Annex E: Procurement Strategy Report

Standard Gate two submission for London Water Recycling SRO

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 suite of documents that make up the 'Gate 2 submission.' That submission details all the work undertaken by Thames Water in the ongoing development of the proposed SRO. The intention at this stage is to provide RAPID with an update on the concept design, feasibility, cost estimates and programme for the schemes, allowing decisions to be made on their progress.

Should a scheme be selected and confirmed in the Thames Water final Water Resources Management Plan (WRMP), in most cases it would need to enter a separate process to gain permission to build and run the final solution. That could be through either the Town and Country Planning Act 1990 or the Planning Act 2008 development consent order process. Both options require the designs to be fully appraised and, in most cases, an environmental statement to be produced. Where required that statement sets out the likely environmental impacts and what mitigation is required.

Community and stakeholder engagement is crucial to the development of the SROs. Some high-level activity has been undertaken to date. Much more detailed community engagement and formal consultation is required on all the schemes at the appropriate point. Before applying for permission Thames Water will need to demonstrate that they have presented information about the proposals to the community, gathered feedback and considered the views of stakeholders. We will have regard to that feedback and, where possible, make changes to the designs as a result.

The SROs are at a very early stage of development, despite some options having been considered for several years. The details set out in the Gate 2 documents are still at a formative stage.

Disclaimer

This document has been written in line with the requirements of the RAPID Gate 2 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.

ANNEX E - GATE 2 PROCUREMENT STRATEGY REPORT FOR LONDON WATER RECYCLING SCHEMES

13 October 2022

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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, TWUL 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.

Contents

Glossary

Acronym / term	Definition
AMP7	Asset Management Plan 7 - the water sector regulatory period from 2020-2025
AWRP	Advanced Water Recycling Plant
BEIS	Department for Business, Energy and Industrial Strategy
CAP	Competitively Appointed Provider (under a DPC arrangement).
Capex	Capital Expenditure – expenditure on fixed assets
CPI-H	Consumer Prices Index including owner occupiers' housing costs (the inflation index used to determine regulated revenues in the UK water sector)
DPC	Direct Procurement for Customers
HARP	Haweswater Aqueduct Resilience Project
IP	Infrastructure Provider (under a SIPR arrangement)
IPA	Infrastructure and Projects Authority
MEICA	Mechanical, Electrical, Instrumentation, Control, and Automation
Ml/d	Megalitres per day
OEM	Original equipment manufacturer
OFTO	Offshore transmission owner
Opex	Operating Expenditure – expenditure on operating costs
PR19	Price Review 2019 - the regulatory price review for the AMP7 regulatory cycle in the water sector
RAB	Regulatory Asset Base
RAPID	Regulators' Alliance for the Progression of Infrastructure Development
RCV	Regulatory Capital Value
RO	Reverse osmosis
SIPR	Specified Infrastructure Projects Regime
SRO	Strategic Resource Options
STW	Sewage Treatment Works
TLT	Thames Lee Tunnel
Totex	Total Expenditure (the sum of Operating and Capital expenditure)
TTP	Tertiary treatment plant
TTT	Thames Tideway Tunnel
TWUL	Thames Water Utilities Limited
UK	United Kingdom
VfM	Value for money
WACC	Weighted Average Cost of Capital
WRMP	Water Resources Management Plan
WRSE	Water Resources South East (an alliance of the six water companies that cover the South East region of England, that develops the Regional Plan)
WTW	Water Treatment Works

1 Executive Summary

This document outlines the Gate 2 Procurement and Commercial Strategy for each of the four potential London water recycling schemes, to support the Gate 2 Report for submission to the Regulators' Alliance for Progressing Infrastructure Development (RAPID).

There are currently four potential schemes of various size configurations within the SRO:

1. Teddington Direct River Abstraction ('DRA', hereafter referred to as 'Teddington' scheme);
2. Beckton water recycling scheme (hereafter referred to as the 'Beckton' scheme);
3. Mogden water recycling scheme; and
4. Mogden South Sewer.

The Gate 1 assessment identified no 'showstoppers' and recommended that all four schemes should advance to Gate 2 for further assessment and refinement to inform the Water Resource South East (WRSE) Regional Plan, which indicates which of these schemes will be progressed in TWUL's Water Resource Management Plan (WRMP), and on what timescales. We understand that the most recent Regional Plan indicates that:

- Teddington is the preferred SRO option, selected to be in-service by 2031;
- Beckton is not selected in the regional plan, but is included in TWUL's draft WRMP 2024 as a potential alternative to Teddington or certain other schemes;
- Mogden is not selected in the regional plan, but is included in TWUL's draft WRMP24 as a potential alternative to Beckton or Teddington; and
- Mogden South Sewer: TWUL is recommending that this scheme be removed from the RAPID SRO process at Gate 2, but may be delivered by TWUL due to the wastewater management benefits that it offers.

Each of the four schemes has capex between £237m[1] and £913m and a construction period of three to four years. Jacobs/PA Consulting have been commissioned by TWUL to support delivery of the Gate 2 submission to RAPID, focusing on procurement and commercial strategy and building on our role at Gate 1. Each scheme could be delivered under a range of potential procurement models for delivery and operation. These include:

1) In-house delivery;
2) Competitively tendered models:
    a) Direct Procurement for Customers (DPC) model[2]; and
    b) Specified Infrastructure Projects Regulations (SIPR) model.

This report builds upon the Gate 1 conclusions, by undertaking a more detailed assessment of each scheme in relation to Ofwat's DPC size, discreteness and value-for-money (VfM) criteria set out in PR19. We have also assessed whether each scheme meets the criteria for SIPR procurement, and developed a procurement plan and commercial strategy that aligns with the wider WRSE programme, as required under RAPID's Gate 2 guidance.

This report also considers the risks that different procurement models could pose to the implementation timescales set out in the draft WRSE Regional Plan. The conclusions of our assessment are set out below. In light of the WRSE Regional Plan, our focus is on Teddington.

DPC

- All potential schemes would meet the £100m totex size threshold for DPC delivery set out in Ofwat's PR19 methodology, as well as the £200m size threshold set out in the draft PR24 methodology[3].

Teddington

- The **Teddington scheme** does not pass the discreteness test. The construction of the scheme includes features that require complex interfaces with existing operational TWUL assets at a highly constrained site, including:
    - **constructing the scheme's tertiary treatment plant (TTP) above existing operational storm tanks at the Mogden Sewage Treatment Works (STW).** This requires significant modifications to the existing structure to provide space for the new TTP, during the construction of which the existing tanks will need to be taken offline but may still be required to be available at short notice. In addition, the highly constrained site means that construction activity will have significant interdependencies with ongoing STW operations and maintenance. TWUL owns and controls the existing STW and its operations, and holds knowledge of its condition and the risk to operations associated with carrying out the works, and so is considered best placed to manage these risks on a day to day basis; and

[1] All costs in this document presented in 20/21 prices, unless otherwise stated.
[2] For the avoidance of doubt, this report is based on the DPC model characteristics as set out by Ofwat at PR19, which we refer to as the 'Standard Form' DPC model.
[3] Creating tomorrow, together: consulting on our methodology for PR24. Appendix 5 - Direct procurement for customers, July 2022

- **connecting the outflow shaft onto the existing Thames-Lee Tunnel (TLT)**. The original construction technique for the TLT makes use of surrounding ground pressure to achieve structural integrity. The condition of the tunnel is not clearly understood and sinking the new shaft for this scheme will disturb the surrounding ground. Mitigation would need to be in place during construction to prevent any weakening of the tunnel or structural issues at a later date. The large volumes transferred by the TLT make it key to the west-east water transfer supplies for London and as such it is a critical asset to TWUL's operations.

- These features introduce considerable interface risks that it is likely to be poor value to contractualise into a DPC contract. Based on these considerations, we consider that a 'Late' DPC procurement should not be considered further beyond Gate 2 for the construction of Teddington as a whole.
- We have also considered whether individual components of the Teddington scheme (other than the TTP) could be competitively tendered using DPC. However, the only scheme component that can be considered 'discrete' – the treated effluent pipeline from the TTP to the Thames (£84m totex) – would not meet the PR19 £100m DPC totex threshold. Even when packaged with the new abstraction and pipeline connection to the TLT, the combined totex (£123m) would fall significantly short of the proposed £200m totex threshold in draft PR24 guidance. As noted above, we have significant concerns regarding the discreteness of the connection to the TLT; these risks, and the small size, mean the combined package is considered unlikely to be attractive to the market in light of other much larger, simpler DPC schemes being progressed in parallel.
- Notwithstanding the above, even if a DPC procurement were to be pursued, our analysis has also highlighted risks to achieving the WRSE's 2031 date for delivering Teddington. It may be possible to mitigate this risk (e.g. through undertaking procurement activities in parallel); however doing so may have other implications (e.g. on value for money). In light of our conclusions on size and discreteness, we have not investigated this risk (or its mitigation) further.

Other reuse schemes

- While other schemes in the SRO are not currently selected in the WRSE Regional Plan, they are viable alternatives if the preferred schemes (in particular, Teddington DRA and the Grand Union Canal scheme) cannot be progressed for any reason.
- These schemes are potentially able to be made discrete, and our initial modelling has indicated that DPC offers potential to deliver value for money to customers. We therefore recommend that DPC procurement should be adopted as the central procurement assumption should these schemes be progressed, subject to confirming value for money at future Control Points.
- Should an alternative scenario be adopted in which the Beckton scheme is required 'early', we recommend that further investigation of potential opportunities to drive value under DPC should progress at pace, to inform the value for money analysis. This includes in-depth risk and opportunity analysis, market engagement to test the likely structure of DPC models and the pricing of critical risks.

SIPR

- We conclude that none of the four schemes are of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers, and so are not considered eligible for SIPR under current regulations.
- However, Ofwat has made a recommendation[4] to the Secretary of State for Business, Energy and Industrial Strategy (BEIS) that the 'size or complexity' test be removed from SIPR legislation, so that SIPR can be applied to a broader range of schemes where a licensed approach would offer value for money.
- Our initial modelling suggests that the Beckton scheme may be of sufficient scale to offer value to customers under a SIPR model, and if Beckton is progressed, we therefore recommend that this should be considered further in the event that SIPR legislative changes are adopted.

Promoter options

- We have concluded that for all four schemes, TWUL would be best placed to continue as the scheme promoter, leading the further work on scheme development and procurement. This is because TWUL is the sole provider, the sole beneficiary of Teddington (and the primary beneficiary of Beckton) and has all assets for each proposed scheme located within its region. Should the Beckton scheme be taken forward as a priority, and be needed to meet other water companies' water resource requirements (e.g. Affinity Water), then TWUL would need to consider how best to involve these other beneficiaries as funders and co-sponsors.

[4] Competition stocktake report final (ofwat.gov.uk)

Operating and commercial arrangements

- As above, TWUL is the sole provider and sole or prime beneficiary for all four schemes. Therefore, for all four schemes TWUL should maintain ultimate control of scheme operations.
- For Teddington, TWUL would be the operator of the scheme under the proposed in-house delivery approach. Should Beckton be delivered under DPC or SIPR, TWUL would be the contractual counterparty to the DPC CAP or SIPR IP. Should supply from Beckton be required for any other water companies in the future, this could be contracted under a bi-lateral bulk supply agreement (BSA) to be agreed at the time the need arises. We anticipate the BSA will be operated under a principle of 'commercial neutrality'[5], and will comprise both 'capacity'[6] and 'volumetric'[7] charging elements.

Forward plan

- We have set out our plan for developing these proposals for the Teddington scheme further through Gate 3. We recommend that Teddington should exit the DPC process at Gate 2, but continue to engage with regulators as appropriate, as the procurement is progressed.
- We also recommend that market engagement with the construction supply chain takes place before Gate 3, to further understand key commercial risks. This should be used to inform more detailed development of the in-house procurement model and strategy, in time for contract award at the end of 2025.

[5] Whereby neither TWUL nor the other party to the BSA will be favoured when delivering water supply.
[6] To contribute towards the fixed costs of the Beckton scheme, including upfront capital and ongoing, non-volume-dependent maintenance.
[7] To contribute towards variable, volume-dependent operating costs of the Beckton scheme.

2 Introduction

Under the PR19 methodology[8], Ofwat/RAPID requires water companies to consider whether large, discrete water and wastewater projects could achieve better value for money for customers by appointing a third party to deliver these projects through a competitive tendering process. The available procurement models for appointment of a third party to design, build, finance and operate (or a subset of those activities) each of these projects are the:

1. Direct Procurement for Customers (DPC) model[9]; and
2. Specified Infrastructure Projects Regulations (SIPR) model, which would create a new, separately licensed Infrastructure Provider (IP).

To assist Companies in deciding the appropriate procurement route to adopt, Ofwat/RAPID has issued guidance to follow when evaluating whether individual projects should be competitively tendered or not. This guidance sets out a multi-step process, whereby projects proceed through a series of "gates" to determine whether to competitively appoint a third party and confirm the appropriate route for procuring that third party.

TWUL is considering four potential water recycling schemes for London:

i. Teddington Direct River Abstraction (hereafter referred to as 'Teddington' scheme) – shown as (4) in Figure 1;
ii. Beckton including Lee Tunnel extension – shown as (1) in Figure 1;
iii. Mogden– shown as (2) in Figure 1; and
iv. Mogden South Sewer – shown as (3) in Figure 1.

The characteristics of these schemes are critical to the decision whether to adopt DPC or SIPR, or to proceed with in-house delivery. To provide an overview of the scheme characteristics, Figure 1 sets out a high-level schematic of the four potential water recycling schemes.

Figure 1: London Reuse Scheme Overview

Table 1 presents key details on the estimated construction timeline and costs associated with each scheme.

[8] Ofwat's draft PR24 methodology proposes to mandate DPC for all schemes over £200m totex that pass the discreteness test.
[9] Including the possible application of various Ofwat pre-defined DPC variants (Early, Late, Very Late and Split) to each scheme, or parts of each scheme. For the avoidance of doubt, this report is based on the DPC model characteristics as set out by Ofwat at PR19, which we refer to as the 'Standard Form' DPC model. Where appropriate we set out potential modifications to the Standard Form DPC model that may deliver improved VfM.

Table 1: Indicative construction timeline and project cost estimates for each London Reuse scheme

Scheme	Capital expenditure	Fixed Opex (per annum)	Variable Opex (per annum)[10]	Start detailed design	Begin construction	End construction	Start of operations
Teddington	£237m	£0.6m	£1.4m	2026	2027	2030	2031
Beckton	£913m	£3.7m	£5.8m	No programme timeline for this scheme as it is not selected within the current WRSE Regional Plan.			
Mogden	£624m	£3.8m	£6.0m	No programme timeline for this scheme as it is not selected within the current WRSE Regional Plan.			
Mogden South Sewer	£446m	£2.7m	£4.0m	No programme timeline for this scheme as it is not selected within the current WRSE Regional Plan.			

The WRSE[11] is undertaking regional water resource modelling, to identify the preferred portfolio of water resource schemes (known as the 'Regional Plan') across the south-east, that most cost-effectively delivers the supply and resilience needs of all six water companies in the region, with a particular focus on SROs. The Regional Plan defines the schemes that each water company includes in their strategic Water Resource Management Plan (WRMP). The most recent drafts of the Regional Plan and TWUL WRMP indicate that:

- Teddington is the preferred SRO option, selected to be in-service by 2031;
- Beckton is not selected in the regional plan, but is included in TWUL's draft WRMP 2024 as a potential alternative to Teddington or certain other schemes);
- Mogden is not selected in the regional plan but is included in TWUL's draft WRMP 2024 as a potential alternative to Beckton or Teddington; and
- Mogden South Sewer: TWUL is recommending that this scheme be removed from the RAPID SRO process at Gate 2 but may be delivered by TWUL due to the wastewater management benefits that it offers.

Based on this, this report focuses primarily on Teddington and Beckton. The Mogden schemes are assessed but have not been developed to the same level of detail at this stage.

2.1 Background: Gate 1 procurement strategy findings

At Gate 1, each scheme was assessed using the criteria set out by Ofwat for the assessment of DPC suitability (size, 'discreteness' and value-for-money), and an adapted criteria for the other models considered. To provide some insight into the value-for-money of different models, a high-level commercial risk and pricing assessment was used, and for DPC models, an assessment was undertaken by TWUL in their PR19 document CSD011-Direct Procurement for Customers.

The assessments of each scheme against the criteria were then consolidated to provide an overall RAG-rating of the suitability of different models for the London Reuse schemes. The Gate 1 assessment, outlined in Table 2, showed that DPC and in-house DBOM models were considered suitable for the London Reuse schemes, while typical current in-house models offered some challenges relating to water company expertise with similar schemes. IP/SIPR models were considered to have significant viability challenges as the size and complexity of the schemes was unlikely to justify the creation of a specific licensed IP.

Table 2: Summary of the Gate 1 procurement model assessment for London Reuse schemes

Procurement Models	Gate 1 Summary Assessment of Procurement Models	Rating
In-house delivery models	There is limited water company expertise in the operation and maintenance of water recycling technology, therefore it is likely that the supply chain is better able to manage operational risks. This is likely to decrease the relative value-for-money of traditional procurement models.	
DPC models	Potential for a range of DPC options as it is expected that the supply chain may be better placed to manage the design, build, operations and maintenance of the plant. Previous TWUL value-for-money analysis indicates that DPC could offer value-for-money benefits over in-house delivery models. It is recognised that the incumbent	

[10] Based on 30 days of full flow and 335 days of sweetening flow per annum. Flow based on scheme capacity variants set out in Section 4. While full flow requirements are uncertain and will vary year-to-year, we have included an estimated element of full flow in scheme totex calculations to ensure we consider the 'worst-case' for DPC size assessments.

[11] The Water Resource South East or 'WRSE' refers to an alliance of the six water companies that cover the South East region of England

Procurement Models	Gate 1 Summary Assessment of Procurement Models	Rating
	water company would still need some involvement in the early planning phase. Note: This aspect of the model could become more complex if more water companies are supplied by the London reuse schemes.	Green
DBOM models	These models enable TWUL to procure the capabilities of the supply chain throughout the design-build-operate-maintain life-cycle, offering some of the advantages of DPC, but without requiring third-party finance.	Green
IP Models (SIPR)	This would require a licenced service provider which would need regulatory endorsement. At the time at which the Gate 1 report was developed, Ofwat had indicated that individual SRO schemes would not be licensed. Further, schemes were not anticipated to be large or complex enough to justify creation of a specific licensed provider.	Red

RAG rating definitions	
Red	Major challenges to the viability of the procurement model without obvious, straightforward solutions at this stage
Amber	Minor challenges to the viability of the procurement model without obvious, straightforward solutions at this stage
Green	No significant challenges to the viability of the procurement model at this stage, or straightforward solutions to challenges are obvious

Each of the four reuse schemes passed Gate 1, meaning that they were to be considered in more detail ahead of Gate 2.

To support TWUL undertake its Gate 2 submission to RAPID, Jacobs/PA Consulting have been commissioned by TWUL to assess how each of the four schemes compares against the eligibility requirements for both DPC and SIPR.

Specifically, to support TWUL's Gate 2 submission to RAPID, Jacobs/PA Consulting has been commissioned to:

- Expand upon the overarching scheme assessment at Gate 1 by undertaking a specific assessment of each individual scheme within the SRO, against In-house, DPC and SIPR models[12];
- Undertaking a qualitative value-for-money analysis supported by high-level quantitative modelling, to assess potential value-for-money of the DPC model (rated 'green' for suitability at Gate 1), for schemes that meet the DPC size and discreteness tests;
- Adding further granularity to the viability assessment of different models by evaluating additional criteria including 'Implementation Timescales' and 'Financeability' and dividing 'value-for-money' into two dimensions – 'cost-to-customers' and 'value-to-customers'.

Jacobs/PA Consulting have been asked to simplify the assessment and provide a more focused comparison between in-house delivery and competed delivery models by considering both the 'in-house delivery models' and 'DBOM' models considered at Gate 1 within a single 'In-House delivery' model.

To address this scope of work, the remainder of this report is structured as follows:

- **Section 3 – Framework for assessing eligibility for DPC and SIPR:** Describes the criteria against which each scheme is assessed to decide whether to adopt DPC or SIPR, or to maintain in-house delivery, and the assessment framework and methodology we have used.
- **Section 4 – Assessment of procurement models**: Discusses our assessment of whether each scheme satisfies the criteria for DPC and SIPR and recommends whether to proceed to Gate 3 or not.
- **Section 5 – Scheme promoter options and operating arrangements:** Outlines the preferred promoter approach for the schemes, and indicative operating and commercial arrangements.
- **Section 6 – Risk allocation:** setting out the high-level indicative allocation of risks between TWUL and the contractor for each scheme under its preferred procurement approach.
- **Section 7 – Procurement risks, plan and market engagement:** Key actions to be taken forward beyond Gate 2, including responding to revisions of the WRSE demand requirements, operational constraints, further development of the VfM assessment, and additional market engagement.

