SESRO

Option Appraisal Documents

Option Appraisal Context and Methodology Report

J696-DN-A01A-ZZZZ-RP-ZD-100006

May 2024

Notice

This document has been produced to support the public consultation on key infrastructure options, draft Design Principles and an Interim Master Plan for the South East Strategic Reservoir Option and to inform scoping of the environmental impact assessment. The information presented represents the current stage of the project design. It comprises material or data which is still in the course of completion, pending consultation, engagement and further design and technical development.

Contents

List of Figures

List of Tables

Glossary

Term	Definition
Biodiversity Net Gain (BNG)	BNG is an approach to development. It makes sure that habitats for wildlife are left in a measurably better state than they were before the development. In England, BNG is mandatory under Schedule 7A of the Town and Country Planning Act 1990 (as inserted by Schedule 14 of the Environment Act 2021) and will be required on Nationally Significant Infrastructure Projects from late November 2025. Developers must deliver a BNG of 10%. This means a development will result in more or better quality natural habitat than there was before development
Environmental Impact Assessment (EIA)	An Environmental Impact Assessment (EIA) is the systematic evaluation of the potential environmental consequences of a proposed plan, policy, program, or actual project before a decision is made to proceed with the proposed action.
Interim Landscape and Environmental Master Plan	This is the master plan that is being developed for inclusion in the public consultation in 2024. It is a revision to the Indicative Gate 2 Master Plan based on work undertaken for the development of the SESRO project since the Gate 2 RAPID submission.
Indicative Gate 2 Master Plan	The SESRO master plan developed for the Gate 2 RAPID submission (November 2022).
National Policy Statement (NPS) for Water Resources Infrastructure	A policy paper by the Department for Environment Food & Rural Affairs (Defra) designated in September 2023 that sets out the government's policies for developing nationally significant infrastructure projects for water resources in England. Full information on the NPS for Water Resource Infrastructure is available online at https://www.gov.uk/government/publications/national-policy-statement-for-water-resources-infrastructure
National Landscape	Revised name for Area of Outstanding Natural Beauty (AONB) – November 2023. Note that the Appendices of this report may still refer to AONB.
Nationally Significant Infrastructure Project (NSIP)	The Planning Act 2008 introduced a new bespoke consenting route for major infrastructure projects in the fields of energy, transport, water, waste and wastewater. An NSIP is a project that can be consented via this route.
Preferred Option	The preferred option at this time, following the option appraisal undertaken, working towards the Gate 3 submission but before the public consultation in 2024. It is the preferred option for master planning (i.e., for development of the Interim Landscape

Term	Definition
	and Environmental Master Plan) and for public consultation in summer 2024.
Red/Amber/Green (RAG) Score	Red, Amber, Green (RAG) scoring categories were used to inform the scale of the impact or benefit of each option against each of the appraisal criteria. The RAG 'score' represents a subject-matter expert judgement based on the evidence evaluated in the options appraisal.
Regulators' Alliance for Progressing Infrastructure Development (RAPID)	An alliance of the three water regulators Ofwat, Environment Agency and Drinking Water Inspectorate formed to help accelerate the development water infrastructure and design future regulatory frameworks. Full information on RAPID is available online at https://www.ofwat.gov.uk/regulated-companies/rapid/
South East Strategic Reservoir Option (SESRO) Project	The concept for the South East Strategic Reservoir Option is to abstract water from the River Thames near Culham when sufficient flow is available, store it in a non-impounding raw water reservoir, located to the south west of Abingdon in Oxfordshire, and release it to the same river reach to augment flow in the river for downstream abstraction at times of low flow. Stored reservoir water would also be transferred directly to treatment and supply.
Thames to Southern Transfer (T2ST)	A separate strategic water resources project that proposes to transfer water from SESRO to the Southern Water area. Proposal includes a water treatment works and pipeline transfer.
Water Framework Directive (WFD)	The Water Framework Directive (WFD) Regulations are an important mechanism for assessing and managing the water environment in the UK. The core aim of the Water Framework Directive is to protect the UK's water environments by preventing their deterioration and improving their quality. It does this by setting ecological targets and environmental objectives.
Water Resource Management Plan (WRMP)	Plans that must be produced by water companies every five years to set out how they will continue to supply water in their supply area over (at least) the next 25 years.
Water Resources South East (WRSE)	An alliance of the six water companies that cover the South East region of England, which are Thames Water, Affinity Water, South East Water, Southern Water, Portsmouth Water and Sutton & East Surry (SES) Water. Full information on WRSE is available online at https://www.wrse.org.uk/
Water Treatment Works (WTW)	A facility that treats water to improve water quality. The WTW referred to in this report would produce potable water for transfer and distribution to supply customers.

