. Thames Water has agreed with the Planning Inspectorate to proceed with pre-application Service Tier 2 (Standard). This will facilitate the appropriate level of pre-application engagement, support and advice from the Planning Inspectorate, including with respect to facilitating discussion and consensus-building between the applicant and statutory consultees concerning key examination issues and potential areas of disagreement.

Customer research

9.31. Thames Water undertook extensive customer research through 2022 exploring the acceptability of water recycling and communicating changes in water sources. This work was reported in our Gate 2 submission (Annex D[30]) and we have not sought to repeat this work but build on it through Gate 3 where we commissioned independent research to understand

[29] https://thames-wrmp.co.uk/projects/teddington/
[30] Microsoft Word - Annex D - Stakeholder and customer engagement at Gate 2

awareness of, and attitudes to, the Project in the local community and across Thames Water customers in Greater London area as it is these areas that are set to benefit from the Project.

9.32. It is recognised that public consultations, whilst open to all, are generally responded to by those who have a concern or a particular viewpoint and as such the feedback to a public consultation is not necessarily representative of the general population or community hence the importance of this research, as it reflects the views and preferences of a representative sample of Thames Water's customers. The findings of the research will be considered by the Project team alongside feedback from wider engagement and public consultation.

9.33. The main objectives of the research were:

- To understand the views on the need to plan for long-term water supply and to test communication messages regarding drought and resilience.
- To understand current awareness of, and attitudes towards, the Teddington DRA Project and the main sources of information in relation to the Project
- To understand the level of support and opposition, the main areas of concern, and aspects of the Project that customers would like further information on
- To understand the preferred areas of community investment which could be integrated into the Project.

9.34. The data was collected through a mixed method approach involving the use of a commercial panel, a postal push to web approach and face-to-face interviews. In total, 1,258 interviews were conducted, with 623 interviews in the localised area and 635 in the wider London area. The survey participants were selected to ensure they were representative of Thames Water's customer base, with additional participants representing digitally excluded and future customers.

9.35. The research has shown that the majority of customers agree that, in the face of climate change and population growth, we need to act now to protect our water supply. And that with an understanding of the Project, two-thirds of participants (67%) support the development of the Project. The research also showed that some people, particularly in the local area, have concerns about the Project and oppose its development. The main concerns raised in relation to the project were:

- impact on wildlife
- impact on the quality of water in the river
- disruption during construction

9.36. Thames Water is committed to work openly and transparently with all interested stakeholders, listening and responding to concerns, and sharing information at timely and formative points in the development of the project.

10. Board Statement and Assurance

10.1. Thames Water board statement for this Gate 3 submission is provided in the associated covering letter.

10.2. The assurance framework used for this submission is based on a risk-based assurance approach and is based on the three lines of assurance model shown in figure 10-1. It is also consistent with the assurance requirements laid out in Ofwat's Company Monitoring Framework[31] and meets the assessment criteria defined by RAPID.

[31] The latest iteration of Ofwat's Company Monitoring Framework can be found on their website through the following link: http://www.ofwat.gov.uk/publication/company-monitoring-framework-final-position/

10.3. This approach provides an effective programme of assurance which considers areas that are known to be of prime importance to customers and regulators; or may have a significant financial value, alongside the likelihood or reporting issues. Areas of higher risk receive three lines of assurance while other areas, where the risk is lower, may be targeted with first and second lines only.

10.4. A detailed risk assessment was completed against each report to identify the lines of assurance required. Line 1 assurance was undertaken by our consultants undertaking work, Thames Water technically assured reports as a 2nd line review and AECOM were appointed as the external assurers (Line 3) and their findings are set out in paragraph 10.6.