[12] Re-considering the SIPR model based on updated RAPID guidance in their December 2021 consultation document (*The regulatory and commercial framework for strategic water resource solutions – a consultation*, RAPID, December 2021)

3 Framework for assessing eligibility for DPC and SIPR

The eligibility criteria for DPC and SIPR set out by Ofwat is summarised below:

DPC model assessment criteria:

- **Size:** the scheme must be at least £100m totex (based on PR19 guidance. Ofwat's draft PR24 methodology sets the size threshold at £200m totex, this has also been considered where relevant).
- **Discreteness:** the scheme should be sufficiently discrete from the wider network to support the CAP delivering the contracted outcomes.
- **Value for Money:** DPC should offer the potential to deliver a lower cost to customers (informed by Ofwat's specified assumptions, set out at PR19).

SIPR model assessment criteria:

The criteria for specifying a project under SIPR are set out in The Water Industry (Specified Infrastructure Projects) (English Undertakers) Regulations 2013, as follows:

- *The Secretary of State or the Authority may exercise the power ……… if the Secretary of State or the Authority respectively is of the opinion that:*
    - *i. the infrastructure project is of a **size or complexity** that **threatens the incumbent undertaker's ability to provide services for its customers**; and*
    - *ii. specifying the infrastructure project is likely to result in better **value for money** than would be the case if the infrastructure project were not specified, including taking into account:*
        - *i. the charges fixed or likely to be fixed under Chapter 1 of Part 5 of the Act(9) (financial provisions, charges); and*
        - *ii. the powers of the Secretary of State under section 154B of the Act(10) (financial assistance for major works).*

We have used these criteria to assess whether each of the four potential London water recycling schemes are eligible for SIPR specification under current legislation.

We set out below how we have approached assessing whether each scheme meets these criteria or not.

3.1 Size, discreteness, and complexity

Whether a project meets the size criteria for DPC or not requires calculation of the present value of whole life capex and opex to see if that value exceeds £100m of totex.

Whether a project meets the discreteness criteria for DPC requires a more qualitative assessment of various factors, set out in Ofwat's 'Direct Procurement for Customers: Technical Review' report, including:

1. Stakeholder interactions and statutory obligations;
2. Interactions with the network;
3. Contributions to supply/ capacity and ability to specify outputs; and
4. How well asset and operational failures of the scheme are understood.

We have considered these features when assessing the discreteness of each scheme. (The discreteness assessment for DPC is also assumed to apply to SIPR.)

Whether a project meets the size or complexity criteria for SIPR depends on whether the project "*threatens the incumbent undertaker's ability to provide services for its customers*". We use a similar risk-based approach to that applied for the Thames Tideway Tunnel (TTT) to compare each scheme's 'size or complexity' to that of TTT, the only scheme specified under SIPR to-date. This includes a specific focus on 'scale risk', including an assessment of whether the financeability of the incumbent undertaker could be endangered by undertaking the project itself. To address this issue, we have held discussions with TWUL about the impact of delivering the project in-house on TWUL's forecast financeability and, undertaken a desktop exercise to assess each scheme's impact on typical financeability metrics.

3.2 Implementation timescales

We have considered whether there is sufficient time to implement either DPC or SIPR before each scheme's assumed in-service date as determined by the draft WRSE Regional Plan. It takes time to set up and run a DPC or SIPR procurement process, so if a scheme is urgently required, a competitive tendering process may put the delivery timescales at risk.

To inform our assessment of implementation timescales, we consider the time taken to implement each London Reuse scheme under each potential procurement model. Based on experience with models similar to DPC, and insight from the TTT and United Utilities' HARP scheme, we assumed a minimum duration of approximately three years to reach CAP award under a DPC model, and approximately three to five years to reach IP award under a SIPR model, starting from confirmation of the preferred procurement model at Gate 3.

3.3 Value for Money

We have assessed VfM through two 'lenses':

- Assessing the 'cost to customers': i.e. the potential impact on customer bills, and
- Water resilience/resource value: the benefits that customers receive from the water asset being able to produce sufficient water when required.

To assess the cost to customers, at this stage of scheme development, we have considered how much higher or lower the financing, capex and opex costs would be under DPC and SIPR compared to in-house delivery. We discuss potential opex and capex savings based on an assessment of potential savings for various sub-categories of costs. Our assessment of financing costs is based on high level assumptions (including Ofwat's PR19 assumptions), in line with our scope of work. We have not spoken to prospective DPC or SIPR bidders to inform our work at this early stage, so our work is based on desktop analysis, research and discussions with TWUL and its other advisers.

To assess water resilience/resource value, we have examined the benefits of the scheme to customers through the provision of drought resilience and ongoing water resource supply, and assessed whether there would be a material difference in these benefits under different procurement models.

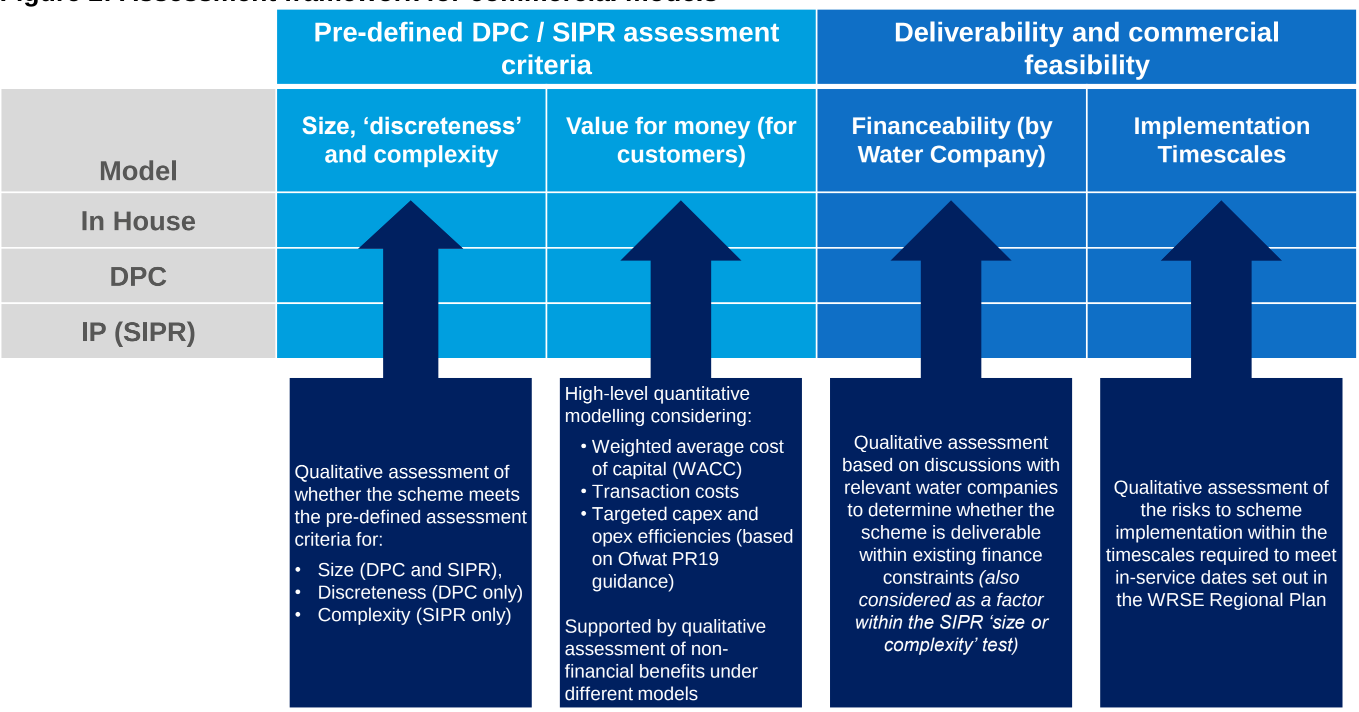
Evaluation framework

We have undertaken high level financial modelling of the schemes to inform our assessment of eligibility for DPC and SIPR, but many of the criteria discussed above can only be assessed qualitatively. For those criteria we have undertaken a Red-Amber-Green style evaluation, where Red indicates that the criteria would not be met.

Figure 2 below, which integrates pre-defined assessment criteria for both the DPC[13] and SIPR[14] models with our additional criteria for deliverability and commercial feasibility, summarises our assessment framework and methodology.

In the following chapters we discuss whether each scheme satisfies the eligibility criteria for DPC and SIPR outlined above using our assessment framework.

Figure 2: Assessment framework for commercial models



[13] As set out in Ofwat's 'Direct Procurement for Customers: Technical Review' report
[14] As defined in the Water Industry (Specified Infrastructure Projects) (English Undertakers) Regulations 2013

4 Assessment of procurement models

We have set out our assessment of whether each of the four schemes is eligible for DPC and/or SIPR.

- Teddington is considered in the main report, reflecting the priority given to Teddington in the WRSE regional modelling.
- Beckton has been the focus of our quantitative analysis of VfM, and so is also considered in the main report. It is not selected in the latest WRSE Regional Plan, but will be retained as a viable alternative.
- Mogden and Mogden South Sewer are not selected under the current modelling, and have been subject to less detailed analysis, and so are considered in the appendix. (note that Mogden will, like Beckton, be retained as a viable alternative scheme.)

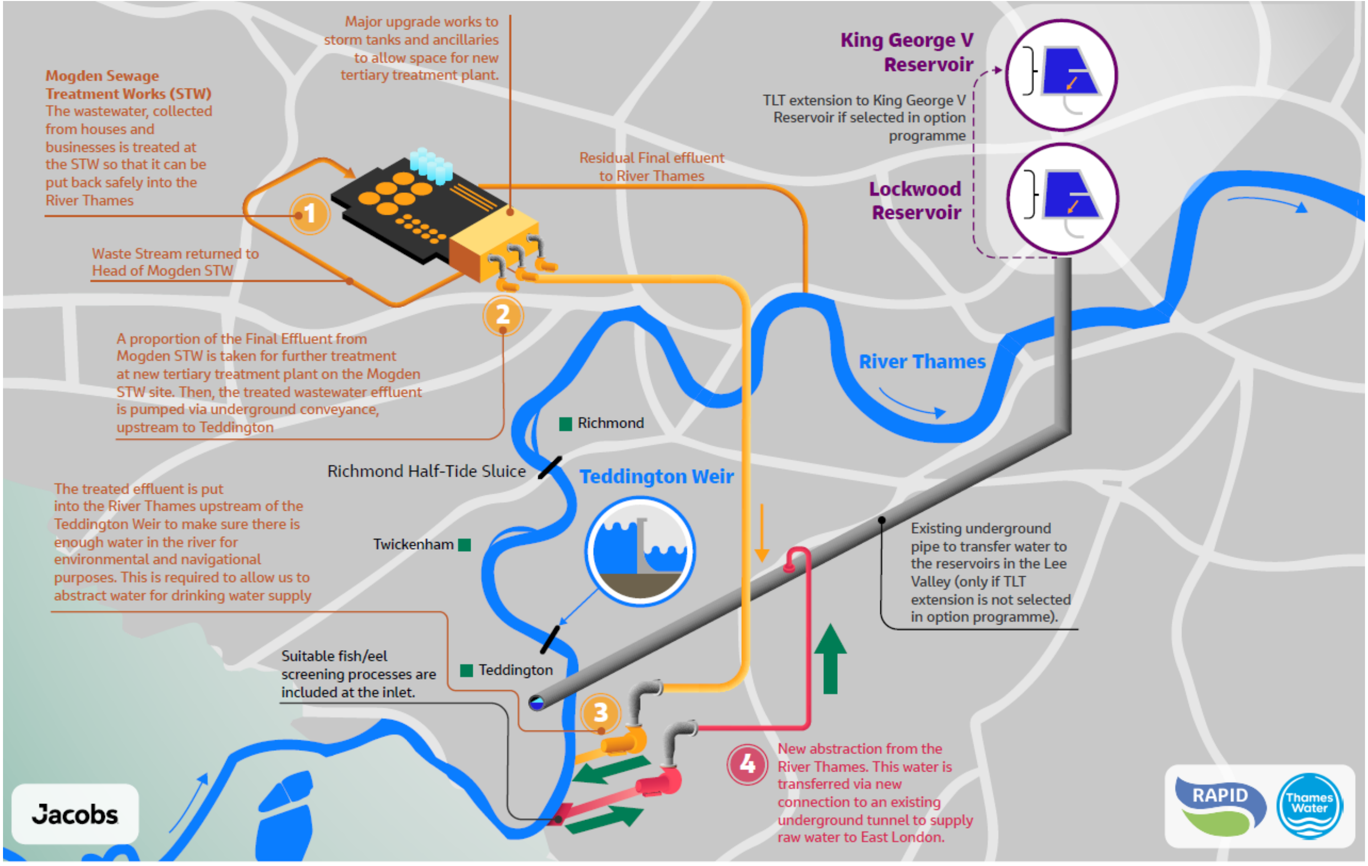
4.1 Teddington

In this scheme a proportion of the final effluent from the Mogden Sewage Treatment Works (STW) would be treated at a new Tertiary Treatment Plant (TTP) situated above the storm tanks at the Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir east of the Teddington Lock, flowing into the river Thames.

As part of the scheme, raw water would be abstracted from the river Thames (upstream of the new treated effluent discharge location) and pumped into the Thames Lee Tunnel (TLT) for transfer to the Lee Valley reservoirs in East London. As the discharge location for the treated effluent water would be in the most downstream section of the non-tidal section of the River Thames, as well as being downstream of all the existing raw water intake points of Water Treatment Works (WTWs), the design for the treatment plant is focused on meeting water quality consent parameters for discharge to the River Thames. The TTP process operation of nitrifying sand filters and mechanical cloth filters would result in backwashing and desludging waste streams that will be collected in an equalisation tank before being returned to the head of the works of Mogden STW.

The TTP for the scheme is rated at 75Ml/d output discharged to the river Thames with the additional abstraction to the TLT matching the discharge. The plant would operate continuously at a “sweetening flow” of up to 25% x 75 Ml/d and ramp up to meet drought demand. The transfer of water is contained within the London river basin. Figure *3* provides a detailed schematic of this scheme

Figure 3: Teddington scheme schematic



Jacobs PA

Teddington DRA comprises three main components, as below:

a. New TTP, located on the existing Modgen STW site – shown as (2) in Figure 3;

b. Treated effluent pipeline and discharge (a tunnelled gravity pipeline of 4.5km x 1.8m diameter, to discharge treated effluent at Teddington on the River Thames) – shown as (3) in Figure 3;

c. New abstraction and raw water pipeline (including connection to existing Thames-Lee Tunnel) – shown as (4) in Figure 3. The new abstraction point will be located on the River Thames c.100m upstream of the effluent discharge point.

Cost estimates for each component are included in Table 3. These estimates are based on the likely maximum capacity scheme option (75 Ml/day).

Table 3: Project cost estimates for the Teddington scheme

Component	Capex	Fixed Opex (per annum)	Variable Opex (per annum, average)[15]	25-year Opex	25-year Totex
(a) New tertiary treatment plant (TTP)	£128m	£0.40m	£1.06m	£37m	**£165m**
(b) Treated effluent pipeline and discharge	£78m	£0.13m	£0.12m	£6.3m	**£84m**
(c) New abstraction and raw water pipeline (including connection to existing Thames-Lee Tunnel)	£31m	£0.05m	£0.24m	£7.3m	**£38m**
ENTIRE SCHEME	*£237m*	*£0.6m*	*£1.4m*	*£50m*	***£287m***

4.1.1 Size, discreteness, and complexity

DPC

We have assessed this scheme against the key areas outlined in Ofwat's definition of project size and discreteness as set out in their 'Direct Procurement for Customers: Technical Review' report, relevant sections of which are italicised in the assessment below. This assessment covers: i) size; ii) stakeholder interactions and statutory obligations; iii) interactions with the network; iv) contributions to supply / capacity and ability to specify outputs; and v) asset and operational failures.

To provide a comprehensive assessment of Teddington against the DPC size and discreteness tests, we have considered the three scheme components separately. Our assessment is discussed below, and summarised in Table 4.

a. New tertiary treatment plant (TTP)

- *Size:* The estimated capex for this element is £128m, and the opex is £37m (over 25 years), giving a totex of £165m. Therefore, this component passes the DPC size test based on PR19 guidance, but falls some way short of the £200m threshold set out in the draft PR24 methodology.

  Discreteness (construction): The existing Mogden site is extremely constrained. It was originally constructed between 1931-1935, and has been expanded several times since then to accommodate population growth in its catchment. The existing plant is surrounded by a wooded bund covered in mature trees, which provides a visual and physical buffer to reduce the plant's impact on local residents. Expansion of the site beyond its existing perimeter is not possible as it is completely surrounded by suburban housing, The space constraints introduce two key construction-related discreteness challenges for the TTP. Firstly, **there is no 'greenfield' or 'brownfield' space to construct the new TTP**. The only feasible location for the new plant is on top of two of the existing operational storm storage tanks (shown in Figure 4 below). Constructing the TTP requires a new platform/deck to be built above the storm tanks and supported by the existing structure. In addition, it is likely that new piles will be required through the existing floor for additional support columns, as well as some localised lowering of the existing floor. This will require the two tanks to be taken offline (sequentially) to enable construction activities. The storm storage tanks mitigate the risk of sewage discharge to the River Thames during high flow rainfall events and are

[15] There is significant uncertainty over the projected usage of the Teddington scheme – variable opex is based on an assumed usage of approximately 2-3 months every 2-3 years, or 30 days/year average at 75 Ml/day; and 335 days/year of sweetening flow usage (25% of 75 Ml/day, or 18.75 Ml/day).

regularly used throughout the year[16]. During the construction period, Mogden STW will need to remain operational, which means an alternative storm storage facility may need to be provided and operated on an ongoing basis, and/or construction activity may need to be stopped at short notice to allow the storm tanks to be filled if necessary. The final effluent culvert for the whole STW runs along the south side of the storm tanks and the then along the east side (where there is an operational air blower plant to inject oxygen in certain conditions), and the storm return pumping wells and pumps are on the west side. Therefore operational access is required at all times to the entire perimeter of the tanks where the TTP is to be built.

Mogden serves approximately 2.1 million TWUL customers, and as such is a critical part of TWUL's network, and the storm tanks are an integral and operationally-critical part of Mogden's overall operations.

Secondly, **there is extremely limited space for construction storage and logistics** on the Mogden site. This is exacerbated by the fact that Mogden is a continuously operational site, and will remain so throughout the TTP construction. The TTP will need to be constructed from modular components – the lack of storage areas means these will need to be delivered on a 'just-in-time' basis. This, combined with the lack of space for large-vehicle movements on the Mogden site, means that site deliveries (and potentially associated activities such as crane operations to install TTP components) will need to be carefully planned alongside ongoing Mogden site operations. Storage space allocations on the site are to be determined but likely to be scattered around the site and subject to change during the construction period if operational maintenance activities require the space. Activities around the storm tanks may change at short notice (for example due to changes in weather), creating complex and difficult-to-manage interdependencies between the DPC CAP's construction activities and Mogden site operations.

In summary, constructing the new TTP will require the DPC CAP to maintain '*significant, complex and frequent interactions with the appointees' [TWUL's] network*', and operate sub-components (the storm tanks) that '*are actively managed as part of the overall system operation of the network*'. These are not typical activities that DPC CAP or their supply chain would be expected to undertake, and are unlikely to be feasible to be delivered as part of a DPC contract.

Because of this, we conclude that **construction of the new TTP does not pass the discreteness test**.

[16] The storm storage tanks fill to capacity 30-40 times in a regular year.

Figure 4: Existing Mogden STW storm overflow tanks, on top of which the TTP will be constructed

- *Discreteness (operations):* Teddington DRA will discharge treated effluent directly into the River Thames with an equal flow value being abstracted upstream (i.e. a direct quantity compensation flow) and must also provide enough flow to maintain river levels at the Teddington Weir. Therefore, this is an asset that '*materially contributes towards the appointee meeting statutory obligations'*, specifically TWUL's obligations to ensure treated effluent discharged to the river meets quality standards and to maintain river levels at the Teddington Weir. However, these effluent quality and volume obligations are expected to be able to be codified and written into contractual arrangements between TWUL and the CAP. Therefore, this is not a 'blocker' for DPC, but does raise some issues that will need to be mitigated through the DPC contract. Because of this, we conclude that **operating the new TTP passes the discreteness test, but with risks that need to be mitigated through the DPC contract**.
- ***DPC conclusion****:* The new TTP component is **not suitable for DPC**, as it does not pass the discreteness test.

b. Treated effluent pipeline and discharge

- *Size:* The estimated capex for this element is £78m, and the opex is £6m (over 25 years). Therefore, with a totex of c.£84m, this component does not pass the £100m totex DPC size test based on PR19 guidance, (or the £200m threshold set out in the draft PR24 methodology). As this could potentially become part of a larger scheme (e.g. combined with the new abstraction and raw water pipeline), we have considered whether this component would pass the discreteness test.
- *Discreteness (construction and operations):* This component is a passive pipeline that comprises typical water sector assets, has no significant contribution to statutory obligations or interactions with the network, with straightforward and easily specified outputs and contributions to supply/capacity, and well-understood and low asset and operational failure risks. Therefore, it would be considered to pass the discreteness test.