Source: Thames Water Internal, 2024

Executive Summary

The South East Strategic Reservoir Option (SESRO) is a proposed strategic water resource for the south east to secure water supplies for Thames Water, Affinity Water and Southern Water customers. The project is being developed for RAPID Gate 3 submission and an application for a Development Consent Order (DCO) under the Planning Act 2008 regime. The concept for SESRO is to abstract water from the River Thames near Culham when sufficient flow is available, store it in a non-impounding raw water reservoir and release it to the same river reach to augment flow in the river for downstream abstraction at times of low flow. Reservoir water will also be transferred in a treated water transfer to the Southern Water area and a raw water transfer will supply local Thames Water customers in the Swindon and Oxfordshire (SWOX) water resource zone.

SESRO is a large project and requires an iterative, multi-stage design development process that considers the core purpose of the reservoir and its potential to deliver environmental gain and social value. Within the overall SESRO project there are a number of options available for the essential associated infrastructure for the reservoir. The following are identified as the associated infrastructure:

- Replacement flood storage.
- Access and diversion roads.
- A rail siding and materials handling area to import construction materials by freight train to the SESRO site.
- Infrastructure for connectivity to the River Thames – emergency discharge and intake/outfall arrangements.
- Water Treatment Works (WTW) location - Whilst not essential infrastructure for the construction and operation of SESRO itself, a WTW is required to enable Southern Water (via the Thames to Southern Transfer) to access the SESRO resource.

This Option Appraisal Context and Methodology Report introduces the Gate 3 option appraisals for the associated infrastructure, undertaken to identify a preferred option for each, to support development of the overarching SESRO project concept, vision and master plan. This report is part of a suite of option appraisal reports that capture the results of the individual option appraisals undertaken in 2023 and 2024 to support Gate 3.

This report does not seek to cover the need for SESRO or site selection for the project as this has been determined through the WRMP24 regional and company planning processes, but instead includes the following:

- An overview of the project background, a description of the work conducted previously to lead to the options being appraised for Gate 3, a description of the SESRO Design Development Process, an explanation of the purpose of the RAPID Gate 3 assessment process, and an outline of the relevant regulatory processes for the development of the SESRO project.
- A constraints assessment to review the shape, position and footprint of a 150Mm3 reservoir through examination of existing constraints at the SESRO location.
- An explanation of the approach and methodology developed for the option appraisals of the associated infrastructure.
- An outline of the overall scope and objectives for the SESRO Gate 3 option appraisals for the associated infrastructure.

1 Introduction

This section provides an overview of the project background, explains the purpose of the RAPID Gate 3 assessment process, and outlines the relevant regulatory processes for the development of the SESRO project.