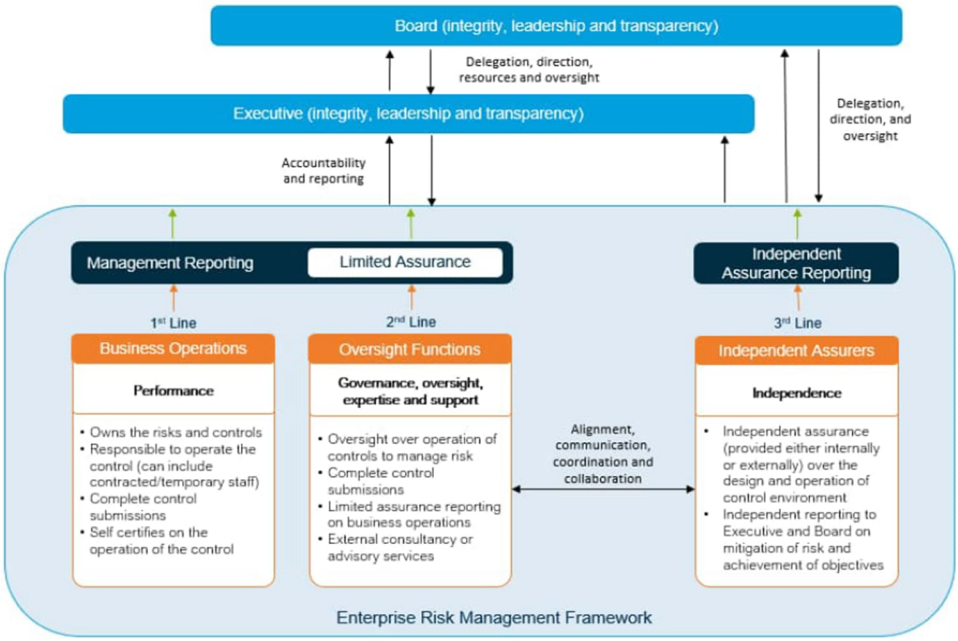

Figure 10-1: Assurance approach to Gate 3 submission

10.5. Thames Water confirms that this submission has been prepared in accordance with the RAPID Gate 3 guidance and that:

- It supports the recommendations for solution progression made in the submission at Gate 3 and the recommendations for which option within the solution should be progressed.
- It is satisfied that a realistic and achievable programme for the solution is in place, there are no insurmountable obstacles to the delivery of the solution in accordance with that programme and that progress on the solution at gate three in accordance with that programme is commensurate with the solution being "construction ready" for 2025-2030.
- It is satisfied that all significant risks to the delivery of the solution in accordance with the programme and within current cost projections have been identified and that those risks are managed well.
- It is satisfied that the work carried out at gate three is of sufficient scope, detail and quality to ensure that applications can be made for development consent orders, planning applications and other necessary statutory consents and permits in accordance with the programme and the work carried out at gate three is commensurate with the solution being “construction-ready” in 2025-2030.
- it is satisfied that expenditure has been incurred only on activities that are appropriate for gate three and is efficient and cost effective.

10.6. AECOM has challenged and independently assured our Gate 3 submission, and that the submission represents a checkpoint on the way to a solution being prepared for planning and consenting. At the completion of the assurance work AECOM confirm that:

- The Gate 3 work appropriately summarises the breadth and comprehensiveness of activities undertaken in preparation for submission of pre-application planning and DCO applications for a single solution.
- The Gate 3 work for Teddington DRA has been of sufficient scope, details and quality which is expected for a large infrastructure project and follows the key requirements set out in RAPID's Gate 3 guidance and template.
- Gate 3 expenditure (Annex H) meets the objectives of RAPID's submission template in that the costs incurred are broken-down per activity and are appropriately evidenced as being approved, proportionate and efficient.
- Project costs have been generated using consistent methodologies and appropriate costing mechanisms, benchmarked where defined appropriate.
- There is evidence that carbon values have been updated and ongoing work is investigating ways of reducing carbon impacts.
- The scheme delivery programme presented in the submission aligns with being construction ready in AMP8 and there is a clear programme and plan through the consenting process.
- Evidence of regular engagement with key regulators and stakeholders ensures the Gate 3 submission provides trust and confidence in the progress of the preferred solution.