- *DPC conclusion:* The treated effluent pipeline and discharge component is **not suitable for DPC on its own**, as it does not pass the size test.

c. New abstraction and raw water pipeline (including connection to existing Thames-Lee Tunnel)

- *Size:* The estimated capex for this element is £31m, and the opex is £7m (over 25 years). Therefore, with a totex of c.£38m, this component does not pass the £100m totex DPC size test based on PR19 guidance, (or the £200m threshold set out in the draft PR24 methodology). As this could potentially become part of a larger scheme (e.g. combined with the treated effluent pipeline above), we have considered whether this component would pass the discreteness test.
- *Discreteness (construction):* The construction of the outflow shaft onto the existing TLT will be complex and high-risk. The TLT was built in the 1960s, and the tunnel design is integral with the surrounding ground pressure to achieve structural integrity. Sinking the new shaft for this scheme for the connection to be made will disturb the surrounding ground which will require mitigation measures to maintain integrity during construction. The condition of the tunnel is not clearly understood[17]. Mitigation would need to be in place during construction to prevent any weakening of the existing tunnel, envisaged to include propping installation within the tunnel during the sinking of the shafts and making the connections. The permanent installation will need to ensure no structural issues could manifest at a later date. The connection will need to be made during a specifically planned outage, limited to twelve weeks' duration. Although this outage can be planned in advance, it may be delayed at short notice if the outage would impact the resilience of the Lee Valley reservoirs. To-date no other similar connections have been made to this tunnel, though there are examples of connections to other wedge-block tunnels in the London region.

  Therefore, the '*failure risk is not well-understood with limited [no] track record of effective mitigations*.' Further the large volumes transferred by the TLT make it vital to the west-east water transfer supplies for London and as such it is a critical asset to TWUL's operations, making this an '*asset where there are no backup supplies*.' Because of this, we conclude that construction of this component, specifically the connection to the existing TLT, **does not pass the discreteness test**.
- *Discreteness (operations):* Once constructed, the magnitude of the risks outlined above will reduce significantly, but will not disappear. There will remain a small risk that the construction of the connection introduces weaknesses in the tunnel or surrounding ground, that may not become visible for several years. Should these risks be realised, the impact would be very significant due to the criticality of the TLT to London's overall water supply system, including a realistic risk of large parts of East London losing supply. Further, making repairs to the connection before a catastrophic failure would re-introduce the much of the construction risk outlined above. Because of this, we conclude that operations of this component, specifically the long-term risk associated with the connection to the existing Thames-Lee Tunnel, **passes the discreteness test, but with risks that need to be mitigated through the DPC contract.**
- *DPC conclusion:* The new abstraction and raw water pipeline (including connection to existing Thames-Lee Tunnel) component is **not suitable for DPC** (on its own or in conjunction with the treated effluent pipeline), as it does not pass the size or discreteness tests.

Entire scheme:

- *Size:* The estimated capex for all components combines is £237m and the opex is £50m (over 25 years), giving a totex of £287m. Therefore, this component passes the DPC size test based on the PR19 guidance and the £200m threshold set out in the draft PR24 methodology.
- *Discreteness (construction and operation):* As set out above, the new tertiary treatment plant and the new abstraction and raw water pipeline (including connection to existing Thames-Lee Tunnel) components **do not pass the discreteness test**.
- *DPC conclusion:* Considered as a whole scheme, Teddington is **not suitable for DPC**. The scheme's largest component (the TTP) and the new abstraction and raw water pipeline to the TLT, do not pass the discreteness test; and if these components were to be removed, the remaining component (b. treated effluent pipeline and discharge) would have totex of only £96m and therefore would not pass the size test.

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[17] A planned shutdown of the TLT in 2023 will enable tunnel inspections and surveys, and enable planning for temporary and permanent works for the TLT connection.

Table 4: Detail of the Teddington project size and discreteness criteria as measured against Ofwat's 'Direct Procurement for Customers: Technical Review' report

Diagram reference (Figure 3)	(2)	(3)	(4)	***N/A***
Asset	(a) New tertiary treatment plant (incl. enabling upgrades to existing assets)	(b) Treated effluent pipeline and discharge	(c) New abstraction and raw water pipeline (including connection to existing Thames-Lee Tunnel)	***ENTIRE SCHEME***
Size (£ totex[18])	£165m	£84m	£38m	***£287m***
Discreteness (construction)				
Discreteness (operations)				
DPC Conclusion	Not suitable for DPC, as it does not pass the discreteness test.	Not suitable for DPC, as it does not pass the size test.	Not suitable for DPC, as it does not pass the size or discreteness test.	Not suitable for DPC, as critical components do not pass the discreteness test.

SIPR applicability

As set out in Section 3, a key criteria for a scheme to be specified under SIPR legislation is that it is of '*size or complexity that threatens the incumbent undertaker's ability to provide services for its customers*'. In the case of Teddington, the 'incumbent undertaker' is TWUL. To assess Teddington against this criteria, we use a similar risk-based approach to that applied for the TTT[19] to compare each scheme's 'size or complexity' to that of TTT, the only scheme specified under SIPR to-date. The specification of the TTT under SIPR considered four risks – 'scale risk', 'construction risk', 'management risk' and 'regulatory risk', as well as an assessment of whether delivering the scheme in-house would impact TWUL's financeability to the extent that it would endanger the ability of the company to deliver services for its customers. We address each of these aspects for Teddington below.

Scale risk – Teddington is clearly not of a comparable scale to TTT. Its £237m capital cost would amount to less than 2% of TWUL Utilities Ltd's (TWUL's) RCV at the end of AMP7, compared to TTT which, at £4.2bn, was assessed as representing around 35% of TWUL's RCV at the end of 2015. Further, Teddington's size would only amount to around 4% of net capex in AMP7.

Construction risk – Teddington does entail some significant construction risks as set out in the DPC discreteness assessment above. However, these risks are not comparable to those of TTT, which involved tunnelling under central London, with the potential to cause extensive impact on properties above or existing underground infrastructure.

Management risk – Teddington will require some dedicated management attention, but is not of a significantly greater size or complexity than schemes previously delivered in-house by TWUL, for example the Lee Tunnel. Therefore, management risk for Teddington should be manageable within TWUL's existing management and governance structures.

Regulatory risk – TTT construction spanned multiple regulatory periods, and was therefore deemed to put TWUL at significant risk as it would need to commit to scheme construction without certainty of required funding in future price controls. This risk does not apply to Teddington, which has a construction period of 3 years (i.e. less than one regulatory period).

In summary, none of the four risks that led to specification of TTT apply to Teddington.

[18] Over 25 years of operations (in addition to a four year construction phase), based on the maximum recommended DPC contract duration set out in Ofwat's PR19 DPC guidance.
[19] As set out in the *Thames Tideway Tunnel project specification reasons notice*, part of the *Thames Tideway Tunnel: project specification and preparatory work notices*, Department for Environment, Food & Rural Affairs, June 2014 Thames Tideway Tunnel: project specification and preparatory work notices - GOV.UK (www.gov.uk)

Financeability to TWUL

To assess Teddington's financeability impacts, we have held discussions with both the Treasury and Finance Teams from TWUL about the impact of delivering the project in-house on TWUL's forecast financeability, and undertaken a desktop exercise to assess the scheme's impact on typical financeability metrics. These discussions have concluded that the Teddington scheme is potentially financeable through in-house delivery.

To cross check the views provided to us by TWUL, we have considered the capex as a percentage of RCV (Regulated Capital Value) and the impact that financing the capex may have on TWUL's gearing. This analysis[20] shows that delivering the scheme in house and financing it entirely with debt would not on its own represent an unmanageable impact to TWUL's financeability, although (depending on the circumstances) some equity finance may be required.

Based on this analysis, Teddington does not entail comparable risks to TTT, and could potentially be financed in-house by TWUL. Therefore, it does not appear to be of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers, and so is not considered eligible for SIPR.

4.1.2 Implementation timescales

The latest WRSE Regional Plan indicates a required in-service date for Teddington of early 2031. Assuming a c.4 year construction and commissioning period, and allowing around 12 months for contractor mobilisation and detailed design, this implies a contract award date of late-2025, around two years after the currently planned Gate 3 date of autumn 2023.

Experience with models similar to DPC, and insight from the Thames Tideway Tunnel and United Utilities' HARP scheme indicates a minimum duration of approximately three years to reach CAP award from this point under a DPC model. This highlights that, notwithstanding the recommendation that Teddington is not suitable for DPC procurement (on grounds of discreteness), were a DPC model to be pursued, there would be a risk to the achievement of these timescales. There may be opportunities to accelerate some elements of DPC preparation or to complete activities in parallel if a DPC model were to be pursued, however, **current timescales indicate that pursuing a DPC model for Teddington would put overall programme delivery timescales at risk.**

4.1.3 Value for Money

Notwithstanding our assessment that Teddington does not meet DPC discreteness criteria, we have assessed the potential value for money offered by DPC and in-house procurement.

Assessing cost to customers

Financing costs

We have not presented quantitative modelling outputs for the Teddington scheme here, as we have concluded that this scheme is not 'discrete' and so not suitable for DPC. However, we have used the quantitative modelling undertaken for the Beckton scheme, presented in Section 4.2, to inform a qualitative assessment.

In summary, our analysis for the Beckton scheme shows that financing costs (including, for example, returns to equity investors, repayments to debt investors, transaction costs, liquidity costs and the cost of carry) may be higher under the 'standard form' DPC model than under in-house delivery. This indicates that DPC would need to achieve capex and opex savings of approximately 10-15% to lead to potentially overall lower cost to customers in comparison to in-house delivery. The potential for the Teddington scheme to deliver these savings is discussed below.

Efficiency savings

The capex and opex (fixed and variable) for this scheme is shown in Table 3 above.

Ofwat's PR19 DPC guidance indicates that water companies should assume efficiency savings of 10-15% on both capex and opex compared to an in-house delivery model, with innovation a significant contributor to achieving this greater level of efficiency, and as noted above, our modelling for Beckton suggests these savings will be needed to

[20] Delivering Teddington in house and financing it entirely with debt would increase TWUL's actual gearing close to 85%, which is relatively high by comparison to other water companies or to TWUL's historical gearing. TWUL's Baa2 rating takes into account the covenant and security package as agreed by the company, with the terms and conditions of its financing arrangements allowing TWUL to increase its indebtedness (on the basis of net debt/ RCV) up to 85% before distribution lock-ups come into effect. Failure to maintain a level of adjusted interest cover of at least 1.1x in any single year (or 1.2x on a three-year rolling average) would also trigger the dividend lock-up mechanism (Moody's Credit Opinion, TWUL, 2020/21). This suggests that delivering the scheme in-house may reduce financial resilience and future financial flexibility (TWUL Annual and Sustainability Report 2020/21). In practice, equity is likely to form a portion within the financing structure, and this would need to be raised to sustain appropriate gearing levels and credit metrics both on notional and actual basis. The actual impact on TWUL's financing will be confirmed as cost estimates and corresponding financing, commercial and contractual structures are further developed at Gate 3 and beyond.

drive an overall lower cost to customers. However, these assumptions need to be tested and evaluated in the context of the specific scheme under consideration.

Over 25 years (a typical DPC period), capex will account for approximately 83% of the totex for this scheme, so the potential to achieve capex efficiencies will be a key determinant of whether DPC will deliver better value for money for consumers. To test the potential construction savings through DPC we have examined different categories of capex spend individually. We note that for this scheme capex is made up of approximately:

- 72% civils construction (primarily large diameter and other pipework and civils for the tertiary treatment plant)
- 28% mechanical, electrical, instrumentation, control and automation (MEICA) works (pumping plant, tertiary treatment plant and associated ancillaries).

With respect to the capex for civils construction work, pipeline construction, including "no dig" techniques, is a mature construction technique deliverable through a large and established supply chain. Moreover, TWUL has experience of procuring pipeline construction activity previously within their capital programme and as such are likely to be at a high level of efficiency. Consequently, it may be difficult for DPC to achieve additional efficiency savings, above that achievable by TWUL, of the magnitude Ofwat has assumed.

With respect to the capex for mechanical and electrical plant work, the tertiary plant is likely to be procured through a package offering by a specialist Original Equipment Manufacturer (OEM). The plant is likely to be pre-designed / modular with existing manufacturing in place. The plant is then integrated on site. As a result, the opportunity to innovate around the design and manufacture of the package plant will be limited given that this sits within the OEM provider's control.

Overall, in light of the above, 10-15% capex efficiency appears to be an ambitious target for Teddington.

The opex proportion of totex for this scheme is relatively small, and predominantly relates to power costs (36%) and maintenance (40%) with the balance spread across labour, chemicals and other smaller opex costs. The CAP would need to procure power from electricity markets, just as TWUL would if it developed the project in-house. The opportunities for the CAP to procure electricity more cheaply than TWUL would only arise through innovative procurement or hedging practices, as the power price is determined by exogenous factors outside of the control of TWUL and the CAP. TWUL routinely procures electricity from the market and is experienced at doing so, plus Ofwat has benchmarked electricity costs as part of its efficiency assessments at PR19 and prior price reviews, so it is not immediately obvious that the CAP would be able to identify a new way of procuring electricity compared to TWUL . Hedging strategy may be one opportunity for the CAP to achieve savings compared to TWUL , but this would come with the trade-off of either higher or lower risk exposure, with the ultimate impact on value for money for customers depending on whether power prices increased or decreased more than expected.

Overall, 10-15% opex efficiency appears to be an ambitious target, and with opex being such a small component of totex it would have a small contribution to any improved VfM calculation.

In summary, while there may be opportunities for a CAP to drive capex and opex efficiencies relative to an in-house delivery model, it seems unlikely that a CAP could achieve 10-15% capex and opex efficiency savings.

Construction risks

The most significant construction risks associated with the Teddington scheme relate to the construction of the TTP on top of the existing operational storm tanks at the Mogden site, and the connection to the existing TLT – these are discussed in the 'discreteness' assessment in Section 4.1.1. The construction methodology of the remaining scheme elements are relatively typical for the water industry, however the residential location of the treated effluent pipeline introduces delay risk that is likely to impact the value for money offered by DPC.

The pipeline will be constructed using pipe jacking, which involves the construction of several chambers along the pipeline route, from which pipe sections are pushed through a cavity excavated by a cutting tool at the leading edge. During the pipe jacking process, these chambers will be continuously operating, and will require significant adjacent space for storage of pipe sections, crane movements and associated activity. Further, construction of the pipeline will require regular vehicle movements, for example for delivery of construction materials. All of this activity will need to take place in the relatively affluent suburban areas of Twickenham and Teddington, adjacent to the River Thames. Construction will take place close to homes, and is likely to require disruption to local streets, walkways and nature areas[21]). This introduces the risk of resident challenge, resulting in delay to construction activities. Although planning consent will mitigate these risks, it is likely that DPC investors will price an element of delay risk into project financing, driving up financing costs and impacting DPC's value for money potential.

[21] Potentially including Sites of Special Scientific Interest.

Figure 5: Typical site location for a pipe jacking chamber, in a nature reserve close to houses, on a small local street and adjacent to the River Thames

Consideration of the Very Late DPC variant

There are four Ofwat pre-defined variants of DPC: Early, Late, Very Late and Split. The Early, Late and Split variants all involve the transfer of construction activity to the CAP, while Very Late DPC involves the transfer of a completed scheme once it is commissioned and ready for operation. We have concluded that the Teddington scheme does not pass the DPC discreteness test – however the underlying reasons for this are linked to the required construction methodology, and will be largely resolved once the scheme is completed. Therefore, the Very Late DPC model could potentially be applied. However, for the Very Late model to offer improved value for money, it would need to deliver either reduced opex costs, reduced finance costs, or both. The cost to customers discussion above, and our 'amber' assessment of operational discreteness, highlights that significant opex savings appear unlikely to be achieved through the DPC model alone; and it is not apparent whether a re-tendering of financing costs post construction would deliver a reduced WACC. We do not recommend further exploration of the Very Late DPC model for Teddington based on the current assessment. However, if future evidence from pathfinder DPC schemes indicate that Very Late DPC has the potential to drive value for money improvements (i.e. lower WACC than in-house), the Very Late DPC model could be reconsidered during Teddington construction.

Water resilience value

This scheme creates a resilience asset that will ensure that water deficits are are reduced in a drought situation. This determines the core 'water resource value' delivered to customers from this scheme.

Future flexibility of this plant's capacity and operating regime may be desirable for the reasons given below.

- The required capacity of the plant may increase. The plant currently selected is 75 Ml/d but could be uprated in the future to 100 Ml/d depending on drought demand in the future.
- This scheme is highly energy intensive. Changes in energy costs could significantly impact the cost-efficiency of this schemes in comparison to other sources, and it is plausible that future constraints on energy use (e.g. driven by net zero and/or public perception) influence how the plant is operated.

If this flexibility was required within approximately 25 years, under DPC it would likely require a change to the CAP arrangements partway through the DPC contract period. Whilst changes during the contract period are possible, they are likely to come at a cost, thereby eroding value for money. At this stage it is hard to value the benefits of such future flexibility, but on balance this would support in-house delivery.

Overall assessment of value for money

Our analysis shows that for the Teddington scheme:

- The 'standard form' DPC model is unlikely to achieve lower financing costs (including, for example, returns to equity investors, repayments to debt investors, transaction costs, liquidity costs and the cost of carry) than in-house delivery, although there may be opportunities to adapt the 'standard form' DPC model (for example, introducing staged payments during construction or recovering costs over a longer period) to drive improved financing costs. Notwithstanding the above, it is likely that capex and opex efficiencies of around 10-15% will be needed for DPC to achieve significantly lower costs to customers than in-house delivery.

- The nature of the Teddington scheme, which mostly comprises reasonably typical water industry work-types and assets and relatively low opex as a proportion of totex, limits the scope for innovation which means that achieving 10-15% capex and opex efficiencies under DPC appears ambitious.
- There may be value-for-money benefits associated with retaining flexibility to adapt the scheme's future operating regime and capacity in response to changing needs and/or external factors (such as energy costs). This could favour in-house delivery over DPC.

However, as set out above in our 'size, discreteness and complexity' assessment, we conclude that Teddington is not suitable for DPC as critical components fail the discreteness test, and if these components were isolated from DPC arrangements, the remaining component would not meet the size threshold. Therefore, we do not recommend undertaking further, more detailed DPC value-for-money analyses for Teddington beyond Gate 2.

4.2 Beckton

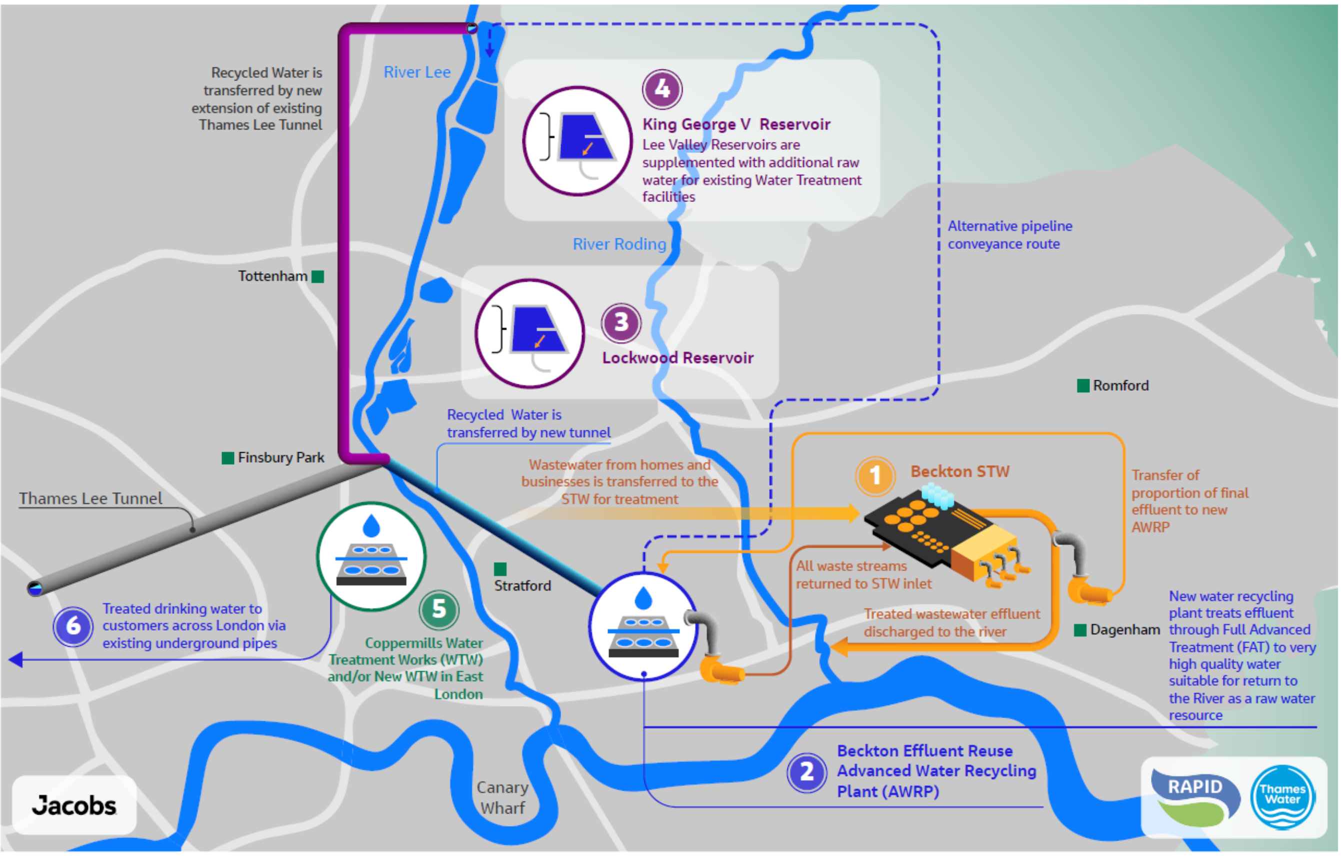
In this scheme final effluent from Beckton STW in East London would be treated at a new Reverse Osmosis Plant (RO) within the STW site boundary. This would create a supply of treated water that would then be pumped to a proposed discharge location on the River Lee Diversion above the inlet for the King George V (KGV) Reservoir to supplement the raw water supply to the Lee Valley reservoirs.