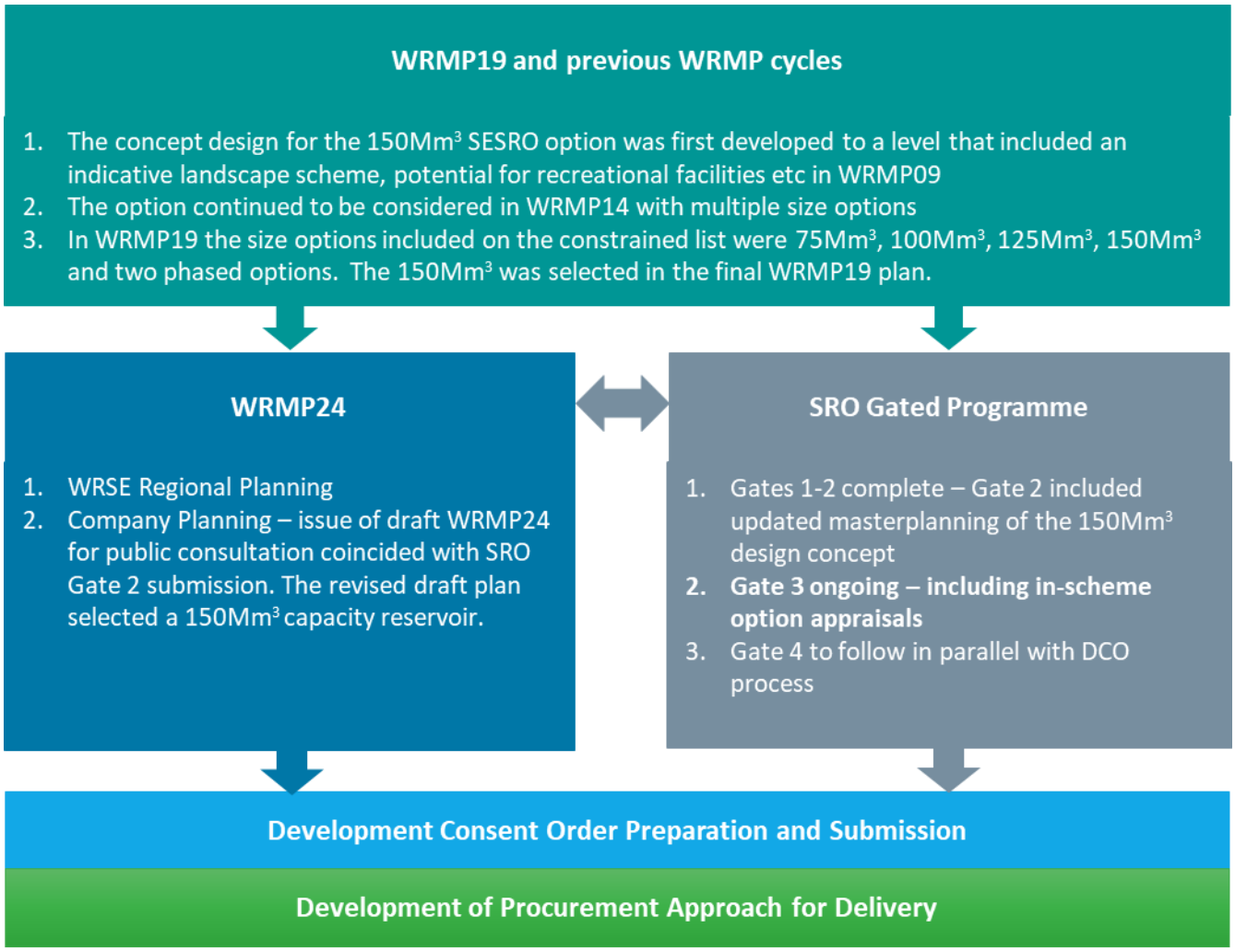
1.1 Purpose of this report

1.1.1 The South East Strategic Reservoir Option (SESRO) is a strategic water resource for the south east to secure water supplies for Thames Water, Affinity Water and Southern Water customers. The project is being developed for RAPID Gate 3 submission and an application for a DCO under the Planning Act 2008 regime. Within the overall SESRO project there are a number of options for the infrastructure associated with the reservoir. The associated infrastructure includes access and diversion roads, the temporary rail siding and materials handling area (to import construction materials for SESRO by freight train), the infrastructure for connectivity to the River Thames, and a water treatment works (WTW) for the Thames to Southern Transfer.

1.1.2 This report introduces options appraisal work undertaken for the SESRO project to support development of an overarching project concept, vision, and master plan. It is supported by a suite of reports that capture the individual option appraisals undertaken in 2023 and 2024, as shown in Figure 1.2.