11. Gate 3 Expenditure

Gate 3 summary

11.1. The PR19 Final Determination maximum cost allowance for LWR SRO was £62.9m, with a 35% allocation to Gate 3 equating to £22m. RAPID confirmed in the Final Decision at Gate 1[32] and Gate 2[33] that savings made against those previous allowances could be carried over to subsequent gates.

- Our Gate 1 expenditure was £2.5m against a Gate 1 allowance of £6.2m.
- Our Gate 2 expenditure was £5.5m against a Gate 2 allowance of 9.4m

11.2. Our Gate 3 budget for LWR therefore totals £29.6m. Expenditure for LWR at **Gate 3 totals £22.6m** and is shown per scheme in Tables 11-1, 11-2, 11-3. Our expenditure is supported by further information in Appendix H which provides the RAPID cost breakdown table and explanation for all activities exceeding £0.5m in value. A total of £7m is proposed to be carried over to Gate 4 making an available allowance of c.£32.1m (17/18 price base) for future scheme progression through planning and procurement.

11.3. All work planned for Gate 3 has been completed and results used to develop the conceptual design for Teddington DRA to the level of maturity to progress with planning activities. We have completed a non-statutory consultation and obtained an EIA Scoping Opinion for the Project. We have undertaken environmental modelling and completed new assessments focussing on providing greater certainty to the potential effects from the Project and addressing the Priority Actions set at Gate 2. Our work has built on work undertaken for WRMP19, Gate 1 and Gate 2 and has not included any WRMP24 business as usual activities.

11.4. In discussion with RAPID we delayed our original Gate 3 submission date to ensure Teddington DRA took account of revisions to the draft WRMP and to enable us to investigate and subsequently re-design key aspects of the Project causing most concern to stakeholders and the public. We also sought approval from RAPID for scope changes through Gate 3 to include:

- Investigation into fish screening studies and screening technology to directly address a Priority Action set at Gate 2
- Develop a pilot plant at Mogden to demonstrate proof of concept and directly address a Priority Action set a t Gate 2.

11.5. The extension of Gate 3 by an additional 12 months and the changes listed above have resulted in cost increases to the original forecasts set out in Gate 2 on a pro-rata basis.

11.6. Through Gate 3 we have progressively recruited a Project Management Office (PMO) team to support the delivery of all Thames Water SROs through consent and procurement award. The PMO has been established to provide a consistent approach across programme controls including governance, risk, cost management, change, assurance and performance reporting and to provide support to the other core functions including Regulation, Commercial Strategy, Scheme Development, Consents & Stakeholder Engagement and Legal. The development of this team within Thames Water was agreed with RAPID prior to the start of Gate 3 in 2022.

11.7. In delivering the Gate 3 submission, Thames Water has adhered to the criteria provided by RAPID for expenditure, namely activities are pre-agreed and delivered ensuring activities are relevant, timely, proportionate and of high quality.

[32] Strategic regional water resource solutions: Standard gate one final decision for London Effluent Reuse (thameswater.co.uk)
[33] lwr-gate-2-final-decisions.pdf (thameswater.co.uk)

Table 11-1: Gate 3 expenditure for Teddington DRA shown by WBS in 2017/18 prices

RAPID WBS	Total WBS cost estimate (17/18 cost base)
Programme and Project Management	£3,043,364
Feasibility assessment and concept design	£3,762,965
Options benefit development and appraisal	£0
Environmental assessment	£3,635,453
Data collection, sampling and pilot trials	£5,130,415
Procurement	£2,084,365
Planning	£1,504,413
Stakeholder engagement	£1,849,285
Legal	£489,291
Total	**£21,499,551**

Table 11-2: Gate 3 expenditure for Beckton shown by WBS in 2017/18 prices

RAPID WBS	Total WBS cost estimate (17/18 cost base)
Programme and Project Management	£118,221
Feasibility assessment and concept design	£256,961
Options benefit development and appraisal	£0
Environmental assessment	£457,741
Data collection, sampling and pilot trials	£38,912
Procurement	£57,255
Planning	£4,409
Stakeholder engagement	£57,131
Legal	£15,127
Total	**£1,005,756**