The design of the RO plant has been developed in alignment with the TWUL methodology focusing on Drinking Water Standards and environmental legislation compliance. This provides a standard of treatment globally accepted for indirect reuse through Ultrafiltration (UF), referred to as Full Advanced Treatment.

The recycled water would be pumped from Beckton STW via a tunnel to Lockwood Pumping Station and then via an extension to the TLT to the River Lee Diversion, upstream of the inlet for KGV. All waste flows will be combined with final effluent from the Beckton STW and discharged to the River Thames via the existing STW outfall in the estuarine Thames Tideway Reach.

The tunnels and pipelines within this scheme are sized for the anticipated maximum 300 Ml/d deployable output. The plant would operate continuously at a “sweetening flow” of 15 Ml/d and ramp up to meet drought demand. The transfer of water is contained within the London river basin. Figure 6 provides a detailed schematic of this scheme.

Figure 6: Beckton scheme



Key elements of this scheme include:

- Construction of a new pumping station on the Beckton site to a new RO water recycling plant located on a discrete area of land on the north side of the Beckton site.
- Gravity discharge from the RO plant to the new reception shaft on the Beckton site.
- Construction of a new tunnel to the existing Lockwood pumping station (15km x 3.5m diameter x 20m depth) plus intermediate shafts.
- Construction of a new connection from the existing TLT discharge shaft (at Lockwood) to a new discharge shaft from Beckton.
- Construction of a new discharge tunnel to the River Lee. The discharge point will be upstream of the existing abstraction point by TWUL to the KGV, allowing greater flows into the Reservoir.
- Construction of a new reception shaft at the River Lee Diversion.

4.2.1 Size, discreteness, and complexity

DPC

In this section we first assess this scheme against the key areas outlined in Ofwat's definition of project size and discreteness as set out in their 'Direct Procurement for Customers: Technical Review' report. This assessment covers: i) size; ii) stakeholder interactions and statutory obligations; iii) interactions with the network; iv) contributions to supply / capacity and ability to specify outputs; and v) asset and operational failures.

Table 5: Detail of the Beckton project size and discreteness criteria as measured against Ofwat's 'Direct Procurement for Customers: Technical Review' report

	Size	• Scheme exceeds £100m totex size threshold for DPC delivery set out in Ofwat's PR19 methodology, as well as the £200m size threshold set out in the draft PR24 methodology, and therefore meets this requirement.
Discreteness	**Stakeholder interactions and statutory obligations**	• Beckton is being designed as a resilience asset, that needs to be operational during drought conditions for TWUL to meet its obligations to provide sufficient raw water to meet the demands of its customers. Therefore, during drought conditions, Beckon would '*materially contribute towards the appointee meeting statutory obligations*', • However, these obligations are expected to be able to be written into a DPC contract • Therefore, this is not a 'blocker' for DPC, but does raise some issues that will need to be mitigated through the DPC contract • Unclear whether RO plant needs to be Regulation 31 compliant.[22]
Discreteness	**Interactions with the network**	• Very well understood interactions (inputs and outputs) • Clearly separate assets when located on existing site i.e. RO plant
Discreteness	**Contributions to supply/ capacity and ability to specify outputs**	• Resilience assets and therefore demand profile is difficult to predict. Estimated full capacity required 2-3 months every 2-3 years • 'Sweetening flow' is well known (i.e. business as usual operations) and avoids the requirement for cold standby • Triggers for increased flow understood (drought linked, flow over Teddington weir and levels in KGV reservoir)
Discreteness	**Asset and operational failures**	• Very well understood civil assets (pipelines, tunnels) and pumping assets • (RO water recycling technology is less mature in the UK, but mature in international markets. Potential DPC CAPs may have more experience in managing RO-related risks than TWUL. • Strategies for asset failure can be informed from TWUL wider operations (risk of collapse on strategic tunnel, risk of operational breakdown of M&E plant). • Flexibility in route corridors and shaft locations.
	Discreteness summary	**There are some risks to discreteness against two headings, in particular relating to the fact that the detailed demand profile will be challenging to define, and failure would result in water stress for TWUL customers. However, these risks are considered manageable, and likely to be able to be mitigated through a DPC contract.**

SIPR

As set out in Section 3, a key criteria for a scheme to be specified under SIPR legislation is that it is of '*size or complexity that threatens the incumbent undertaker's ability to provide services for its customers*'. In the case of Beckton, the 'incumbent undertaker' is TWUL. To assess Beckton against this criteria, we use a similar risk-based approach to that applied for the TTT to compare each scheme's 'size or complexity' to that of TTT, the only scheme specified under SIPR to-date. The specification of the TTT under SIPR considered four risks – 'scale risk', 'construction risk', 'management risk' and 'regulatory risk', as well as an assessment of whether delivering the scheme in-house would impact TWUL's financeability to the extent that it would endanger the ability of the company to deliver services for its customers. We have addressed the four risks and TWUL's financeability for the Teddington

[22] Regulation 31 of The Water Supply (Water Quality) Regulations 2016 implements Article 10 of the Council of the European Union Drinking Water Directive (DWD) in England and Wales for all chemicals and construction products used by water undertakers, from the source of the water, up to the point of delivery to the consumer's building. It sets out how approvals can be given to such construction products and materials that do not prejudice water quality and consumer safety.

scheme in Section 4.1 above. The discussion for Beckton is very similar, and therefore we do not repeat in full here, except to state that in conclusion, none of the four risks that led to specification of TTT apply to Beckton, and delivering Beckton in-house would not have an unmanageable impact on TWUL's financeability

To assess Beckton's financeability impacts, we have held discussions with both the Treasury and Finance Teams from TWUL about the impact of delivering the project in-house on TWUL's forecast financeability and undertaken a desktop exercise to assess each scheme's impact on typical financeability metrics. These have concluded that the Beckton scheme is potentially financeable through in-house delivery, although its scale is considerably larger than Teddington (and is considered potentially suitable for competitively tendered delivery models as described above). To cross check the views provided to us by TWUL, we have considered the capex as a percentage of RCV (Regulated Capital Value) and the impact that financing the capex may have on TWUL's gearing. This analysis[23] shows that delivering the scheme in-house would not, on its own, represent an unmanageable impact on TWUL's financeability.

Based on this assessment, Beckton does not entail comparable risks to TTT, and could potentially be financed in-house by TWUL. Therefore, it does not appear to be of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers. However, we understand that Ofwat have recommended to Government that the 'size and complexity' test be abolished and SIPR eligibility focus purely on value for money. This would require legislation. Should this happen, we would recommend that a SIPR approach be kept under review for Beckton, given the potential value for money benefits, as set out below.

4.2.2 Implementation timescales

Beckton is not currently selected under the WRSE Regional Plan, and therefore there is not a firm timeline for this scheme at this stage. However, Beckton will be retained as an alternative option until TWUL's WRMP obtains Secretary of State approval in late 2023, at which point Beckton's timelines will be confirmed (if it is needed). We understand that the earliest likely date for CAP award for Beckton would be the late 2020s. Given that the estimated time required to establish a DPC model is a minimum of approximately three years from Gate 3 (or three to five years for a SIPR model), we conclude that there are unlikely to be significant time-related risks to implementing a DPC model (or a SIPR model, should this be modified to become applicable to Beckton in the future) by the time Beckton needs to be constructed. However, we recommend that this assessment is re-visited once Beckton's status is confirmed.

4.2.3 Value for Money

Consideration of different DPC variants

There are four Ofwat pre-defined variants of DPC: Early, Late, Very Late and Split. The Early and Split variants involve planning activity being transferred to the CAP. In the case of Beckton, significant work has been undertaken by TWUL already as part of the early RAPID gated process. Further, Beckton assets will be constructed in Thames Water's region, meaning that Thames Water has existing relationships with key stakeholders in the planning process (for example local authorities and customer groups). Conversely, a CAP delivering the scheme would need to build these relationships, spend time and effort developing an understanding of key planning issues identified by TWUL to-date, and place significant trust in the work undertaken by TWUL to date. Based on this, we conclude that the CAP is likely to be less capable of managing planning risks than TWUL, and therefore there is unlikely to be significant benefit in transferring planning responsibility to a CAP. This effectively rules out the Early and Split DPC variants for Beckton (and other London Reuse schemes).

The Late DPC model involves the transfer of the scheme to the CAP before the detailed design and construction stage, while Very Late DPC involves the transfer of a completed scheme once it is commissioned and ready for operation. The Very Late DPC model may offer reduced finance costs as the CAP would not have to bear any construction risk, however the Late DPC model offers the greatest opportunity for the CAP to drive improved capex and opex efficiencies. The value for money discussion below focuses on the Late DPC model, as this offers the greatest scope for discussion of different aspects of the DPC model that may influence overall value for money. Should the Late model not offer significant opportunity for improved value for money, the Very Late model could be retained as an option and explored during the procurement and construction phase and implemented post-construction should there be strong evidence that it could offer value for money benefits.

[23] Delivering Beckton in house and financing it entirely with debt would increase TWUL's actual gearing close to 90%, which is a high level by comparison to other water companies or to TWUL's historical gearing. TWUL's Baa2 rating takes into account the covenant and security package as agreed by the company, with the terms and conditions of its financing arrangements allowing TWUL to increase its indebtedness (on the basis of net debt/ RCV) up to 85% before distribution lock-ups come into effect. The potential gearing related to this scheme would therefore breach the maximum permitted level under Thames' covenants agreement , which suggests that delivering this scheme in-house would require a significant component of equity finance in order to sustain appropriate gearing levels and credit metrics both on notional and actual basis. (TWUL Annual and Sustainability Report 2020/21). The actual impact on TWUL's financing will be confirmed as cost estimates and corresponding financing, commercial and contractual structures are further developed at Gate 3 and beyond.

Assessing cost to customers

Financing costs

Financing costs encapsulates the returns to equity investors and the interest and principal repayments to debt investors. It also includes transaction costs (including bid costs) and various other costs such as liquidity costs and the cost of carry.

The costs of debt and equity depend on the risk of the project, and on the way in which the project is financed e.g. the gearing, the type and tenor of debt financing the returns required by equity investors (which may differ depending on the risk profile of the investment). It is outside our scope of work to undertake a detailed assessment of these costs for Gate 2. Instead, simplified assumptions have been made for the purposes of this work and are shown in Table 7 below. We have also undertaken high-level modelling of the financing costs under different models, as shown in Figure 7. Financing costs are discussed further alongside modelling outputs at the end of this section, however in summary, further work on financing costs is required for Gate 3 but based on this preliminary analysis for Gate 2 it appears likely that financing costs would be higher under DPC than under an in-house delivery model.

Potential finance lease liability

We also note that the DPC arrangements could give rise to a finance lease liability on TWUL's balance sheet (via IFRS 16). In particular, the finance lease liability would be recognised on company's balance sheet once the related asset has been commissioned. This would represent an unsecured liability and impact gearing and interest cover ratios. TWUL's gearing ratio would deteriorate through net debt increasing while RCV denominator remains the same, and for Adjusted Interest Cover ratio the negative impact will be channelled through an increase in debt interest payable, the denominator, without any offsetting increase in the numerator (as TWUL's revenues would not increase as a result of recognising the finance lease). However, all this will be driven by commercial arrangements (i.e. the level of risk transfer to the CAP), and therefore the impact cannot be concluded upon at this time. Further detailed accounting analysis (i.e. interpretation and opinion from auditor of IFRS 16 condition) and analysis of credit rating will be required in due course to clarify these presumptions.

Efficiency improvements

Scheme specific capex and opex efficiency could enable the DPC model to deliver a lower cost to customers compared to in-house delivery. The capex and opex (fixed and variable) for this scheme is shown in Table 6.

Table 6: Project cost estimates for the Beckton scheme

Scheme	Capital expenditure	Fixed Opex (per annum)	Variable Opex (per annum)
Beckton	£913m	£3.7m	£5.8m

Note: capital costs in Table 6 above assume construction of the Beckton scheme up to 300Ml/d deployable output; fixed and variable opex cost assumptions are based on 100Ml/d deployable output

Ofwat's DPC guidance indicates that water companies should assume efficiency savings of 10-15% on both capex and opex compared to an in-house delivery model, with innovation a significant contributor to achieving this greater level of efficiency. However, these assumptions need to be tested and evaluated in the context of the specific scheme under consideration.

In present value terms over 25 years (a typical CAP period), capex will account for approximately 79% of the totex for this scheme, so the potential to achieve capex efficiencies will be a key determinant of whether DPC will deliver better value for money for consumers. To test the potential construction savings through DPC we have examined different categories of capex spend individually. We note that for this scheme capex is made up of approximately 64% civils construction (primarily tunnelling works) and 36% mechanical, electrical, instrumentation, control and automation (MEICA) works (RO plant, pumping plant and associated ancillaries).

With respect to the capex for civils construction work, tunnelling is a mature construction technique deliverable through a large and established supply chain. Moreover, TWUL has experience of procuring tunnelling construction activity previously within their capital programme and as such are likely to be at a high level of efficiency. Consequently, it may be difficult for DPC to achieve additional efficiency savings , above that achievable by TWUL, of the magnitude Ofwat has assumed.

With respect to the capex for mechanical and electrical plant work, the RO plant is likely to be procured through a package offering by a specialist Original Equipment Manufacturer (OEM). The plant is likely to be pre-designed / modular with existing manufacturing in place. The plant is then integrated on site. As a result, the opportunity to innovate around the design and manufacture of the package plant will be limited given that this sits within the OEM provider's control.

Overall, 10-15% capex efficiency appears to be an ambitious target that requires further validation should the Beckton scheme be progressed.

The opex proportion of totex for this scheme predominantly relates to power costs (49%) with the balance spread across labour, chemicals, maintenance and other smaller opex costs. The CAP would need to procure power from electricity markets, just as TWUL would if it developed the project in-house. The opportunities for the CAP to procure electricity more cheaply than TWUL would only arise through innovative procurement or hedging practices, as the power price is determined by exogenous factors outside of the control of TWUL and the CAP. TWUL routinely procures electricity from the market and is experienced at doing so, plus Ofwat has benchmarked electricity costs as part of its efficiency assessments at PR19 and prior price reviews, so it is not immediately obvious that the CAP would be able to identify a new way of procuring electricity compared to TWUL . Hedging strategy may be one opportunity for the CAP to achieve savings compared to TWUL, but this would come with the trade off of either higher or lower risk exposure, with the ultimate impact on value for money for customers depending on whether power prices increased or decreased more than expected.

Another opportunity for the CAP to reduce power costs for this scheme would be to adopt a different operating regime, with the RO plant turned off rather than constantly running a sweetening flow. This would require greater planning of demand to allow the RO plant to come on-line through a “cold start” and associated flushing of the tunnel and other pipelines. That said, when discussed with TWUL’s Programme Management team as part of the data gathering for this report it was stated that a cold start operating regime is deemed high risk by the water company, and has already been considered and discounted in favour of the sweetening flow approach.

Overall, 10-15% opex efficiency appears to be an ambitious target without TWUL being prepared to allow the CAP to adopt the increased operational risk associated with a cold start operating regime. Even then however, with opex being such a small component of totex, it would have a small contribution to any improved VfM calculation.

Opportunities to split out specific assets from the Beckton scheme

Notwithstanding the above analysis of the entire Beckton scheme, we recognise that the RO supply chain in the UK is relatively immature, and there may be global supply chain organisations that can bring innovative solutions to the design and operation of the RO plant that could significantly reduce the whole-life cost of the plant. The RO plant on its own has capex of £301m, and annual opex of c.£8m, giving a 25-year totex of c.£502m, of which approximately £201m is opex. Therefore, the RO plant would exceed both the PR19 and draft PR24 DPC size threshold. Further, there is likely to be a greater opportunity to achieve significant capex and opex efficiencies for the RO plant as a separate scheme, than in combination with the transfer tunnel components, that are more passive, typical water company assets. In addition, the supply chain for RO plants may be different to that for transfer pipelines, meaning a wider range of organisations may be attracted if the RO plant was separated out from the rest of the scheme (i.e. specialist RO plant constructors/operators could bid directly, without having to partner with more typical pipeline and civil works contractors). This may further improve the competitiveness of tendering, and encourage further reductions in capex and opex costs. On the other hand – these potential savings would need to be offset against potential increases in cost and/or risk to TWUL customers by ‘de-integrating’ the scheme (and therefore transferring integration risks to TWUL and its customers). We recommend further exploration of the risks and benefits of separating out the RO plant at Gate 3, to determine the best value for money approach. This should include detailed risk analysis and engagement with potential RO contractors and investors.

Summary of the cost efficiency opportunities for Beckton

In summary, while there are opportunities for a CAP to drive capex and opex efficiencies relative to an in-house delivery model, it is unclear at this stage if the CAP could achieve 10-15% capex and opex efficiency savings. Should the scheme be progressed, we recommend engaging with prospective DPC supply chain organisations between Gates 2 and 3 to understand the level of efficiency they believe would be achievable and understand the potential for innovative approaches to drive capex and opex savings, particularly relating to the construction and operation of the RO plant. This should include specific consideration of whether the scheme could be made more attractive and achieve greater efficiency opportunities if the RO plant was delivered under a separate contract. This engagement would also help to get the detailed level of information required to carry out detailed value-for-money modelling for DPC.

Overall assessment of cost to customers

The overall assessment of whether DPC and SIPR would deliver reduced cost for customers depends on the combination of financing costs, capex and opex under the DPC, SIPR and in-house delivery models. To combine these elements we have undertaken some high level financial modelling of the NPV of the cost to customers of an indicative scheme under the different delivery models. Some of the key assumptions used include:

- Using simplistic discounted cash flow analysis for DPC delivery route
- Using RAB based models for SIPR & In House delivery;
- Using 30-year recovery period post-construction.

Table 7 below sets out the key input assumptions we have used in our indicative modelling, to determine the relative ranges of cost to customers for the in-house, DPC and SIPR models.

Table 7: Detailed modelling parameters

				Values used for modelling		
Parameter	**Low Case**	**High Case**	**Sources**	**DPC Range**	**SIPR Range**	**In-house Range**
Weighted Avg. Cost of Capital (CPI-H deflated, standard form)	2.5%	3.8%	Bottom range is based on the TTT project. Upper range on OFTOs 2017/18 WACC.[24]	2.5% to 3.8% Based on TTT WACC/STPR 76-125 years rate to OFTOs 17/18 WACC.	2.5% to 3% Based on TTT WACC and Ofwat's PR19 WACC.	2.5% to 3% Based on TTT WACC and Ofwat's PR19 WACC.
Transaction Costs*	0.10% (incl. in reg. WACC)	5% capital spend, additional bidder & transaction costs.	Bottom range is part of Ofwat's WACC. Upper range is sum of Ofwat's bidder and procurement costs within Table A.	2% to 5% of capex	2% to 5% of capex	0.1% (incl in WACC) to 1% of total capital spend (assumed by PA)
Capex Efficiency Savings *(Sensitivity)*	-10%	-15%	-10 to -15% saving based on Ofwat's Vfm DPC guidance.	-10% to -15%	-10% to -15%	0%
Opex Efficiency Savings *(Sensitivity)*	-10%	-15%	-10 to -15% saving based on Ofwat's Vfm DPC guidance.[25]	-10% to -15%	-10% to -15%	0%
Modelling Mechanics	• DPC contract duration is assumed to be 30 years post-construction • SIPR and in-house models assume recovery starts when assets begin to be constructed, with a 30-year recovery period post-construction • Under all models assets are assumed to fully depreciate by end of the recovery period.					

The results of the modelling are shown in Figure 7 below. The modelling compares the annuitized cost of the scheme under each delivery model. It should be noted that for each model there are three bars, which are an accumulation of the costs to customer (expressed in annuitized terms) layering in the key variables one by one:

- The light blue bar reflects the weighted average cost of capital (WACC) impact only;
- The green bar is the light blue bar with the addition of transaction costs; and
- The dark blue bar is the green bar with the addition of opex and capex efficiency savings.