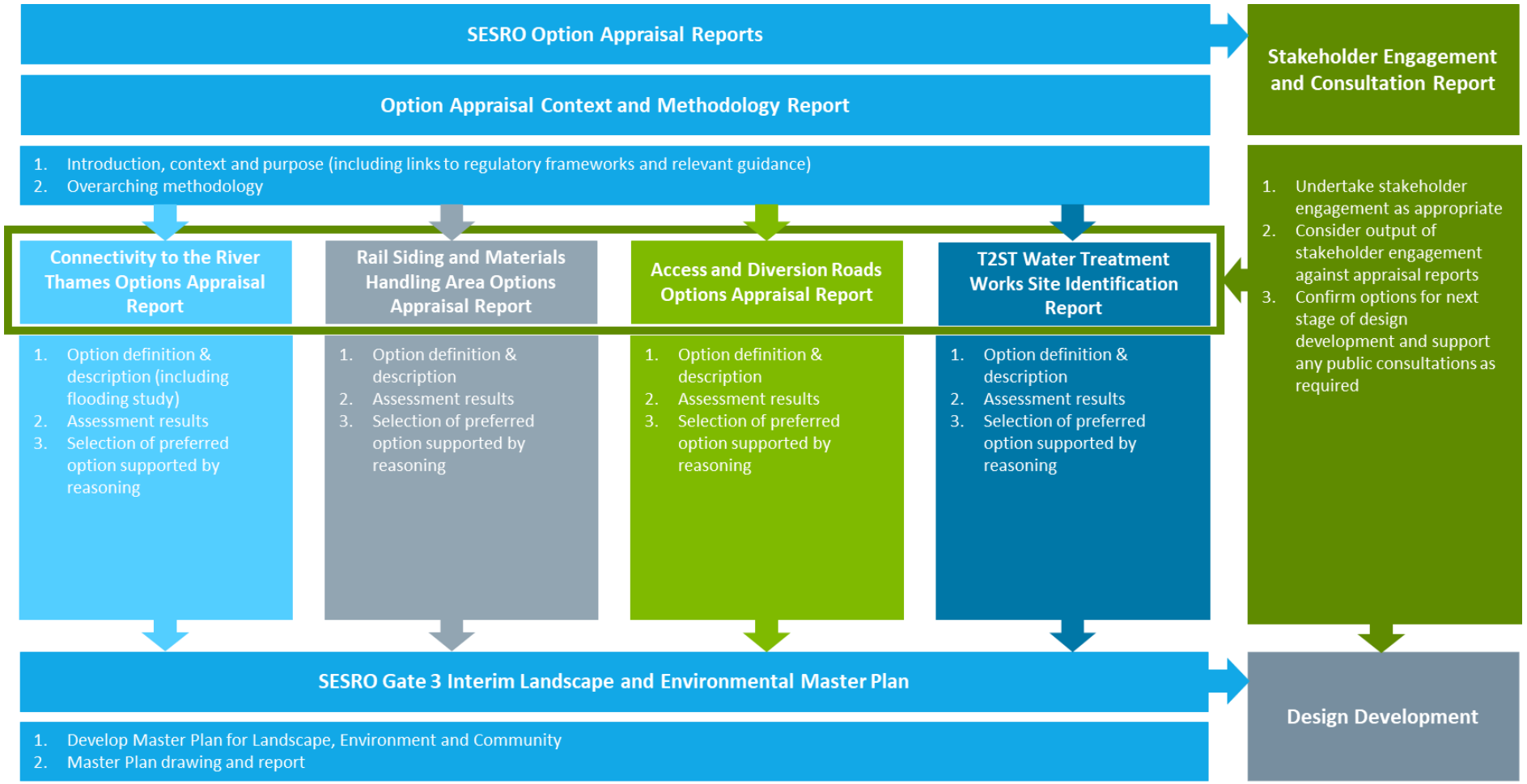
1.1.3 The studies undertaken to inform this report build on historical studies and design development for the SESRO project. The background to the Gate 3 option appraisal work is summarised in Figure 1.1 and described further in the following sub-sections. This report does not seek to cover the need for the SESRO project or site selection as these are both identified in the water resources management planning (WRMP) process (see Sections 2.2 and 2.3 for further information).