Table 11-3: Gate 3 expenditure for Mogden DRA shown by WBS in 2017/18 prices

RAPID WBS	Total WBS cost estimate (17/18 cost base)
Programme and Project Management	£0
Feasibility assessment and concept design	£33,733
Options benefit development and appraisal	£0

RAPID WBS	Total WBS cost estimate (17/18 cost base)
Environmental assessment	£61,166
Data collection, sampling and pilot trials	£0
Procurement	£0
Planning	£0
Stakeholder engagement	£0
Legal	£0
Total	**£94,898**

Early gate four spend

11.8. Thames Water has set up new frameworks for the appointment of a Technical Partner (TP) to progress Teddington DRA through planning, consent and delivery phases. Limited early Gate 4 spend has been incurred as a result of onboarding a TP through Q4 2024 ready to commence work for Gate 4. This value totals approximately £528k in 17/18 prices and has not been included in the above tables.

Solution progression

11.9. Subject to agreement with RAPID, it is proposed that the full SRO Final Determination funding, less the Gate 1, 2 and 3 expenditure is made available for Teddington DRA to progress to Gate 4. This equates to a total allowance of c.£32.16m (17/18 price base) calculated as 40% of the PR19 allowance of £62.9m for Gate 4; £25.16m, plus £7m from previous gate underspend. This would allow Teddington DRA to progress through pre-application stage of planning and submission of a development consent application. It would also allow the progression of Project procurement. Table 11-4 summarises the estimated cost for Gate 4 for Teddington DRA forecast by WBS, which totals **£31.4m** and is based on a submission in September 2026 (see section 6). Appendix H provides key assumptions and exclusions for this forecast.

11.10. We plan for Beckton and Mogden Water Recycling schemes (the alternative schemes) to progress as planned to the end of AMP7 (March 2025) with activities agreed through RAPID checkpoints. The forecast expenditure from December 2024 to end of AMP7 for Beckton and Mogden is estimated at **£1.5m** (17/18 prices base). At the end of AMP7 we recommend a checkpoint for the alternative schemes where work since Gate 2 is summarised and a recommendation is made on which alternative scheme is the preferred and should be progressed into AMP8 as the single alternative to Teddington DRA.

11.11. Once in AMP 8 we recommend annual checkpoints (April each year) for the preferred alternative scheme to set out and agree development activities. Key activities proposed for FY25/26 (AMP 8 Year 1) would be further scheme design refinement, options appraisals, scheme engagement and environmental investigations. The forecast expenditure from April 2025 to March 2026 is estimated as **£14.5m** (17/18 price base) based on the progression of ground investigation works, the implementation of a pilot plant, continuation of environmental, engineering, procurement, stakeholder and planning activities and the project and programme management of works.

Table 11-4: Forecast spend for Teddington DRA through Gate 4 in 17/18 prices

RAPID WBS	Total WBS cost estimate (17/18 cost base)
Programme and Project Management	£5,500,000
Feasibility assessment and concept design	£4,000,000
Options benefit development and appraisal	£50,000
Environmental assessment	£6,000,000
Data collection, sampling and pilot trials	£7,000,000
Procurement	£3,000,000
Planning	£2,000,000
Stakeholder engagement	£2,500,000
Legal	£850,000
Other (early Gate 4 spend September 24 to November 24)	£528,000
Total	**£31,428,000**

Table 11-5: Summary of future expenditure post Gate 3 submission

Post Gate 3 scheme progression	Total cost estimate (17/18 cost base)
Beckton and Mogden AMP7 development (Dec24 – March 25)	£1.5m
Teddington DRA – Gate 4 (Dec24 – Sept 26)	£31.4m
Preferred alternative water recycling scheme (either Beckton or Mogden) AMP 8 Year 1 (April 2025 – March 2026	£14.5m

12. Conclusions and Recommendations

12.1. London water recycling schemes can provide a provide a reliable, sustainable and new supply of water to the London WRZ during critical times of drought and will support Thames Water in being 1-in-200-year drought resilient in the early 2030s.