To indicate scale, the vertical arrow shows that the highest value for DPC is approximately 48% greater than the highest value for in-house delivery.

Modelling outputs indicate that the DPC model could offer a lower cost to customers if a WACC of 2.5% and capex/opex efficiencies of c.15% can be achieved. Further, comparing the light blue bars shows that even if DPC achieves the same WACC as in-house delivery (and does not achieve any capex/opex savings), the overall cost to customers would be higher under DPC. This is due to the fact that under the DPC model there is no revenue recovery during the construction period, while under in-house and and SIPR, recovery starts as soon as assets are constructed. This means that the total amount of capital raised under the DPC model is slightly higher, as the full capital value of the scheme needs to be raised and spent before any revenue is recovered. Therefore, the total amount of debt outstanding at any point under in-house and SIPR will be lower, leading ot overall lower financing costs than under DPC.

Finally, the range of potential costs to customers under DPC is much wider than for in-house or SIPR models. This is a result of the different gearing ratios assumed for the upper and lower DPC WACC values – as discussed in the '*Financing Costs*' section above. For DPC procurement, we have assumed a range of 2.5 - 3.8% WACC (Vanilla, CPI-H deflated) based on a range of evidence available as set out in Table 7. This includes a modest gearing range of c. 40% (for the low WACC scenario) to c.60% (in the high WACC scenario). Our DPC modelling approach also assumes that equity investors will achieve Internal Rate of Return (IRR) by making project IRR equal to cost of equity – this has a significant impact on the finance costs achievable under DPC, and makes the gearing ratio a particularly important DPC parameter.

Holding all else constant, we note that increasing the gearing level beyond this would result in a lower WACC. This in turn would improve the VfM outcome for customers:

- Considering the difference between potential delivery models, we note that increasing the gearing level from c. 60% to 80% would result in the gap between the DPC lower range and the in-house higher range being reduced by c. 10%, thus making the lower end of the DPC range comparable to in-house delivery.

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[24] PA's calculation based on CEPA's Evaluation of OFTO Tender Round 2 and 3 benefits. Source: Table 4.1 of '*Review of cost of capital ranges for new assets for Ofgem's Networks Division*', Ofgem, 2018 (cepareport_newassets_23jan2018.pdf (ofgem.gov.uk)) (values adjusted for inflation (CPI-H) and to exclude tax)
[25] See for example Table A published by Ofwat for detailed assumptions.

- We also note that our modelling indicates that opex and capex efficiencies savings in accordance with PR19 assumptions (c.10-15% savings) would have an approximately equivalent effect on the indicative cost to consumers as a lower WACC, thus implying that both areas are of similar importance in driving a greater VfM.

However, it is unlikely that increasing the gearing ratio while holding all else constant is realistic – increased gearing is likely to increase the cost of debt, which would therefore counteract some of the potential cost reductions brought about by higher gearing. Further, more detailed exploration of potential DPC model parameters such as gearing, and the cost of debt and equity is recommended for Gate 3. This should be undertaken through market engagement to ensure that parameters are based on realistic, up-to-date information, and supported by comprehensive financial modelling to determine the overall cost to customers under DPC.

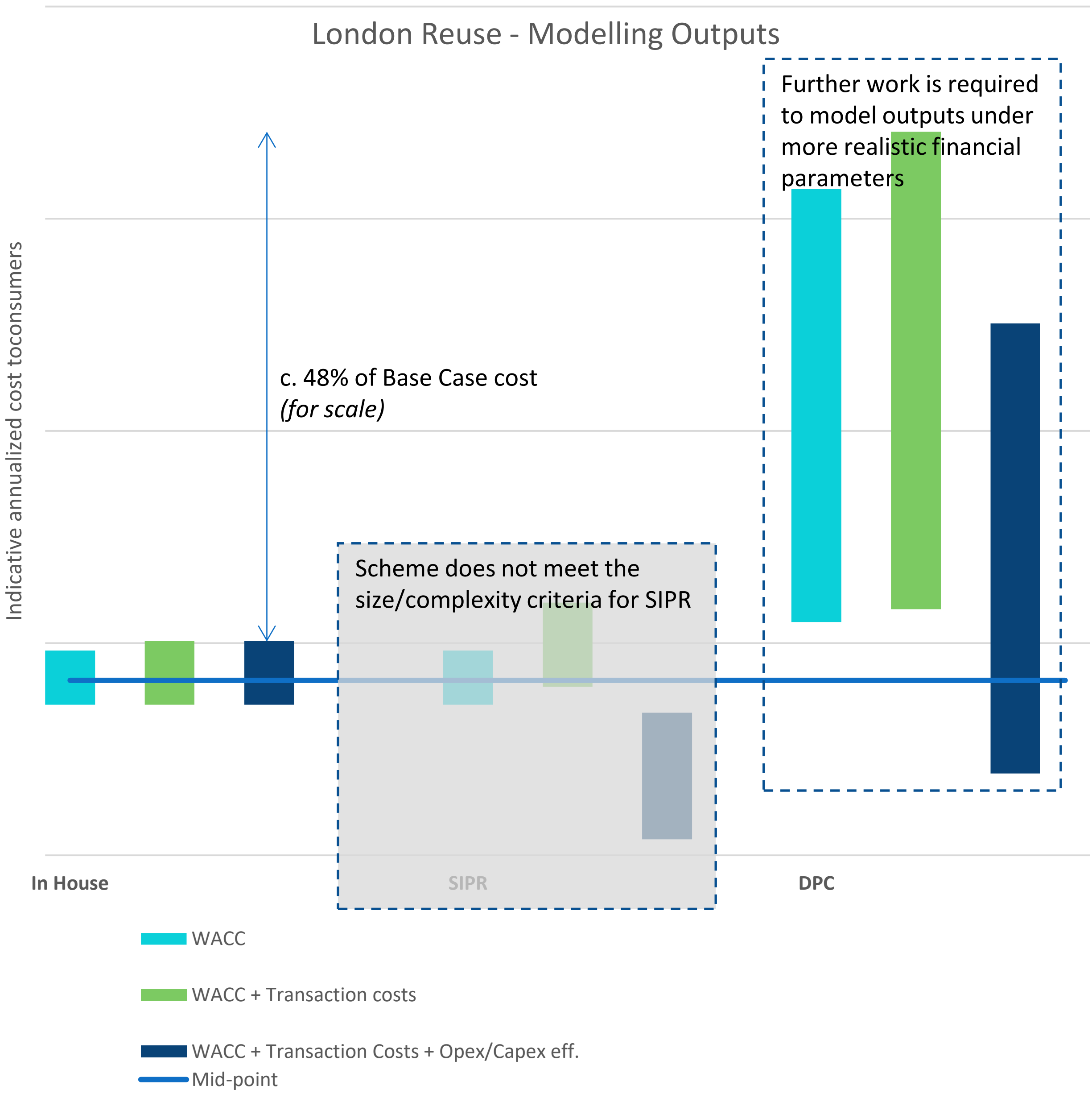


Figure 7: Indicative high-level modelling results

Water resilience value

This scheme creates a resilience asset that will ensure that water deficits are not experienced in a drought situation. However, the exact value that the scheme provides to customers depends on how it is used over its lifetime and whether or not it would be expanded or not. For example:

- The required capacity of the plant may increase: The plant is being constructed for 100 Ml/day but could be uprated in the future to as much as 300 Ml/day depending on drought demand in the future.
- This scheme is highly energy intensive: Changes in energy costs could significantly impact the cost-efficiency of this scheme in comparison to other sources, and it is plausible that future constraints on energy use (e.g. driven by net zero and/or public perception) influence how the plant is operated.

If the project was delivered through an in-house model, then TWUL would have the flexibility to operate the scheme itself as part of its wider system of water resources. TWUL would also have the option to apply to Ofwat for approval for additional revenue to fund the cost of expanding the project's capacity. However, whether the same degree of flexibility would be available under a DPC contract is unlikely. If this flexibility was required within approximately 25 years, under DPC it would likely require a change to the CAP arrangements partway through the DPC contract period. Whilst changes during the contract period are possible, they would come at a cost, thereby eroding value for money. Under SIPR, we anticipate that the IP licence regime could be designed in a way to incorporate this kind of flexibility, although whether this would enable a similar level of flexibility (or incentivise changes that would reduce overall customer bills) to the same degree as an in-house model.

At this stage it is not clear whether the need for future flexibility is a material consideration when assessing the potential value for money under DPC or SIPR vs. In-house delivery. Therefore it is difficult to value the benefit of the additional flexibility to customers, but qualitatively it reduces the case for DPC (and to a lesser degree SIPR) relative to an in-house delivery model.

Overall assessment of value for money

Our analysis shows that for the Beckton scheme:

- The 'standard form' DPC model may not achieve lower financing costs than in-house delivery, and therefore it is likely that capex and opex efficiencies of around 10-15% will be needed for the 'standard form' DPC model to achieve significantly lower costs to customers than in-house delivery. There are opportunities to adapt the 'standard form' DPC model (for example, introducing staged payments during construction or recovering costs over a longer period) to drive improved financing costs, and therefore we recommend DPC is considered further for Gate 3.
- For elements of the Beckton scheme that comprise reasonably typical water industry work-types and assets and relatively low opex as a proportion of totex, achieving 10-15% capex and opex efficiencies under DPC appears ambitious. However, the complex and specialist technology involved in the RO plant, and its relatively high opex as a proportion of totex, mean that there may be greater opportunity to drive significant efficiencies under a DPC model, particularly if this was split out and delivered under a separate contract.
- There may be value-for-money benefits associated with retaining flexibility to adapt the scheme's future operating regime and capacity in response to changing needs and/or external factors (such as energy costs). This would favour in-house delivery over DPC – however at this stage further analysis of the likelihood and impact of future change is required to validate the materiality of this flexibility.

We recommend further investigation of these indicative findings, including detailed commercial risk analysis, market engagement with both potential investors and the construction supply chain, to inform more realistic parameters to include in detailed financial modelling of costs to customers under both DPC and in-house models. In particular, we recommend specific consideration of whether the scheme could be made more attractive and achieve greater efficiency opportunities if the RO plant was delivered under a separate contract. Detailed, more informed quantitative modelling between Gate 2 and Gate 3 would support a firm conclusion on the value-for-money potential of DPC for the Beckton scheme.

4.3 Mogden and Mogden South Sewer

As stated earlier in this report, the Mogden and Mogden South Sewer schemes have not been selected in the most recent WRSE Regional Plan. For this reason, we have not included the procurement model assessments for these two schemes here, but have included these in the appendices.

4.4 Procurement Model Assessment Conclusion

Table *8* overleaf summarises the assessment of the eligibility of each of the four schemes for DPC and SIPR.

At this stage, it is considered unlikely that the value and complexity of any of the four London Reuse scheme options would pass the SIPR 'size and complexity' test[26], or that the additional effort required to apply SIPR would be justified. We therefore recommend ruling out SIPR at Gate 2 for each option.

Considered as a whole scheme, Teddington is **not suitable for DPC**. The scheme's largest components do not pass the discreteness test, and if these components were to be removed, the remaining component (b. treated effluent pipeline and discharge) would have totex of only £84m and therefore would not pass the size test.

However, there are no critical impediments to the application of DPC for the three remaining London Reuse schemes based on size, discreteness or other commercial feasibility parameters. Therefore, the defining factor between in-house and DPC delivery for these schemes will be VfM. At this stage, VfM assessments set out in this report are inconclusive, but suggest that there is potential for DPC to deliver financing, opex and capex savings relative to in-house delivery. The magnitude of these savings is in a wide range based on the work done for Gate 2. Consequently, further work is required between Gate 2 and 3 to provide a more robust assessment of whether competitively tendered models are likely to offer improved value for money for customers when compared to in-house delivery. This includes alignment to any changes in scheme delivery milestones based on water resource modelling[27], detailed investigation of the likely operating regime for the scheme; and market engagement to inform more detailed modelling of the likely cost-to-customers under different delivery models.

[26] SIPR "size and complexity" test summarised as "….*the infrastructure project is of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers…..*"

[27] Undertaken by Water Resources South-East (WRSE)

Table 8: Summary of Gate 2 assessment for London Reuse schemes

		Teddington	Beckton	Mogden	Mogden South Sewer
Anticipated required in-service date[28]		2031	N/A		
DPC	Size	All schemes significantly exceed the £100m size threshold for DPC delivery set out in Ofwat's PR19 methodology, as well as the £200m size threshold set out in the draft PR24 methodology			
	Discreteness	Scheme does not pass the discreteness test. Scheme construction requires complex interfaces with existing operational TWUL assets, including the modification of existing assets while keeping them operational, and challenging, high-risk interfaces with the existing Lee tunnel.	Risks identified against multiple discreetness headings, however it is anticipated that these could be mitigated through the DPC model. Risks are primarily around material contribution to supply, interactions with existing network and ability to specify outputs given that resilience demand is variable.		Relatively minor risks identified under single discreetness heading (material contribution to supply), which are anticipated to be able to be mitigated through the DPC model.
	Implementation timescales	The required in-service date implies a DPC CAP award date of mid-2026, with Gate 3 planned for late 2023. This means there are likely to be significant challenges to developing and procuring a DPC model within the period between Gate 3 and required CAP award date.	Should Beckton be required, the likely earliest CAP award date would be the late 2020s, with DPC implementation activity to commence from late 2023 upon WRMP approval. This gives sufficient time to implement a DPC model before CAP award (although we note that timings may need to be re-assessed upon WRMP approval in 2023)	N/A – schemes not currently selected in the WRSE Regional Plan, therefore no in-service date information available.	
	Value for money	Our analysis indicates that for DPC to drive better value-for-money than in-house delivery, DPC needs to deliver capex and opex efficiencies of approximately 10-15%, *and* comparable finance costs to in-house delivery. For all schemes, capex makes up over 75% of scheme totex over a typical DPC contract period, and the worktypes involved indicate that achieving 10-15% capex efficiency may be challenging. There may be opportunities for opex efficiencies through more active and cost-effective management of ongoing operations and energy costs, however the small proportional value of opex limits the impact of this on overall cost efficiency under DPC. Further investigation, including detailed commercial risk analysis for the scheme and comprehensive market engagement to inform more detailed modelling of the likely cost-to-customers is needed to determine whether DPC offers better value-for-money than in-house delivery.			
SIPR	Size and complexity	None of the four London Reuse schemes are large or complex enough to satisfy the SIPR eligibility test i.e. no scheme is of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers. However, our initial assessment suggests that the Beckton scheme may be of sufficient scale to deliver better value to customers under a SIPR model, and we therefore recommend that the preferred procurement model for Beckton should be reviewed in the event that SIPR legislative changes (recently suggested by Ofwat) are adopted.			

RAG rating definitions	
(Red)	Procurement model does not satisfy the criteria and should be dis-counted from consideration post-Gate 2.
(Amber)	Procurement model satisfies the criteria based on information available at this stage, however there are some challenges to its viability that need further work to conclusively resolve.
(Green)	Procurement model satisfies the criteria.

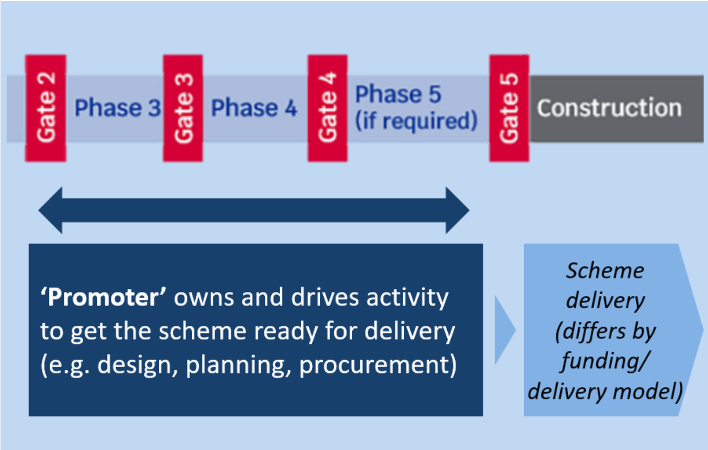
[28] Based on the WRSE Regional Plan, or, in the case of Beckton, TWUL's draft Water Resource Management Plan.

5 Scheme ‘promoter’ options and operating arrangements

5.1 Promoter options

The scheme ‘promoter’ will own and drive activity to prepare the scheme ready for delivery from Gate 2, as shown in the diagram below. Promoter responsibilities span the following key areas: preliminary design and feasibility activity; stakeholder engagement and consultation; planning activity; and procurement.

Figure 8: Overview of promoter activity within the RAPID gated process



Using the definitions set out in the RAPID / Ofwat December 2021 consultation document[29], the Promoter could be the provider/exporting company, the company where the assets are located, the importing/beneficiary company, a joint venture between the above, a third party or one company could lead with defined involvement from the others.

However, in the current case, TWUL is the sole provider, primary beneficiary, and has all of the assets located within its region for each proposed scheme. Moreover, because planning risks are considered relatively high for each London Reuse scheme proposed, there appears to be little benefit in transferring this risk and responsibility to a future DPC CAP (i.e., any DPC model will be implemented once planning consent is in place, and therefore the CAP will not be the promoter). Consequently, as illustrated in Table 9 below, we recommend that TWUL should remain the promoter beyond Gate 2 for each proposed London Reuse scheme.

Table 9: Promoter mapping to each proposed scheme

	Teddington	Beckton	Mogden	Mogden South Sewer
Provider / exporting company	✓ *Source water extracted in TWUL area*	✓ *Source water extracted in TWUL area*	✓ *Source water extracted in TWUL area*	✓ *Source water extracted in TWUL area*
Company where the assets are located	✓ *Assets located in TWUL area*	✓ *Assets located in TWUL area*	✓ *Assets located in TWUL area*	✓ *Assets located in TWUL area*
Importing / beneficiary company	✓ *Water is returned from reservoir directly to the TWUL area*	✓ *Water is returned from reservoir directly to the TWUL area (scheme may indirectly benefit Affinity Water via the Thames to Affinity Transfer scheme)*	✓ *Water is returned from reservoir directly to the TWUL area*	✓ *Water is returned from reservoir directly to the TWUL area*

[29] https://www.ofwat.gov.uk/wp-content/uploads/2021/12/RAPID-Autumn-2021-condoc.pdf

5.2 Operating arrangements

Most SROs are being jointly delivered by at least two companies, which introduces complexity and specific consideration of divisions of control during operations. However, the London Reuse schemes only involve TWUL, and therefore, will be ultimately operated by TWUL.

Currently, the operating requirements of each scheme are still under development, and while it appears clear that TWUL will need some involvement in the operating regimes for these schemes, the need for active, day-to-day control (as opposed to ‘arms-length’, passive oversight) is unclear. For Teddington, which we recommend is delivered in-house, this does not require further consideration as TWUL will be operating the assets in-house on a day-to-day basis regardless. For the other schemes, however, which are anticipated to be suitable for DPC delivery, the preferred operating regime and the DPC commercial arrangements should be developed together, to ensure that operational responsibilities and accountabilities of TWUL vs. the CAP are adequately reflected in the risk and cost transfer between the two parties (for example, if TWUL retains control of day-to-day flowrates through the scheme, and the flowrates are a key influencing factor in ongoing maintenance costs of pumping and treatment assets, then TWUL should retain some commercial liability for the maintenance costs of the scheme – e.g. through maintenance costing based on volumetric ‘bands’ of flow). Between Gate 2 and Gate 3 we recommend further detailed investigation of the operating regimes of these schemes, including scenario-testing, to inform the most appropriate operating arrangements to be incorporated into future DPC commercial arrangements.

6 Risk allocation

This section sets out the current early thoughts on potential risk allocation between TWUL, the contractor/CAP and customer for the Teddington and Beckton schemes. As the two Mogden schemes are not currently being selected under the WRSE Regional Plan, we have not presented a detailed overview of these schemes; however, should these progress, they would be expected to follow a similar approach to Beckton, assuming delivery under DPC.

6.1 Teddington

As set out in Section 4.1, Teddington is not considered suitable for DPC, and is therefore assumed to be progressed through in-house delivery.

Context – current TWUL procurement routes for major capital projects

TWUL currently delivers capital projects under four different 'runways' as set out in Table 10 below. This approach is anticipated to continue through into AMP8, when Teddington is expected to be delivered, for entry into service by 2031.

Table 10: TWUL capital project procurement routes

'Runway'	Typical project value (capex)	Procurement route
Runway 0 – small civils, mechanical and electrical works	<£1m	TWUL contract directly with Tier 2 supply chain
Runway 1 – small-medium projects	£1m - £5m	FA1488 framework – covers TWUL's entire region, divided into two lots: - Lot 1 – 'Non-infra' (above-ground equipment, structures and process plant) - Lot 2 – 'Infra' (below-ground water and sewerage) Each lot includes several suppliers, individual projects are procured through mini-competitions.
Runway 2 – medium-large projects	£5m - £30m	Bespoke, one-off projects procured through the FA1488 framework, as above. For repeatable, programmatic projects, the regional FA1495 framework is used. This is divided into two regional 'non-infra' lots and three regional 'infra' lots. Each lot has a 'Primary' and 'Secondary' contractor, who are allocated projects based on pre-agreed criteria.
Runway 3 – major projects	>£30m	For very large projects, bespoke procurement events are run, compliant with Utilities Contract Regulations. Under these procurements, aspects such the lotting strategy, contract form and risk allocation would be considered and determined based on the individual project characteristics.