Figure 1.1: SESRO SRO Development



Source: Thames Water Internal, 2024

Figure 1.2: SESRO Option Appraisal Document Suite



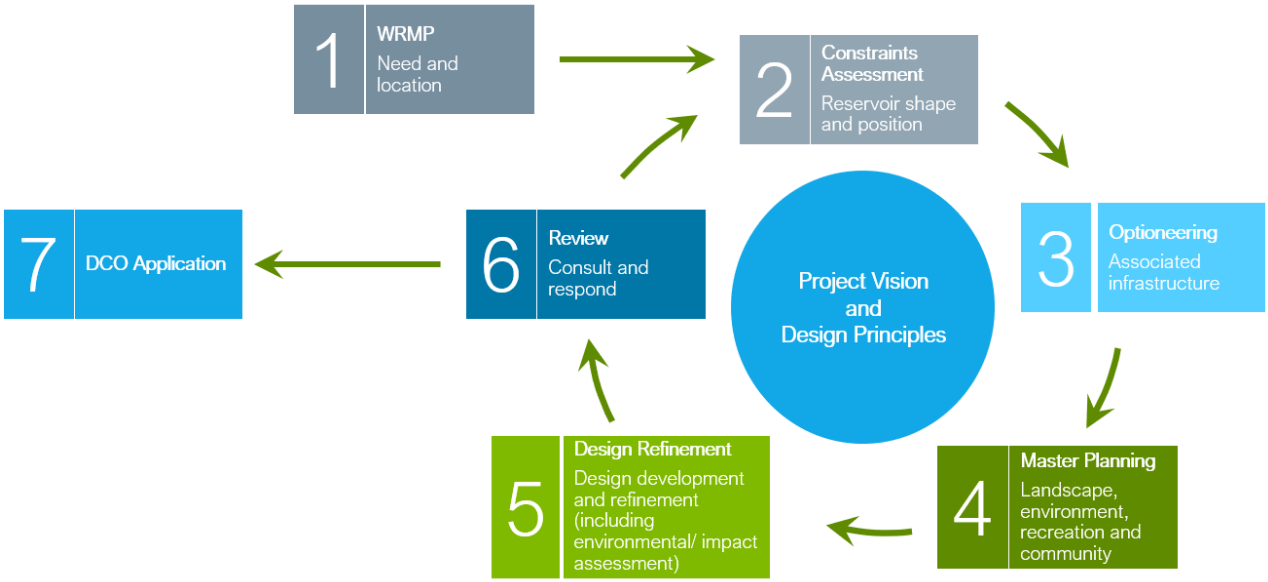
Source: Thames Water Internal, 2024

1.2 Design Development Process

1.2.1 The concept for SESRO is to abstract water from the River Thames near Culham when sufficient flow is available, store it in a non-impounding raw water reservoir and release it to the same river reach to augment flow in the river for downstream abstraction at times of low flow. Reservoir water will also be transferred in a treated water transfer to the Southern Water area and a raw water transfer will supply local Thames Water customers in the Swindon and Oxfordshire (SWOX) water resource zone.

1.2.2 SESRO is a large project and requires an iterative design development process that considers the core purpose of the reservoir and its potential to deliver environmental gain and social value. Figure 1.3 summarises the design development process as a series of steps that can be repeated as the design progresses and increasing design data (included survey work and consultations) becomes available. The process is underpinned by a Project Vision and Design Principles, which are reported in document J696-AA-ZZZZ-ZZZZ-RP-ZD-100001, SESRO Draft Design Principles[1].