12.2. All schemes can be construction ready between 2025 and 2030 if required. Teddington DRA is our preferred scheme set out in the published WRMP24 and is being progressed through planning to provide a WAFU in Q1 2033. We have progressed proportionate development activities for Beckton and Mogden water recycling schemes reflecting that they are alternatives in our published WRMP.

12.3. Our engineering design at Gate 3 has been refined to take account of public engagement feedback and we have made a number of key design changes since Gate 2 including the following:

- Change in construction technique for the conveyance from pipejacking to tunnel boring. This has resulted in less above ground infrastructure in sensitive locations between Mogden STW and the River Thames and a more direct conveyance route.
- Change in treatment process from nitrifying sand filters to moving bed biofilm reactor which provides future proofing to the Project. A pilot plant is currently testing the process.

- Confirmation that the recycled water produced from the hot standby mode will be discharge through the existing final effluent channel to Isleworth Ait rather than to the River Thames upstream of Teddington Weir.

12.4. We continue to refine the design and have been working closely with the Environment Agency to investigate to potential for additional design mitigation and enhancement opportunities in the River Thames close to the discharge and abstraction points.

12.5. All capital costs have been benchmarked and care has been taken to ensure spend through Gate 3 has been proportionate and efficient.

12.6. A key focus through the early pre-application stage of planning and Gate 3 has been open and transparent engagement supported by consultation which has been expanded since Gate 2. We held a public consultation on site options in autumn 2023 and followed this up with public information events on the design changes in autumn 2024. We have continued working closely with statutory authorities and regulators on developing our baseline understanding and preliminary impact assessments.

12.7. We have now implemented our planning and lands strategy and through Gate 3 have received a S.35 Direction from the SoS and an EIA Scoping Opinion from the Planning Inspectorate. Our environmental investigations are continuing as planned and we have addressed the Priority Actions set at Gate 2.

12.8. We are now implementing our procurement strategy having completed market engagement early in 2024. Our approach is to procure a design and build contractor in 2026 before DCO consent.

12.9. Thames Water are ready and committed to proceed to Gate 4 and continue with the planning and procurement processes for Teddington DRA to achieve the key milestones required for a WAFU date from Q1 2033.

13. Supporting documentation

Annexes to the Gate 3 submission

Table 13-1: List of support appendices and cross references for Gate 3

Document	Document title	Link (where relevant)
Annex A1	Teddington DRA Gate 3 Conceptual Design Report	Part of submission
Annex A2	Teddington DRA Gate 3 Cost and Carbon Report	Part of submission
Annex B	Drinking Water Safety Plan – Strategic Water Quality Risk Assessment (SWQRA) for London Water Recycling Gate 3	Part of submission
Annex C1	EIA Scoping Report	Scoping Report
Annex C2	WFD screening Report	WFD screening report
Annex C3	HRA Screening Report	HRA screening report
Annex C4	EIA Scoping Opinion from PINS	PINS Scoping Opinion.pdf
Annex D	Priority Actions Technical Notes	Part of submission
Annex E	Consultation Brochure 2023 and 2024	Brochure 2023 Brochure 2024
Annex F	Statement of Response to non-statutory consultation	Statement of Response
Annex G	Planning, Lands and Delivery Programme	Part of submission
Annex H	Efficiency of Gate 3 spend and forecast for Gate 4	Part of submission
Annex I	Gate 3 guidance criteria and signposting	Part of submission
	Covering Letter & Board Statement	Part of submission