As set out in Table *3* in Section 4.1, the total estimated capex for the entire Teddington scheme is £237m, and each of its constituent components has capex >£30m. Therefore, Teddington would be anticipated to proceed through 'Runway 3' even if divided into its constituent components.

Risk allocation for Teddington

Based on the above, Teddington is anticipated to be delivered under a bespoke, full-scale procurement, with a bespoke contract that sets out the appropriate risk allocation specifically for Teddington. Figure 8 of Ofwat's *Direct Procurement for Customers: Technical Review* report[30] (reproduced in Appendix 8.3 for reference) sets out indicative risk allocations for a project under typical in-house delivery model. With the exception of the construction of the tertiary treatment plant and connection of the raw water pipeline to the existing Thames-Lee Tunnel, (which we describe further below), the construction risk profile for Teddington is relatively typical for a water industry project. As such we expect risk allocation to reflect that set out in the Ofwat report, albeit with greater risk transfer to the contractor during the construction phase. As the project develops and specific risks and costs become clearer towards Gate 3 and beyond, we recommend a more granular approach to the transfer of specific risks,

[30] *Direct Procurement for Customers: Technical Review*, KPMG, 2017.

following the principle, set out in the HM Treasury Green Book and reflected in the IPA Project Routemap, that '*responsibility for management of risk should be allocated to the organisation best placed to manage it*'.

Construction over the Mogden storm tanks and connection to the existing Thames-Lee-Tunnel

As set out in Section 4.1, these elements are relatively high-risk, and atypical within water industry construction. Because of this, the risk transfer associated with these elements requires particular consideration.

For the construction over the Mogden storm tanks, it is likely that risk mitigation will require a level of involvement from TWUL operations staff who have experience and expertise in the operations of the existing storm tanks and will be able to advise on the operation of any temporary facilities required during construction. Therefore, these risks should be shared between TWUL and the contractor, with the degree and mechanism of this sharing to be determined as part of scheme development beyond Gate 2.

The connection to the existing Thames-Lee Tunnel involves significant uncertainty as the tunnel was built in the 1960s and relies on surrounding ground pressure for structural integrity, and a connection such as this has not been attempted previously. Further, the impact of failure is extraordinarily high as the tunnel is a key transfer of raw water from west to east and forms a critical part of the London water supply system. Because of this, transferring this risk entirely to a contractor would likely result in excessive cost-of-risk being built into the contractor's price. Therefore, this risk should be shared between TWUL and the contractor, potentially with a mechanism under which the risk is progressively transferred to the contractor as assumptions relating to the tunnel condition and required construction methodology (e.g. temporary works requirements) become clearer during the construction phase.

6.2 Beckton

As set out in Section 4.2, Beckton is considered suitable for DPC and therefore this discussion is based on Beckton being delivered under DPC.

Figure 9 of Ofwat's *Direct Procurement for Customers: Technical Review* report (reproduced in Appendix 8.3 for reference) sets out indicative risk allocations for a typical project under the DPC model. With the exception of the RO plant (which we describe further below), the risk profile for Beckton is relatively typical for a water industry project, and as such we expect risk allocation under DPC to reflect that set out in the Ofwat report. As the project develops and specific risks and costs become clearer towards Gate 3 and beyond, we recommend a more granular approach to the transfer of specific risks, following the principle, set out in the HM Treasury Green Book and reflected in the IPA Project Routemap, that '*responsibility for management of risk should be allocated to the organisation best placed to manage it*'.

Beckton RO plant

As set out in Section 4.2, the RO plant component of Beckton represents a significantly less 'typical' asset for the UK water sector than other Beckton assets. RO technology is relatively immature in the UK, but mature in other geographies, such as southern Europe and the Middle East. Because of this, it is likely that the supply chain will have greater capability than TWUL in the design, construction and operation of an RO plant, and subsequently will be better able to manage risks in these areas than TWUL. Therefore, we recommend that the design, construction and operation risks are transferred to the CAP to a greater degree than set out in Table 9 of Ofwat's *Direct Procurement for Customers: Technical Review* report, which suggests that much of these risks should be shared with TWUL customers. If the CAP is given control over the detailed design of the plant, and the inputs (e.g. quality of incoming raw water) are assumed to be relatively predictable, the CAP would have the ability to control the design, construction and operations phases of the scheme and as such would be in a position to manage risks throughout. Because RO is relatively complex, non-commoditised technology, it is likely that the cost to the CAP of managing these risks would be significantly lower than the cost to TWUL (and its customers), and therefore these risks should be transferred. Key exceptions to this would be areas of risk outside the CAP's control – for example 'change in design required due to external influences', 'unforeseen ground…conditions' and 'legislative/regulatory change'. Further, volumetric input costs (i.e. costs associated with increasing the volume of supply) for the RO plant are high, meaning that the ability of the CAP to recoup these costs will be key to maintaining cost-efficiency. Meanwhile, the likely demand profile for the plant is likely to be highly volatile and relatively uncertain even when averaged out over a c.25-year DPC contract duration. Therefore, 'demand risk' should remain with customers (i.e. the CAP should not 'lose out' if future demand for Beckton is lower or higher than expected).

Transferring these risks effectively to the CAP for the RO plant, while maintaining cost-efficiency, would need to be enabled by, for example:

- Ensuring sufficient design freedom for the CAP – e.g. through a high-level output specification
- Creating a payment mechanism with both availability- and volume-based components, potentially including different volume-bands to accommodate demand that is significantly higher or lower than expected
- Ensuring the scheme is attractive to the market and drives sufficient interest to maintain competitive tension between bidders

7 Procurement risks, plan and market engagement

7.1 Procurement risks

This section sets out the key risks associated with procurement of the London Reuse schemes. The procurement strategy for these schemes is at an early stage, and as such a detailed procurement risk appraisal is not possible at this stage. However, the Infrastructure and Project Authority's *Project Routemap: Procurement* module[31] sets out some typical high-level procurement-related issues that are often encountered on major projects. As shown in Appendix 8.4, these issues can be simplified to four summary procurement risks – these risks, and their mitigations, are shown in Table 11. The mitigation actions are addressed in the market engagement and forward procurement plans, outlined in Sections 7.2 and 7.3.

Table 11: Summary procurement risks and mitigations for London Reuse schemes

Procurement risk	Mitigation
Sub-optimal detailed procurement/contract strategy and/or plan	Implementation of a robust procurement and contract strategy development process, including a detailed understanding of key scheme commercial risks, informed by comprehensive market engagement, and developed with the support of specialist advisors (e.g. legal) where necessary.
Misunderstanding of or insufficient promoter capability	Ensuring the required resources are in-place to deliver the procurement strategy are in-place, including specialist advisors, and that the required operating model (capabilities, organisation structure and supporting processes) is in place to manage the delivery and future operation of the scheme.
Misunderstanding of supply chain capability and/or appetite	Undertaking a rigorous market engagement process, and using this to inform the detailed procurement, commercial and contract strategy.
Misalignment between project requirements and what's procured	Ensuring the procurement, commercial and contract strategy is developed with an in-depth understanding of project technical and engineering requirements and risks, and any constraints driven through the planning process. This can be achieved by involving technical teams in the procurement, commercial and contract strategy development process, and through running a comprehensive market engagement process whereby prospective bidders are asked to provide feedback on the alignment between the procurement approach and desired project outcomes.

7.2 Teddington – Market engagement and forward procurement plan

This report has concluded that the Teddington scheme is not suitable for DPC delivery. Therefore, we have built the forward procurement plan and market engagement approach based on an in-house delivery model.

Ofwat requires TWUL to submit a procurement plan for each scheme as part of the Gate 2 submission. The procurement plan needs to consider the whole period until the contractor delivering the scheme has been appointed, not just the period between Gate 2 and Gate 3.

Some of the different kinds of activities which TWUL should undertake, and issues which TWUL should consider, include:

- **Engagement with Ofwat** – successful outcomes at the gates and control points will be dependent on appropriate and proportionate engagement with Ofwat. This should help in identifying potential issues before the submission takes place, as well as providing the regulator to have an input in to the overall process. This will be especially important for Teddington, as Ofwat's approval will be required to formally remove Teddington from the DPC process. This may include the development of a Strategic Outline Case demonstrating that in-house delivery is the preferred option for Teddington, which should be largely based on outputs from Gate 2.
- **Engagement with other stakeholders** – the scheme delivery programme will also be highly dependent on getting the external and internal right expertise and inputs at the required times. For example, TWUL will likely require input from legal and commercial advisors when drafting contractual agreements, appropriate outputs of the engagement with Drinking Water Inspectorate, output of the engagement with Environment Agency (for example, on WRMP) and local/regional authorities for obtaining required consents for the scheme.

[31] Procurement_-_FINAL.pdf (publishing.service.gov.uk)

- **Commercial risks –** there likely to be a range of scheme specific risks (for instance, these may include technical, commercial and operational) that will need to be identified and discussed with potential suppliers. Of particular focus should be the construction challenges highlighted in the Teddington discreteness assessment in Section 4.1; specifically the construction of the tertiary treatment plant on top of existing operational storm tanks, and connecting into the TLT. The purpose of this activity would be to more accurately estimate the likelihood and cost impacts of these risks, and develop a more robust understanding of whether these risks should be transferred to the supply chain, or shared between TWUL and the supply chain, and the commercial mechanisms under which this risk transfer or sharing could take place.
- **Tendering and other Internal Activities** – Activities involve finalising the detailed procurement strategy for the Teddington scheme (for example, whether to procure under one contract or separate out individual components, and whether to use TWUL's standard capital delivery procurement frameworks or bespoke tender), planning detailed activities around each of the tendering stages, and ensuring the right resources are in place to manage the process. This needs to be aligned to a detailed understanding of the scheme's technical requirements, developed by scheme technical and engineering teams, and any constraints introduced through the planning process. This includes developing and implementing the future client-side operating model (organisational structure, capabilities, processes and systems) to manage scheme delivery and operation.

The scheme will need to be discussed with potential construction contractors in order to establish how best to design the procurement process, and to maximise competitive tension and resulting value for money. These so called 'market engagement' activities would take place over several phases, including:

- **Early Market Sounding:** this is an optional stage and could include both investors and the construction supply chain to confirm the conclusion of this report that Teddington is not suitable for DPC. Further, engagement with the construction supply chain would help inform views on scheme timelines, key risks and opportunities, as well as 'warming up' the market. This could be communicated through dedicated presentations with a select group of supply chain partners.
- **Soft and Formal Market Testing**: during this time TWUL will need to engage with potential construction contractors to present the scheme, timings, scheme-specific risks, dependencies and constraints, and gathering feedback on how risks are allocated and priced, and the likely structure of the future contract. We would use presentations, workshops and bilateral meetings to communicate with the community. This stage may last between 6 to 18 months.
- **Tender activities:** Formal market engagement would lead into a PQQ stage (~6-months) where bidders will be evaluated according to commercial and/or technical criteria and few shortlisted bidders will be allowed to proceed. During ITT stage (~6months) shortlisted bidders to comment on contract, and preferred bidder is selected. During preferred bidder stage the commercial contract is finalised and agreed. Tender activities are likely to require 12 to 18 months in total.

A forward-looking procurement plan for the Teddington scheme is presented below. This plan is part of the broader Project Delivery Plan (Appendix F-1), and is based on the best information that is currently available. However, as the scheme proceeds beyond Gate 2, TWUL should consider whether further updates to the plans may be required in light of feedback obtained through market engagement and WRMP activities (which could influence the timing of when schemes need to be delivered by). This procurement plan will be developed further into a fully detailed plan as scheme development progresses.

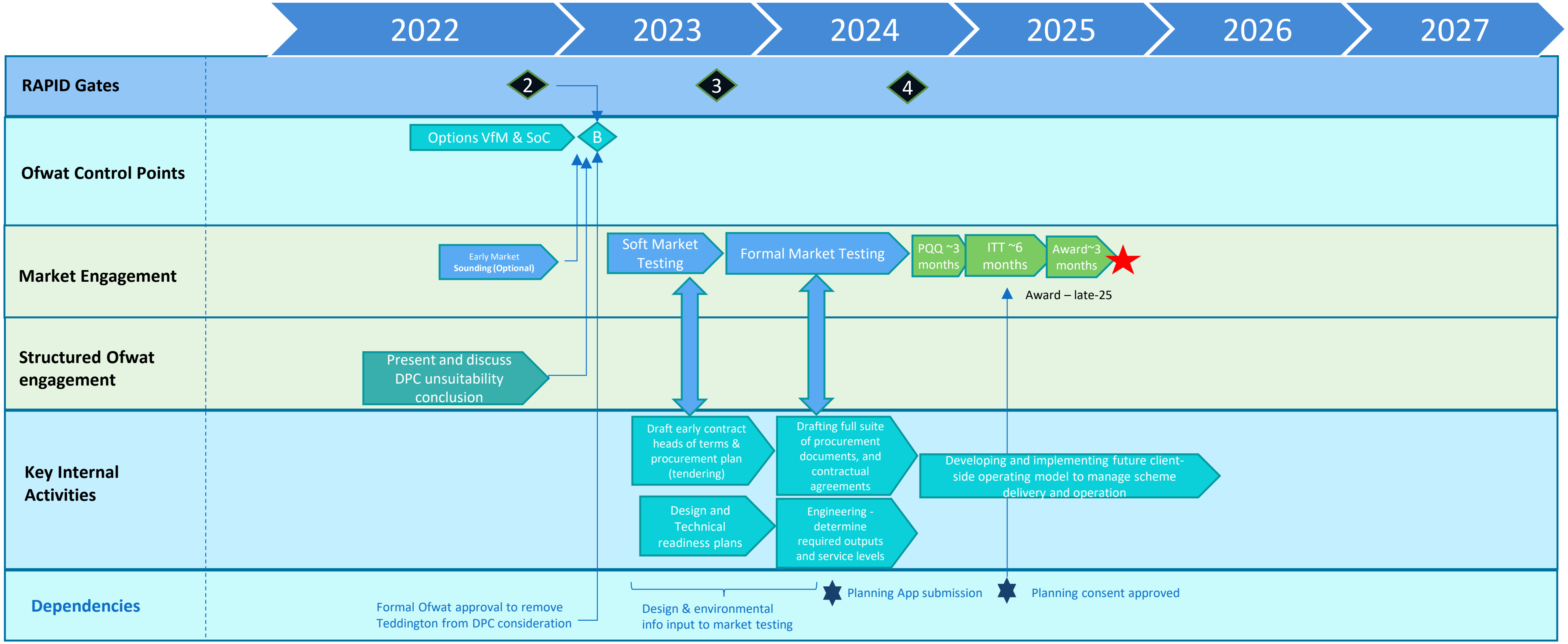
7.2.1 Procurement Plan – Teddington Scheme

The plan below depicts key procurement activities that will need to take place in order to meet contract award date, currently scheduled for end of 2025

The contract award date will be dependent on achieving planning application submission by mid-2024 as well as getting a planning consent approved by mid-2025. Additionally, year 2024 is looking to be particularly busy with number of different Market Engagement related activities taking place concurrently. This could be mitigated by producing additional plans covering more detailed activities, aiming to identify and mitigate potential bottlenecks within the critical path. We envisage that additional work is required to fully mitigate this and other potential risks.

No market engagement has been undertaken so far on this scheme.

Figure 9: Procurement plan for Teddington



7.3 Beckton – Market engagement and forward procurement plan

This report has concluded that the Beckton scheme may have the potential to deliver enhanced value for money for customers through DPC, and as such should proceed to Gate 3. The report has also concluded, however, that further work is required to explore the potential financing, capex and opex savings in more detail. In particular, further investigation of the 'cost to customer' analysis of different procurement models is needed. For example:

- TWUL will need to further develop and test the operational regime i.e. further investigation of how the Beckton scheme will operate in-life. This includes – how often the scheme will be used under different water supply scenarios, as well as ongoing operational and maintenance regimes including the need for sweetening flows and regular operational testing.
- TWUL will need to undertake a more detailed commercial risk appraisal: more comprehensive, more detailed commercial risk appraisal, taking into account the exploration of the operational regime as above, to gain a deeper understanding of the key technical, delivery and operational risks of the project, their mitigations, and whether they are best able to be managed by TWUL, or transferred to the supply chain. As part of this, TWUL will need to explore the feasibility and desirability of building different operational regimes into supply chain contracts (including through DPC).

This should include scenario-testing to assess how well different models respond to different scenarios (e.g. drought conditions, scenarios where other SROs are delayed or don't deliver as expected, significant delays during construction, significant changes in future energy costs). For example – testing whether a DPC provider would continue to deliver good value if the underlying cost of water from the Beckton scheme became much more expensive than currently expected, and whether contractual mechanisms to mitigate negative impacts of this would be feasible or desirable.

The value for money and scenario analysis should be updated to take into account relevant changes in circumstances between Gate 2 and Gate 3. For example:

- This report is based on the current eligibility criteria for triggering a new Infrastructure Provider, which includes SIPR being appropriate in the event that *"…the infrastructure project is of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers..".* By nature, passing the SIPR model is a difficult test to prove, reflecting the intention of this legislation when first enacted. Reflecting this, we have concluded in this report that none of the four London Reuse schemes (including Beckton) is likely to meet the SIPR criteria. However, during the preparation of this report, Ofwat has made a recommendation[32] to the Secretary of State for Business, Energy and Industrial Strategy (BEIS) that the 'size or complexity' test be removed from SIPR legislation, so that SIPR can be applied to a broader range of schemes where a licensed approach would offer value for money. Should this recommendation be accepted, any subsequent changes to SIPR legislation would need to be incorporated into future assessments of the Beckton scheme.
- This report is based on the 'standard form' DPC model report as described in Ofwat guidance. However, during the course of this project discussions have been held with RAPID to understand the appetite to make changes to the DPC model where appropriate to unlock benefit for customers e.g. the possible introduction of stage payments to create a revenue stream during construction, and using a higher gearing ratio to reduce WACC. If changes to the DPC model are possible, it would be appropriate to consider these possible changes, and their implications for the value for money of applying DPC procurement for Beckton, for Gate 3.
- Since financial markets are also evolving, the assessment of financing costs used in the value for money calculations should also be updated to take into account this updated information.

Key activities and plan

Ofwat requires TWUL to submit a procurement plan for each scheme as part of the Gate 2 submission. The procurement plan needs to consider the whole period until the contractor delivering the scheme has been appointed, not just the period between Gate 2 and Gate 3. To assist TWUL prepare its procurement plan, we have considered the activities which TWUL needs to undertake in order to complete its evaluation of whether to DPC each scheme and to prepare for the DPC procurement process.

Some of the different kinds of activities which TWUL should undertake for the Beckton scheme, and issues which TWUL should consider, include:

- **Commercial risks and opportunities –** there likely to be a range of scheme specific risks (for instance, these may include technical, commercial and operational) that will need to be identified and discussed with potential suppliers and financiers. In addition, there may be opportunities – particularly the potential value in separating out the construction and operation of the RO plant, as discussed in Section 4.2. Subsequently,

[32] Competition stocktake report final (ofwat.gov.uk)

these risks and opportunities will need to be captured and reflected upon in to detailed modelling activities. At a high level, this may cover building in appropriate project risk estimates, establishing the capex profile and building in supportive financing activities.

- **Detailed Modelling Activities** – these activities will involve TWUL building a more detailed financial model that better captures realities of the scheme in order to make a robust VfM recommendation on the preferred delivery model at the control point C. Additions to the model may include debt refinancing repayment schedules, equity and debt financeability metrics (i.e. dividend cover, AICR), functionality for stress testing as well as refining financial, capex and opex assumptions following soft market engagement activities and expert input.
- **Engagement with Ofwat** – successful outcome at the gates and control points will be dependent on appropriate and proportionate engagement with Ofwat. This should help in identifying potential issues before the submission takes place, as well as providing the regulator to have an input in to the overall process. This especially going to be important for Control Point C where preferred delivery route would need to be identified, and in between C and E where a number interrelated drafting, planning and modelling activities will be taking place.
- **Engagement with other stakeholders** – the scheme delivery programme will also be highly dependent on getting the external and internal right expertise and inputs at the required times. For example, TWUL will likely require input from legal and commercial advisors when drafting its CAP agreement, appropriate outputs of the engagement with Drinking Water Inspectorate, output of the engagement with Environment Agency (for example, on WRMP) and local/regional authorities for obtaining required consents for the scheme.
- **CAP agreement drafting** – once risks are sufficiently understood and quantified, a CAP agreement would need to be drafted. Similar to typical PFI contract, the risks would need to be appropriately apportioned between the water company and potential investors so that risks are allocated to the party that is best placed to manage them. The CAP agreement document is likely to undertake a number of iterations between Control Point B and D and will be dependent (and inform) the outputs within detailed modelling and market engagement.
- **Tender Activities** – in parallel to CAP drafting, a good oversight will need to be obtained around tendering activities. Activities may involve drafting tender scoring methodology, planning detailed activities around each of the tendering stages, having right resources in place to manage the process. This needs to be aligned to a detailed understanding of the scheme's technical requirements, developed by scheme technical and engineering teams, and any constraints introduced through the planning process. This includes developing and implementing the future client-side operating model (organisational structure, capabilities, processes and systems) to manage DPC delivery and operation, which may include additional capabilities not currently held within TWUL, associated with the management of a DBFOM service contract for water infrastructure.