Figure 1.3: SESRO Multi-Disciplinary Design Development Process



Source: Thames Water Internal, 2024

1.2.3 The design development stages are summarised as follows:

1. **WRMP – Identification of need and location:** SESRO is included on the WRMP24 Constrained List based on an indicative concept design. The WRMP process includes statutory public consultation and develops a best value plan. A number of capacity variants are included on the Constrained List for selection in the WRMP and

[1] Consultees, including the general public and technical stakeholders, will be asked to provide feedback on the Design Principles as part of the non-statutory public consultation in summer 2024. Eventually they will form part of the SESRO DCO application.

the plan identifies the need for a 150Mm^3 reservoir at the SESRO location. See Thames Water WRMP24 documentation for further information[2]

2. **Constraints Assessment – Development of reservoir shape and position:** Identification of the shape, position and footprint of a 150Mm^3 reservoir at the SESRO location through examination of existing environmental and engineering constraints and required storage capacity.
3. **Optioneering – Associated infrastructure:** Identification of preferences for the core infrastructure necessary for construction and operation of the reservoir through multi-disciplinary, multi-criteria option appraisal, including liaison with technical stakeholders such as Network Rail.
4. **Master Planning – Landscape, environment recreation and community:** Development of a Master Plan for the whole project, a multi-disciplinary exercise focussing on landscape design, space for nature, recreational and community facilities, including liaison with landscape stakeholders and community workshops.
5. **Design Refinement – Design development and refinement (including environmental appraisal/assessment):** Development of outline design for residual issues, such as utility diversions. May include engineering feasibility to explore different configurations of assets such as pumping station arrangements. Development of sufficient design detail to inform EIA, DCO and procurement. Undertake interim appraisals, and eventually EIA and iterate design to deliver appropriate mitigation, enhancement and compensation.
6. **Review – Consult and respond:** Public consultation, stakeholder and community engagement. Ongoing stakeholder and community engagement for SESRO to inform the design development process, EIA and statutory and non-statutory public consultations. After each consultation, the project will undertake another iteration of design development as set out in Figure 1.3 to develop further detail and/or make alterations in work associated with stages 2 to 5 (including a review and consideration of option appraisal work where additional information is identified that could impact option selection).
7. **DCO Application:** Preparation and submission of the DCO application for SESRO based on iterated outline design.

1.2.4 In parallel and subsequent to the DCO application and examination (should the Secretary of State grant the DCO), design work would continue to tender design and detailed design for construction. This would include work to discharge DCO Requirements.

1.2.5 This report and the associated option study reports primarily relate to Stage 3 – Optioneering (associated infrastructure); however, it also reports on Stage 2 – Constraints Assessment in Section 2.

[2] Water resources | Regulation | About us | Thames Water

Identification of Associated Infrastructure

1.2.6 As set out in the SESRO Design Development Process above, the capacity and location of the SESRO project and the shape and position of the reservoir are identified in Stages 1 and 2. These elements are therefore assumed fixed in the optioneering of the essential associated infrastructure for the reservoir (Stage 3).

1.2.7 The following are identified as the essential associated infrastructure for the reservoir:

- Replacement flood storage.
- Access and diversion roads.
- A rail siding and materials handling area to import construction materials by freight train to the SESRO site.
- Infrastructure for connectivity to the River Thames – emergency discharge facilities and inlet/outfall arrangements.
- Water Treatment Works (WTW) – Whilst not essential infrastructure for the construction and operation of SESRO itself, a WTW is required to enable Southern Water (via the Thames to Southern Transfer) to access the SESRO resource.

1.2.8 Once a preferred option for each of the above is identified in Stage 3, then the location of elements, such as amenity/recreational activities and associated buildings, can be considered in Stage 4 as part of the development of the landscape and environmental master plan for the whole project. In this way, the options appraisal work in Stage 3 supports development of an overarching project concept, vision and master plan.