Signpost of Gate 2 Priority actions, actions and recommendations

Table 13-2: Gate 2 priority actions, actions and recommendation signposting

Priority Actions		
No	**Detail**	**Signposting**
1	Provide information as to why Mogden (MOG) should be taken forward beyond gate two when not featured in any plans.	Annex D provides a summary of the activities undertaken through Gate 3 to address PA1. Further activities are planned through to AMP7 (March 2025) at which time a decision will be made on which water recycling scheme will be the preferred alternative.
2	Teddington DRA: Work with the Environment Agency to assess indicative permit limits and design tertiary treatment works to meet permit requirements. Work with the Environment Agency to discuss permit conditions and other temperature mitigation measures required to protect the environment. Undertake bench and pilot testing of treatment works	A summary of the activities undertaken to address PA2 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA2 is set out in Annex D
3	Teddington DRA: Work with the Environment Agency to scope and progress further work to understand the impacts on Olfactory chemicals from scheme operation and any subsequent impact on migratory fish	A summary of the activities undertaken to address PA3 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA3 is set out in Annex D
4	Teddington DRA: Improve modelling capability to extend water quality modelling over Teddington weir and into the upper tideway to fully understand any changes to water quality flowing over/down fish passes and into Teddington weir pool and the upper tideway.	A summary of the activities undertaken to address PA4 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA4 is set out in Annex D
5	Teddington DRA: Work with Environment Agency fisheries teams to design the intakes and outfalls, specifically to work with us to manage and mitigate any impacts on velocity, fish and the environment of scheme operation and the depleted reach.	A summary of the activities undertaken to address PA5 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA5 is set out in Annex D
6	Teddington DRA: Extend assessment of fisheries impacts to include other migratory fish in the freshwater Thames	A summary of the activities undertaken to address PA6 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA6 is set out in Annex D
7	Teddington DRA: Work with the Environment Agency to undertake a review of potential environmental impacts and mitigation measures available and then ensure appropriate mitigation measures can be implemented. This is for aquatic environment impacts as a minimum.	A summary of the activities undertaken to address PA7 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA7 is set out in Annex D

Priority Actions		
No	**Detail**	**Signposting**
8	Teddington DRA: Provide further information on how operation of the scheme will interface with the Lower Thames Operating Agreement and Teddington Target Flow TTF to ensure that the environment is not impacted upstream in the River Thames.	A summary of the activities undertaken to address PA8 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA8 is set out in Annex D
9	Teddington DRA: Work with the Environment Agency to scope any further modelling requirements to understand how operation of the scheme may impact on the environment under different environmental conditions – for example consecutive years use or if needed at other times of the year.	A summary of the activities undertaken to address PA9 can be found in table 4-1 of the Gate 3 report. Further details on work undertaken for PA9 is set out in Annex D
10	Beckton: Work with the Environment Agency to scope environmental assessments required to meet a gate three checkpoint for Beckton and Mogden Water Recycling, ensuring that any further work for Beckton includes water quality analysis and modelling of the freshwater River Lee and Water Framework Directive (WFD) assessment of Lee valley reservoirs	Annex D provides a summary of the activities undertaken through Gate 3 to address PA10. We intend for final outputs for PA10 to be presented at the end of AMP7 as part of a LWR checkpoint and a decision on which alternative water recycling scheme will progress into AMP8
11	Beckton: Provide information on mitigation measures to be applied at Beckton, including water treatment AWRP, intake/outfall designs, operating regime options and any other mitigation measures required to protect the environment.	Annex D provides a summary of the activities undertaken through Gate 3 to address PA11. We intend for final outputs for PA11 to be presented at the end of AMP7 as part of a LWR checkpoint and a decision on which alternative water recycling scheme will progress into AMP8
12	Work with the Environment Agency to scope environmental assessments for Beckton and Mogden Water Recycling, ensuring that any further work for Beckton includes water quality analysis and modelling of the freshwater River Lee and WFD assessment of Lee valley reservoirs	Annex D provides a summary of the activities undertaken through Gate 3 to address PA12. We intend for final outputs for PA12 to be presented at the end of AMP7 as part of a LWR checkpoint and a decision on which alternative water recycling scheme will progress into AMP8