The Beckton scheme will need to be discussed with potential investors, construction and O&M contractors as well as with the supply chain in order to establish how best to design the DPC process, and potentially the role of the CAP, to maximise competitive tension and value for money. These 'market engagement' activities would take place over several phases throughout the DPC gated process, including:

- **Early Market Sounding:** this is an optional stage for Ofwat's control point B and could include both investors and the construction supply chain to inform views on scheme timelines, key risks and opportunities, as well as 'warming up' the market. This could be communicated during dedicated presentations.
- **Soft Market Testing**: during this time TWUL will need to engage with potential investors and construction contractors to present the scheme, timings, scheme-specific risks, dependencies and constraints, and gathering feedback on how risks are allocated and priced, the likely structure of the deal, and financing arrangements including gearing, cost of equity and cost of debt. This will help to inform input parameters for the detailed modelling needed for the VfM case at Control Point C. We would use presentations, workshops and bilateral meetings to communicate with the community. This stage may last between 6 to 18 months.
- **Formal Market Testing**: during formal market testing stage (which would commence after publication of PIN), we would expect a number of targeted workshops taking place with potential investors. These may cover scheme optioneering, procurement approach, contract details, construction and operations of the asset, ground investigation, finance & legal activities etc. Formal market engagement may last 12 to 24 months.
- **Tender activities:** following Ofwat's Gate 4/OBC approval, call for competition would be issued, and formal market engagement can start. During PQQ stage (~6-months) bidders will be evaluated according to commercial and/or technical criteria and few shortlisted bidders will be allowed to proceed. During ITT stage (~6months) shortlisted bidders to comment on contract, and preferred bidder is selected. During preferred bidder stage commercial contract is finalised and agreed, financial close is reached and FBC submission is made to the regulator. Tender activities are likely to require 12 to 18 months in total.

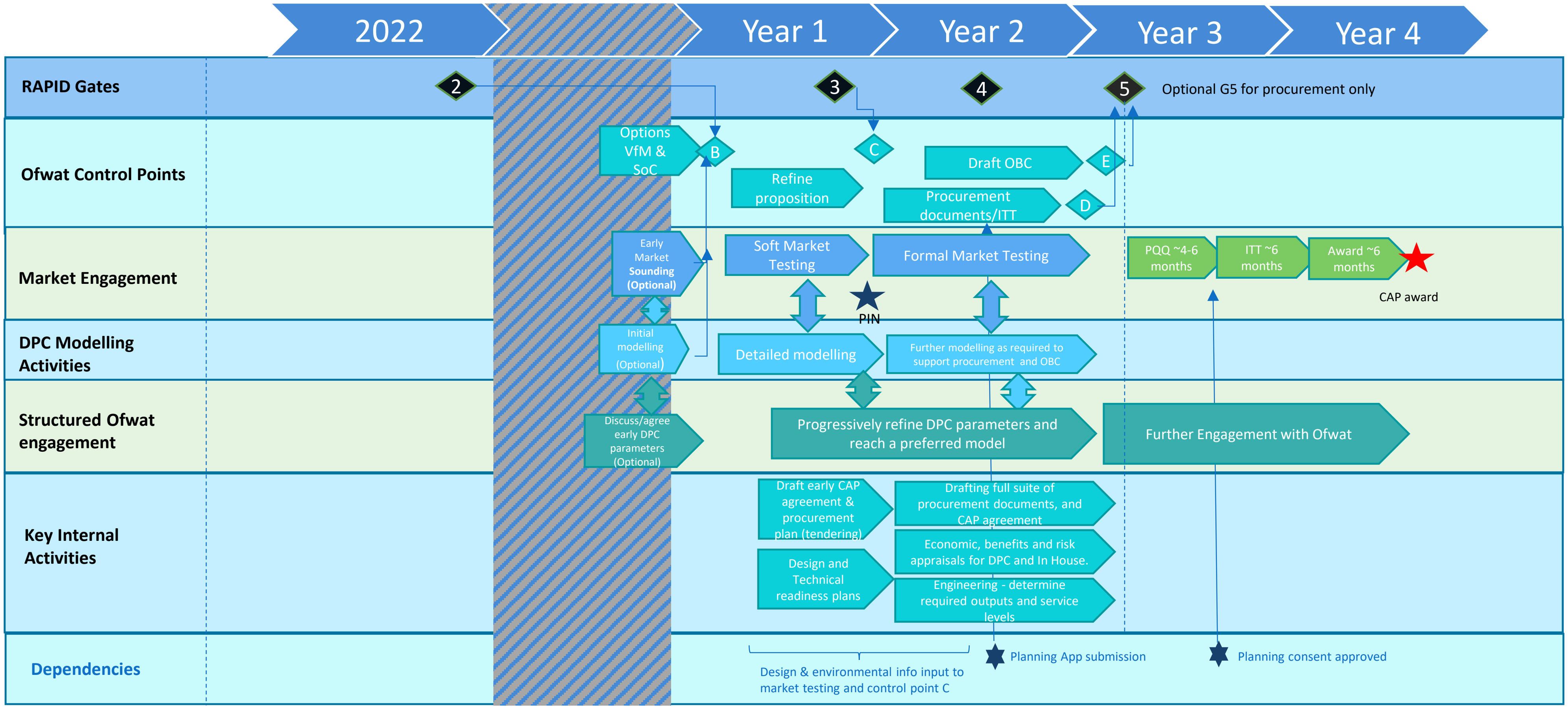
A forward-looking procurement plan for the Beckton scheme is presented below. This plan is part of the broader Project Delivery Plan (Appendix F-1), and is based on the best information that is currently available. As the timing of the Beckton scheme is still uncertain, we have presented a generic timeline based on years' duration rather than setting specific dates. This plan is based on the best information that is currently available. However, as these schemes proceed beyond Gate 2, TWUL should consider whether further updates to the plans may be required in light of feedback obtained through market engagement and WRMP activities (which could influence the timing of when schemes need to be delivered by). This procurement plan will be developed further, into a fully detailed plan, for Control Point C.

7.3.1 Procurement Plan – Beckton Scheme

The plan below depicts key procurement activities that will need to take place prior to CAP award. Beckton is not currently selected under the WRSE Regional Plan, and therefore there is not a firm timeline for this scheme at this stage. Notwithstanding, we understand that the earliest likely date for CAP award for Beckton would be the late 2020s, giving sufficient time to prepare and deliver these activities. However, previous plans have indicated an in-service date as early as 2031. Should this be the case, delivering to the timescales as set out below is likely to be challenging.

No market engagement has been undertaken so far on this scheme.

Figure 10: Procurement plan for Beckton



7.4 Mogden & Mogden South Sewer Schemes

As neither Mogden scheme is currently selected under the latest WRSE Regional Plan, we have not included a detailed market engagement and procurement plan for these schemes. However, should one of these schemes progress through DPC, it would follow similar procurement and market engagement activities and timetable as that shown for the Beckton scheme.

8 Appendices

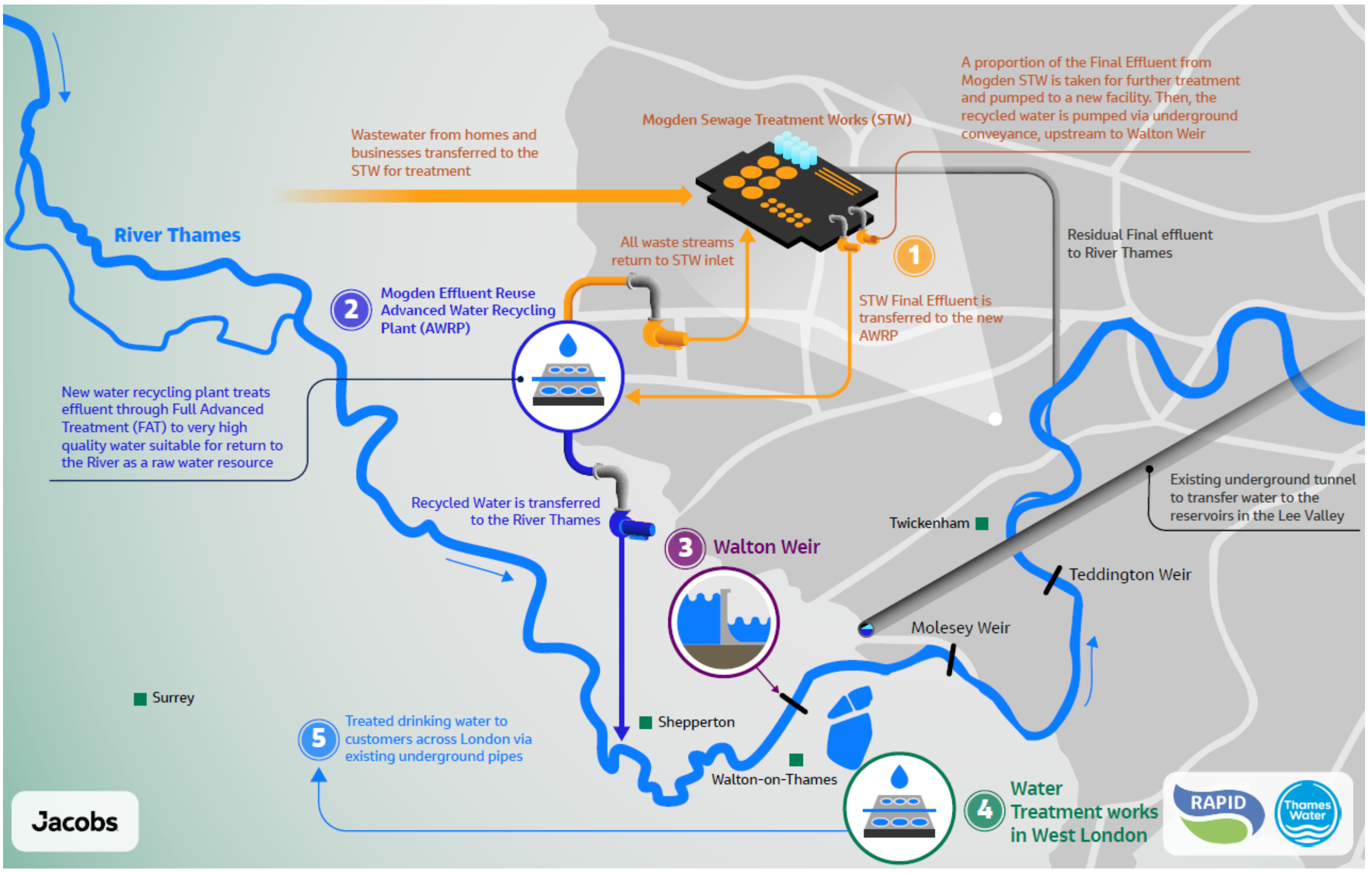
8.1 Mogden procurement model assessment

In this scheme final effluent from the Mogden STW would be pumped to a new RO plant located at a site near Kempton WTW. The recycled water would be discharged into the River Thames upstream of the existing TWUL site at Walton Bridge, increasing the overall flow to the River Thames at this location.

A waste stream including backwashes and RO clean-in-place chemicals will be pumped to the inlet of the Mogden STW.

This could deliver a maximum of 200 Ml/d deployable output. The plant would operate continuously at a "sweetening flow" of 25% x 200 Ml/d and ramp up to meet drought demand. The transfer of water is contained within the London river basin. Figure 11 provides a detailed schematic of this scheme.

Figure 11: Mogden scheme



Key elements of this scheme include:

- Construction of a new pumping station at the Mogden STW.
- Transfer of flows to a new site near Kempton WTW (TWUL owned land adjacent to unrelated site, development of a 7.5km x 1.8m pipeline).
- Construction of a new RO plant at this new site.
- Pumped waste return from RO plant back to Mogden STW.
- Pumped transfer (5.5km x 1.4m) from the RO plant to the River Thames discharge at Walton Bridge.

8.1.1 Size, discreteness, and complexity

DPC

In this section we first assess this scheme against the key areas outlined in Ofwat's definition of project size and discreteness as set out in their 'Direct Procurement for Customers: Technical Review' report. This assessment covers: i) size; ii) stakeholder interactions and statutory obligations; iii) interactions with the network; iv) contributions to supply / capacity and ability to specify outputs; and v) asset and operational failures.

Table 12: Mogden project size and discreteness criteria as measured against Ofwat's 'Direct Procurement for Customers: Technical Review' report

Size		• Scheme exceeds £100m totex, and therefore meets this requirement
Discreteness	Stakeholder interactions and statutory obligations	• Resilience asset which '*materially contributes towards the appointee meeting statutory obligations*' • However, these obligations are expected to be able to be written into a DPC contract. • Therefore, this is not a 'blocker' for DPC, but does raise some issues that will need to be mitigated through the DPC contract. • Unclear whether RO plant needs to be Regulation 31 compliant.
		• Effluent discharge impact of failure of assets could be mitigated in short term by all Mogden final effluent flows running to River Thames
	Interactions with the network	• No significant specialist construction or design. Choice of commercial model would not significantly change design. • Well understood interactions (inputs and outputs) • Clearly separate assets when located on existing site i.e. RO plant • Separately operated assets • Remote / discreet
	Contributions to supply/ capacity and ability to specify outputs	• Triggers for increased flow understood (drought linked) • Resilience assets and therefore demand profile is difficult to predict. Estimated full capacity required 2-3 months every 2-3 years • 'Sweetening flow' is well known (i.e. business as usual operations) and avoids the requirement for cold standby
	Asset and operational failures	• Well understood assets (pipelines and RO plant) • Strategies for asset failure can be informed from TWUL wider operations (risk of collapse on sewers and pipelines, risk of operational breakdown of M&E plant) • Flexibility in route corridors
Discreteness summary		**There are some relatively minor challenges.** **Risks identified against two discreetness headings. Anticipated these could be mitigated through the DPC model. Risks are primarily around material contribution to supply and ability to specify outputs given that resilience demand is variable**

SIPR

As set out in Section 3, a key criteria for a scheme to be specified under SIPR legislation is that it is of '*size or complexity that threatens the incumbent undertaker's ability to provide services for its customers*'. In the case of Mogden, the 'incumbent undertaker' is TWUL. The assessment of the Mogden scheme against this criteria is similar to that for the Teddington scheme, set out in Section 4.1, and we therefore do not repeat it here. In summary, the Mogden scheme does not entail comparable risks to TTT, and would not have an unmanageable impact on TWUL's financeability. Therefore, it does not appear to be of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers.

8.1.2 Implementation timescales

The Mogden scheme has not been selected in the preferred regional water resource portfolio in the most recent WRSE Regional Plan. However, the scheme is included in WRMP24 as an alternative to Teddington and/or Beckton as part of TWUL's adaptive WRMP.

Given that the estimated time required to establish a DPC model is a minimum of approximately three years from Gate 3, and Gate 3 could be delivered within 12-18 months[33] of the scheme being re-introduced into the Regional Plan, we conclude that there are no significant time-related risks to implementing a DPC model by the time Mogden needs to be constructed.

[33] The current RAPID timelines allow approximately 12 months between Gate 2 and Gate 3 for typical SRO schemes; therefore 12-18 months is a reasonable duration for a future Gate 3 process for Mogden.

8.1.3 Value for Money

Assessing cost to customers

Financing costs

For Gate 2, where our scope of work is only to perform high level analysis of financing costs, the financing costs for DPC, SIPR and in-house are assumed to be the same for all four re-use schemes. Please see discussion under the Beckton scheme in Section 4.2 for more details.

Efficiency improvements

Scheme specific capex and opex efficiency could enable the DPC model to deliver a lower cost to customers compared to in-house delivery. The capex and opex (fixed and variable) for this scheme is shown in Table 13.

Table 13: Project cost estimates for the Mogden scheme

Scheme	Capital expenditure	Fixed Opex (per annum)	Variable Opex (per annum)
Mogden	£624m	£3.8m	£6.0m

Note: capital costs in Table 13 above assume construction of the Mogden scheme up to 200Ml/d deployable output; fixed and variable opex cost assumptions are based on sweetening flow and anticipated demand

Ofwat's DPC guidance indicates that water companies should assume efficiency savings of 10-15% on both capex and opex compared to an in-house delivery model, with innovation a significant contributor to achieving this greater level of efficiency. However, these assumptions need to be tested and evaluated in the context of the specific scheme under consideration.

In present value terms over 25 years (a typical CAP period), capex will account for approximately 72% of the totex for this scheme, so the potential to achieve capex efficiencies will be a key determinant of whether DPC will deliver better value for money for consumers. To test the potential construction savings through DPC we have examined different categories of capex spend individually. We note that for this scheme capex is made up of approximately 62% civils construction (primarily large diameter and other pipework and civils for the RO plant) and 38% mechanical, electrical, instrumentation, control and automation (MEICA) works (RO plant, pumping plant and associated ancillaries).

With respect to the capex for civils construction work, pipeline construction, including "no dig" techniques, is a mature construction technique deliverable through a large and established supply chain. Moreover, TWUL has experience of procuring pipeline construction activity previously within their capital programme and as such are likely to be at a high level of efficiency. Consequently, it may be difficult for DPC to achieve additional efficiency savings , above that achievable by TWUL, of the magnitude Ofwat has assumed.

With respect to the capex for mechanical and electrical plant work, the RO plant is likely to be procured through a package offering by a specialist Original Equipment Manufacturer (OEM). The plant is likely to be pre-designed / modular with existing manufacturing in place. The plant is then integrated on site. As a result, the opportunity to innovate around the design and manufacture of the package plant will be limited given that this sits within the OEM provider's control.

Overall, 10-15% capex efficiency appears to be an ambitious target.

The opex proportion of totex for this scheme predominantly relates to power costs (48%) with the balance spread across labour, chemicals, maintenance and other smaller opex costs. The CAP would need to procure power from electricity markets, just as TWUL would if it developed the project in-house. The opportunities for the CAP to procure electricity more cheaply than TWUL would only arise through innovative procurement or hedging practices, as the power price is determined by exogenous factors outside of the control of TWUL and the CAP. TWUL routinely procures electricity from the market and is experienced at doing so, plus Ofwat has benchmarked electricity costs as part of its efficiency assessments at PR19 and prior price reviews, so it is not immediately obvious that the CAP would be able to identify a new way of procuring electricity compared to TWUL . Hedging strategy may be one opportunity for the CAP to achieve savings compared to TWUL, but this would come with the trade-off of either higher or lower risk exposure, with the ultimate impact on value for money for customers depending on whether power prices increased or decreased more than expected.

Another opportunity for the CAP to reduce power costs for this scheme would be to adopt a different operating regime, with the RO plant turned off rather than constantly running a sweetening flow. This would require greater planning of demand to allow the RO plant to come on-line through a "cold start" and associated flushing of the tunnel and other pipelines. That said, when discussed with TWUL's Programme Management team as part of the data gathering for this report it was stated that a cold start operating regime is deemed high risk by the water company and has already been considered and discounted in favour of the sweetening flow approach.

Overall, 10-15% opex efficiency appears to be an ambitious target without the water company being prepared to allow the CAP to adopt the increased operational risk associated with a cold start operating regime. Even then however, with opex being such a small component of totex, it would have a small contribution to any improved VfM calculation.

In summary, while there are opportunities for a CAP to drive capex and opex efficiencies relative to an in-house delivery model, it is unclear if the CAP could achieve 10-15% capex and opex efficiency savings or not. Based on the above, we recommend talking to prospective DPC bidders between Gates 2 and 3 to understand the level of efficiency they believe would be achievable. Involving contracting organisations in those discussions would help to get the detailed level of information required to carry out VfM modelling for DPC.

Water resilience value

This scheme creates a resilience asset that will ensure that water deficits are not experienced in a drought situation. This determines the core ‘water resource value’ delivered to customers from this scheme.

Future flexibility of this plant’s capacity may be desirable for the reasons given below.

- The required capacity of the plant may increase. The plant is being constructed for 100 Ml/day but could be uprated in the future through further investment.

If this flexibility was required within the next 25 years, under DPC it would require a change to the CAP arrangements. Whilst changes during the CAP period are possible, it may be simpler for required flexibility to be managed when the assets are controlled by the water company (In-house delivery).

In conclusion, the benefit of flexibility is subjective depending on confidence around future demand for the scheme.

Overall assessment of value for money

Like for the Beckton scheme, we have undertaken high level financial modelling to provide an initial overall indication of value for money, taking into account the impact of DPC and SIPR on financing, capex and opex costs. However, given the similar input assumptions applicable to each scheme, the results of the modelling are broadly similar for all four reuse schemes and so we do not present the modelling results again here.