Actions		
No	**Detail**	**Signposting**
1	Provide further information on how operation of the scheme will interface with Lower Thames Operating Agreement and treatment to flow to ensure that the environment is not impacted upstream in the River Thames	Within section 2 of the Gate 3 report, paragraph 2.34-2.37 we set out the different scenarios for utilisation. In Section 6, paragraph 6.26-6.28 we describe the interaction with the LTOA under Project '*licencing and other consents*'. Annex D – PA8 also addresses the LTOA operational protocols in relation to the Project covering operating frequency, duration and seasonality for both 1in5 year and 1in20 year flow conditions.

Actions		
No	**Detail**	**Signposting**
2	Provide further information on how operation of the scheme will interface with Lower Thames Operating Agreement and treatment to flow to ensure that the environment is not impacted upstream in the River Thames	Within section 2 of the Gate 3 report, paragraph 2.34-2.37 we set out the different scenarios for utilisation. In Section 6, paragraph 6.26-6.28 we describe the interaction with the LTOA under Project '*licencing and other consents*'. Annex D – PA8 also addresses the LTOA operational protocols in relation to the Project covering operating frequency, duration and seasonality for both 1in5 year and 1in20 year flow conditions.
3	Revise carbon assessment to address gaps identified by consultancy review: • Clear consideration of how whole life carbon (WLC) has been reduced within the design • Use relevant policies, frameworks and approaches to drive down carbon emissions within the design • Embrace innovative designs and renewable energy opportunities or opportunities to sequester carbon • Focus on carbon driven down solution costs • Improve demonstration of scope of 1,2 and 3 emissions • Further explanation of materials selection and whether lowest carbon options have been considered • Further work on how scheme development can help shape availability of low carbon materials in the supply chain • Improved monitoring and reporting of project emissions during and post project completion	Within Section 3 of the Gate 3 report, paragraph 5.1-5.4, the revised carbon assessment methodology and resulting estimated whole life carbon (WLC) emissions has been outlined. In Section 3, paragraph 5.5-5.7 qualitatively discusses the whole life carbon (WLC) reduction measures. Paragraph 5.8-5.9 highlights the relevant policies and frameworks that shall be used to reduce emissions within the design. Paragraph 5.6 demonstrates the use of innovative designs to reduce energy consumption and include renewable energy. In Section 3, paragraph 5.11-5.13 outlines the mitigation measures and potential opportunities for WLC reduction within further development of the scheme(s). Annex A2 – Cost and Carbon Report also provides further detailed information on the WLC assessment, identified mitigation measures and opportunities for carbon reduction.
4	Provide evidence of an increased level of stakeholder and customer engagement relating to these schemes as work progresses through gate three.	Section 9 of the Gate 3 report sets out our consultation, engagement and customer research activities through Gate 3. This is evidenced by: 1) Annex E which contains links to our consultation brochure for the non-statutory consultation on site option undertaken in autumn 2023 and a brochure for our design information events held through autumn 2024. 2) Annex F which contains a link to our statement of response to the non-statutory consultation in 2023. We have setup a dedicated Project website where a range of documents, factsheets, newsletters and videos have been created to support ongoing and continuous engagement activities. Access to the website is at the following link - Teddington Direct River Abstraction (TDRA) - Thames Water Resources Management Plan

Recommendations		
No	**Detail**	**Signposting**
1	Provide total planning period indicative option cost (net present value) figures for each gate to show how solution costs have evolved for the preferred option.	Table 8-1 and 8-2 provides Teddington DRA latest capex costs and compares to previously calculated costs therefore shows how costs have evolved over time. Table 8-2 presents NPV. In the Gate 3 report paragraph 11.1 summarises the Gate 1 and 2 spend for the SRO. Paragraph 11.2 summarises the total spend through Gate 3. Paragraph 11.9 summarises the total spend for Teddington DRA through Gate 4. The total of these represents to total planning period indicative cost which is forecast to be below the PR19 allowance.