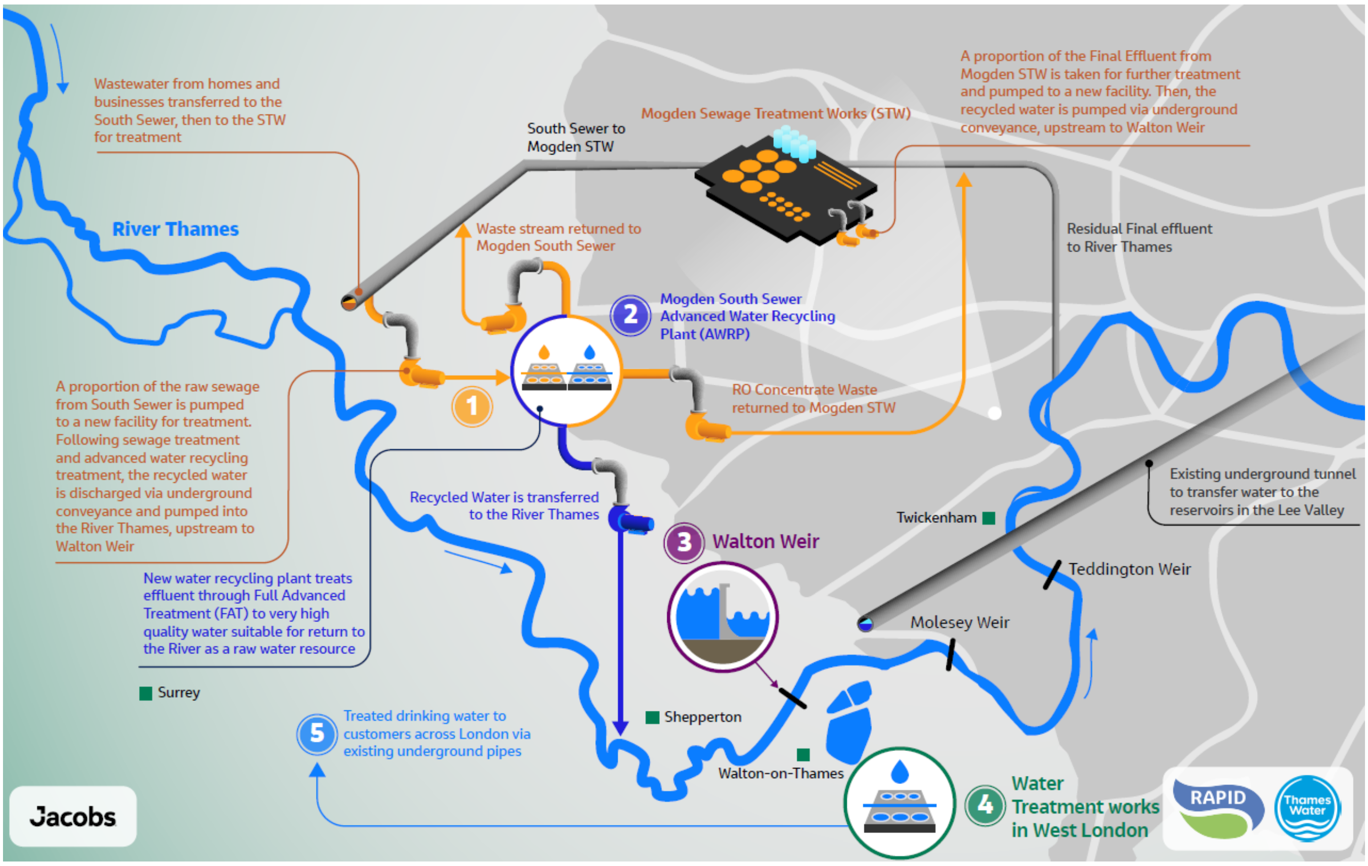
8.2 Mogden South Sewer procurement model assessment

In this scheme sewage would be abstracted from the South Sewer which supplies the Mogden STW and be pumped to a new sewage treatment and RO plant, located at a site near the Kempton WTW. Treated water would be discharged into the River Thames upstream of the existing TWUL Walton intake.

The RO waste stream will be pumped to Mogden STW for treatment or returned to the South Sewer.

This could deliver a maximum of 50 Ml/d deployable output although work through Gate 2 indicates this maximum is c.25 Ml/d. The plant would operate continuously at the designed capacity of the new STW. The transfer of water is contained within the London river basin. Figure 12 provides a detailed schematic of this scheme.

Figure 12: Mogden South Sewer scheme



Key elements of this scheme include:

- Increases flow to Thames at Walton Bridge.
- Supports additional abstraction to Thames Lee Tunnel.
- Raw sewage transfer pumped (2km x 1.1m) from south sewer to Kempton site.
- New RO plant at end of new STW processes.
- RO treated effluent pumped to Walton Bridge discharge as Mogden scheme.
- Waste return from new RO plant to south sewer (which feeds Mogden STW).

8.2.1 Size, discreteness, and complexity

DPC

In this section we first assess this scheme against the key areas outlined in Ofwat's definition of project size and discreteness as set out in their 'Direct Procurement for Customers: Technical Review' report. This assessment covers: i) size; ii) stakeholder interactions and statutory obligations; iii) interactions with the network; iv) contributions to supply / capacity and ability to specify outputs; and v) asset and operational failures.

Table 14: Detail of the Mogden South Sewer project size and discreteness criteria as measured against Ofwat's 'Direct Procurement for Customers: Technical Review' report

Size		• Scheme exceeds £100m totex, and therefore meets this requirement
Discreteness	Stakeholder interactions and statutory obligations	• Resilience asset which is *'materially contributes towards the appointee meeting statutory obligations'* • However, these obligations are expected to be able to be written into a DPC contract. • Therefore, this is not a 'blocker' for DPC, but does raise some issues that will need to be mitigated through the DPC contract. • Effluent flow impact of failure of assets could be mitigated in short term by all South Sewer flows running into Mogden STW, however this would only be an option while Mogden capacity headroom permits this. • Unclear whether RO plant needs to be Regulation 31 compliant.
Discreteness	Interactions with the network	• No significant specialist construction or design. Choice of commercial model would not significantly change design. • Very well understood interactions (inputs and outputs) • Clearly separate assets when located on existing site new STW • Separately operated assets • Remote / discreet • STW would form part of TWUL compliance / consented discharge
Discreteness	Contributions to supply/ capacity and ability to specify outputs	• Normal operational flow known (full flow to new STW) • Outputs clearly defined (quality of effluent) • 'Sweetening flow' is well known (i.e. business as usual operations) and avoids the requirement for cold standby
Discreteness	Asset and operational failures	• Very well understood assets (pipelines and new STW process plant) • Strategies for asset failure can be informed from TWUL wider operations (STW compliance, pipeline collapse, risk of operational breakdown of M&E plant) • Flexibility in route corridors
Discreteness summary		**Risks identified under single discreetness heading (material contribution to supply), anticipated could be mitigated through the DPC model.**

SIPR

As set out in Section 3, a key criteria for a scheme to be specified under SIPR legislation is that it is of '*size or complexity that threatens the incumbent undertaker's ability to provide services for its customers*'. The assessment of the Mogden South Sewer scheme against this criteria is similar to that for the Teddington scheme, set out in Section 4.1, and we therefore do not repeat it here. In summary, the Mogden South Sewer scheme does not entail comparable risks to TTT, and would not have an unmanageable impact on TWUL's financeability. Therefore, it does not appear to be of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers.

8.2.2 Implementation timescales

The risk to implementation cannot be assessed at this time for this scheme as there is no clear indication of the proposed programme timeline.

8.2.3 Value for Money

Assessing cost to customers

Financing costs

For Gate 2, where our scope of work is only to perform high level analysis of financing costs, the financing costs for DPC, SIPR and in-house are assumed to be the same for all four re-use schemes. Please see discussion under the Beckton scheme in Section 4.2 for more details.

Efficiency improvements

Scheme specific capex and opex efficiency could enable the DPC model to deliver a lower cost to customers compared to in-house delivery. The capex and opex (fixed and variable) for this scheme is shown in Table 15.

Table 15: Project cost estimates for the Mogden South Sewer scheme

Scheme	Capital expenditure	Fixed Opex (per annum)	Variable Opex (per annum)
Mogden South Sewer	£446m	£2.7m	£4.0m

Ofwat's DPC guidance indicates that water companies should assume efficiency savings of 10-15% on both capex and opex compared to an in-house delivery model, with innovation a significant contributor to achieving this greater level of efficiency. However, these assumptions need to be tested and evaluated in the context of the specific scheme under consideration.

In present value terms over 25 years (a typical CAP period), capex will account for approximately 73% of the totex for this scheme, so the potential to achieve capex efficiencies will be a key determinant of whether DPC will deliver better value for money for consumers. To test the potential construction savings through DPC we have examined different categories of capex spend individually. We note that for this scheme capex is made up of approximately 65% civils construction (primarily large diameter and other pipework and civils for the new sewage treatment works including RO plant) and 35% mechanical, electrical, instrumentation, control and automation (MEICA) works (RO plant, pumping plant and associated ancillaries).

With respect to the capex for civils construction work, pipeline construction, including "no dig" techniques, is a mature construction technique deliverable through a large and established supply chain. Moreover, TWUL has experience of procuring pipeline construction activity previously within their capital programme and as such are likely to be at a high level of efficiency. Consequently, it may be difficult for DPC to achieve additional efficiency savings , above that achievable by TWUL, of the magnitude Ofwat has assumed.

With respect to the capex for mechanical and electrical plant work, the RO plant is likely to be procured through a package offering by a specialist Original Equipment Manufacturer (OEM). The plant is likely to be pre-designed / modular with existing manufacturing in place. The plant is then integrated on site. As a result, the opportunity to innovate around the design and manufacture of the package plant will be limited given that this sits within the OEM provider's control.

Overall, 10-15% capex efficiency appears to be an ambitious target.

The opex proportion of totex for this scheme predominantly relates to power costs (42%) with the balance spread across labour, chemicals, maintenance and other smaller opex costs. The CAP would need to procure power from electricity markets, just as TWUL would if it developed the project in-house. The opportunities for the CAP to procure electricity more cheaply than TWUL would only arise through innovative procurement or hedging practices, as the power price is determined by exogenous factors outside of the control of TWUL and the CAP. TWUL routinely procures electricity from the market and is experienced at doing so, plus Ofwat has benchmarked electricity costs as part of its efficiency assessments at PR19 and prior price reviews, so it is not immediately obvious that the CAP would be able to identify a new way of procuring electricity compared to TWUL . Hedging strategy may be one opportunity for the CAP to achieve savings compared to TWUL , but this would come with the trade off of either higher or lower risk exposure, with the ultimate impact on value for money for customers depending on whether power prices increased or decreased more than expected.

Another opportunity for the CAP to reduce power costs for this scheme would be to adopt a different operating regime, with the RO plant turned off rather than constantly running a sweetening flow. This would require greater planning of demand to allow the RO plant to come on-line through a "cold start" and associated flushing of the tunnel and other pipelines. That said, when we discussed with TWUL's Programme Management team as part of the data gathering for this report TWUL stated that a cold start operating regime is high risk, and had already been considered and discounted in favour of the sweetening flow approach.

Overall, 10-15% opex efficiency appears to be an ambitious target without the water company being prepared to allow the CAP to adopt the increased operational risk associated with a cold start operating regime. Even then however, with opex being such a small component of totex, it would have a small contribution to any improved VfM calculation.

In summary, while there are opportunities for a CAP to drive capex and opex efficiencies relative to an in-house delivery model, it is unclear if the CAP could achieve 10-15% capex and opex efficiency savings or not. Based on the above, we recommend talking to prospective DPC bidders between Gates 2 and 3 to understand the level of efficiency they believe would be achievable. Involving contracting organisations in those discussions would help to get the detailed level of information required to carry out VfM modelling for DPC.

Water resilience value

This scheme creates a resilience asset that will ensure that water deficits are not experienced in a drought situation. This determines the core 'water resource value' delivered to customers from this scheme.

Future flexibility of this plant's capacity and operating regime may be desirable for the reasons given below.

- The required capacity of the plant may increase. The plant is being constructed for 50 Ml/day but could be uprated in the future through further investment.
- This scheme is highly energy intensive. Changes in energy costs could significantly impact the cost-efficiency of this schemes in comparison to other sources, and it is plausible that future constraints on energy use (e.g. driven by net zero and/or public perception) influent how the plant is operated.

If this flexibility was required within the next 25 years, under DPC it would require a change to the CAP arrangements. Whilst changes during the CAP period are possible, it may be simpler for required flexibility to be managed when the assets are controlled by the water company (In-house delivery).

In conclusion, the benefit of flexibility is subjective depending on confidence around future demand for the scheme.

Overall assessment of value for money

Like for the Beckton scheme, we have undertaken high level financial modelling to provide an initial overall indication of value for money, taking into account the impact of DPC and SIPR on financing, capex and opex costs. However, given the similar input assumptions applicable to each scheme, the results of the modelling are broadly similar for all four reuse schemes and so we do not present the modelling results again here.

8.3 Indicative risk allocation tables (sourced from KPMG *Direct Procurement for Customers: Technical Review* report)

Indicative allocation of technical risks under in-house delivery models[34]

Figure 8: Current allocation of technical risks under status quo models

Key Risks in Project Life Cycle	Stakeholder			Comments
	Appointee	Contractor	Consumer	
1. Solution Development				
Data	✓		✓	— Solution development and planning elements generally undertaken by incumbents under current model in line with WRMP and other statutory requirements. — Risks shared between appointee and customers under cost sharing and re-opener arrangements in regulatory framework. — Some contracting models allow for some sharing of risk associated with latter elements of solution development with contractors/supply chain.
Uncertainty	✓		✓	
Constraints	✓	✓	✓	
2. Planning				
Land purchase and site risk	✓		✓	
Environmental and social risk			✓	
Planning / Consent permission	✓		✓	
Third Party Consideration	✓	✓	✓	
3. Design				
Design process	✓	✓	✓	— Assumes outline design undertaken by appointed company — Some design risks may be passed to contractors under current tendering arrangements or shared (e.g. plant, resource availability) — Where design fails to reflect most efficient whole-life costs approach or is subject to change cost sharing would share risk with customers.
Design for construction	✓		✓	
Design for maintenance	✓		✓	
Resource availability and expertise	✓	✓		
Change in design required due to external influences	✓	✓	✓	
Materials and plant		✓		
4. Delivery				
Time and cost overrun risk	✓	✓	✓	— Various alliancing and other contracting models typically seek to share risks between appointee and contractors. — Some construction risks can be passed to contractors entirely.
Resource availability of contractors		✓	✓	
Unforeseen ground or existing building conditions	✓	✓	✓	
Third party claims	✓		✓	— Where major schemes are late or there are significant cost overruns ODIs are typically used to ensure customers do not pay and companies may be subject to penalties which are likely to be reflected in contracting arrangements. — Cost sharing arrangements still pass some risk back to customers. — Companies have re-openers for certain material risks outside of management control (e.g. legislative change).
Subcontractor default / bankruptcy	✓	✓		
Poor project management		✓		
Commissioning overruns	✓	✓		
Availability of facilities	✓	✓	✓	
Legislative / regulatory change	✓		✓	
5. Operation				
Service performance risk	✓		✓	— Operational risks generally shared between companies and customers. — Where contractors used for operational services it may be possible to share some of these risks in contracts. — Customers bear all demand or volume risk under current arrangements. — Appointed companies are subject to a range of statutory service obligations from which they can receive significant penalties but other aspects of service share risks with customers.
Resource or input risk	✓		✓	
Demand risk			✓	
Maintenance risk	✓		✓	
External and third party impact	✓			
6. Transfer				
Asset condition and performance at handback				— Not similarly present in current model.
7. Tender model specific risks				
Procurement failure				— Not similarly present in current model.

[34] Content sourced from Figure 8 of *Direct Procurement for Customers: Technical Review*, KPMG, 2017.

Indicative allocation of technical risks under DPC delivery models[35]

Figure 9: Potential risk allocation under the DPC model

Key Risks in Project Life Cycle	Stakeholder			Comments
	Appointee	CAP	Consumer	
1. Solution Development				
Data	✓		✓	— Allocation of early design and solution development risks likely to be similar under DPC to existing models. Especially for later tender models. — Early tender model may allow some greater sharing of risk with CAP.
Uncertainty	✓		✓	
Constraints	✓	✓	✓	
2. Planning				
Land purchase and site risk	✓		✓	
Environmental and social risk			✓	
Planning / Consent permission	✓		✓	
Third Party Consideration	✓	✓	✓	
3. Design				
Design process		✓	✓	— Allocation of design risks likely to be similar under DPC to existing models. Especially for later tender models. — Early tender model may allow some greater sharing of risk with CAP.
Design for construction	✓		✓	
Design for maintenance	✓		✓	
Resource availability and expertise	✓	✓		
Change in design required due to external influences	✓	✓	✓	
Materials and plant		✓		
4. Delivery				
Time and cost overrun risk		✓	✓	— Allocation of construction or delivery risks to the CAP from the appointed company is anticipated under the DPC model but assumed to generally be a direct transfer.
Resource availability of contractors		✓	✓	
Unforeseen ground or existing building conditions		✓	✓	
Third party claims		✓	✓	— Some opportunity for risk transfer from customers may be possible in the competitive tender process albeit that this is likely to be priced in the bid. — We assume that some re-openers to CAP revenue continue for material changes that are outside of management control (see section 4).
Subcontractor default / bankruptcy		✓		
Poor project management		✓		
Commissioning overruns		✓		
Availability of facilities	✓	✓	✓	
Legislative / regulatory change	✓		✓	
5. Operation				
Service performance risk	✓	✓	✓	— Allocation of operational risks to the CAP from the appointed company is anticipated under the DPC model but some service related risks may be difficult to transfer where they relate to statutory obligations. — Some opportunity for risk transfer from customers may be possible in the competitive tender process albeit that this is likely to be priced in the bid. — We assume that some re-openers to CAP revenue continue for material changes that are outside of management control (see section 4).
Resource or input risk		✓	✓	
Demand risk		✓	✓	
Maintenance risk		✓	✓	
External and third party impact		✓		
6. Transfer				
Asset condition and performance at handback	✓	✓		— Introduction of DPC model creates new asset transfer and hand-back risk which we assume is shared across appointed company and CAP. DPC contract would need to include requirements for asset transfer and hand-back.
7. Tender model specific risks				
Procurement failure	✓		✓	— Assume procurement risk is faced by both companies and customers where this results in delays or cost increases.

[35] Content sourced from Figure 9 of *Direct Procurement for Customers: Technical Review*, KPMG, 2017.

8.4 Typical procurement risks – based on the Infrastructure and Project Authority's *Project Routemap: Procurement Module*[36]

(reproduced from Project Routemap: Procurement Module, *Infrastructure and Projects Authority*

Typical findings relating to procurement

This list describes situations that might arise and would indicate that the approach to developing project procurement needs improvement. Other relevant modules may also help you close identified capability gaps.

Typical findings relating to procurement	Summary procurement risks: Sub-optimal detailed procurement and contract strategy	Misunderstanding of promoter capability	Misunderstanding of supply chain capability and/or appetite	Misalignment between project requirement and what's procured
There is a disjointed relationship between the sponsor, client, asset manager and market with no clear understanding of risk allocation and no incentive for collaborative working.	✓	✓	✓	✓
A new client model (for example, establishing a fully integrated team) is being proposed, which the client/supply chain organisations do not have previous experience of applying successfully.	✓		✓	
The client model is not aligned with the proposed procurement strategy. For example, adoption of a thin client model with significant retained obligations.	✓	✓		
The requirements are poorly articulated or conflicting, so the purpose of the project and/or what it needs to deliver is confusing.				✓
The client does not understand the capacity, capability nor the market appetite to deliver the project.			✓	
The current supply chain structure is overly complex resulting in inefficiencies and failure of suppliers to work together to meet client needs.	✓			✓
Inadequate time has been allowed for the tender process, and tender documentation issued to the market is incomplete. This risks rushed solutions and poor-quality bids leading to problems downstream during delivery.	✓			
The client over-prescribes how the supply chain should do the work, which limits opportunities for the supply chain to innovate or add value.	✓			✓
The tender process and contract performance indicators are disproportionate to the size and complexity of the project, potentially reducing the pool of bidders and stifling competition and innovation.	✓			✓
Elements of the contracting model (risk allocation, incentivisation) have not been fully stress tested to identify potential unintended consequences, for example, limiting innovation or social value.	✓			✓
The evaluation criteria (technical, behavioural, ESG) are not structured in a manner to differentiate between suppliers. This causes price to become the determining factor obscuring the original intent of a balanced tender process.	✓			
The asset manager is not engaged in the development of asset information requirements, meaning they are not effectively built into the tender documentation and contract model. This results in issues handing over the asset and effective transition into operations and maintenance.	✓			✓

36 Procurement_-_FINAL.pdf (publishing.service.gov.uk)