1.3 Regulatory context and guidance

1.3.1 The relevant regulatory processes for the development of the SESRO project are described below.

Strategic Resource Option Programme

1.3.2 SESRO was included as a Strategic Resource Option ("SRO") in the 2019 Price Review Final Determination[3] by the water industry regulator Ofwat. Development of the SROs is subject to a gated regulatory process and the Regulators' Alliance for Progressing Infrastructure Development (RAPID), which includes Ofwat, the Environment Agency (EA) and the Drinking Water Inspectorate (DWI), review technical submissions at each 'gate'. There are four

[3] PR19 final determinations: Strategic regional water resource solutions appendix found here: https://www.ofwat.gov.uk/publication/pr19-final-determinations-strategic-regional-water-resource-solutions-appendix/ further documents on PR19 final determinations here: Final determinations - Ofwat

gates for SRO project development, as follows:

- Gate 1 – Initial concept design and decision making.
- Gate 2 – Detailed feasibility, concept design and multi-solution decision making.
- Gate 3 – Developed design, finalised feasibility, pre-planning application investigations.
- Gate 4 – Planning application(s), procurement and land purchase.

1.3.3 SESRO was included in the SRO programme with funding assigned to Thames Water and Affinity Water. Gate 1 work focussed on the overarching project concept and considered multiple size options to confirm options for regional and company planning. The SESRO Gate 1 Report was submitted to RAPID in July 2021 and concluded that the project should be progressed for further consideration and development.

1.3.4 During Gate 2, the project concept was refined with a masterplanning exercise based on the 150Mm^3 option, which had been selected in WRMP19. Initial development of design ideas for associated infrastructure at the site was progressed for Gate 2. The Gate 2 report was submitted to RAPID in November 2022.

1.3.5 Gates 1 and 2 of the regulatory process were progressed alongside the regional and company water resources management planning process, which is further described below.

1.3.6 RAPID has confirmed in its Gate 2 determination (final decision 28th June 2023[4]) that SESRO should progress to Gate 3 to allow for further development of a preferred solution. This suite of option appraisal reports has been produced to support preparation of a DCO application submission for the SESRO project and to report to RAPID on the development of SESRO at Gate 3, in accordance, with the Gate 3 Guidance produced by RAPID[5]. Section 2.2 of the guidance, titled 'The preferred solution option', states: "The [Gate 3] submission should provide design information about the preferred option for the solution and evidence justifying its selection with respect to the range of options considered in previous gates."

1.3.7 It is noted that the need for water resources and the solutions to meet that need (including SROs) are identified through the statutory WRMP process outlined below.

Water Resource Management Planning

1.3.8 Water companies are required to produce WRMPs every five years and

[4] Gate two submissions and final decisions - Ofwat
[5] Gate three guidance, Version 2 issued 22nd August 2023: Strategic regional water resource solutions guidance for gate three (version 2) - Ofwat

guidance to produce these plans is provided in the Water Resources Planning Guideline[6], published by the government.

1.3.9 In the 2020 – 2025 five-year period, the Environment Agency has also set out a national framework for water resources[7] that requires water companies to work together in regional groups to produce regional plans. The framework sets out the requirement for five regional water resource plans for England. Each regional group must produce a single plan that builds resilience to a range of uncertainties and future scenarios. The groups are required to develop a preferred plan for the region, through a set of options that present the best value to customers, society and the environment, rather than simply least cost.

1.3.10 SESRO (specifically a 150Mm^3 reservoir at the SESRO location) has been identified as one of the preferred solutions to meet water resources need in the South East in the WRMP24 regional and company planning processes, and resulting plans determine whether and when the options will be needed. Therefore, the SRO project development work does not seek to establish the need for the project but considers alternatives within the project envelope to provide a preferred solution and supporting information for the RAPID process and DCO application. The appraisal methodology, described in Section 3, for the optioneering of associated infrastructure has considered the water resource management planning guidelines and approach to option assessment, but is bespoke to the studies required for the optioneering of infrastructure associated with the reservoir and development of the project for DCO submission.

1.3.11 Considering solutions available to meet the water resources need and how the alternative options perform against each other is a key part of the WRMP process and provides evidence for the RAPID gateways and the DCO process that is described further below. The WRMP process identifies multiple potential reservoir locations and includes various volume variants at the SESRO location; however, there aren't many suitable sites in the South East for a large new reservoir, as they need to be close enough to a large river and have suitable underlying geology. The SESRO location:

- Is close to the River Thames.
- Has reasonably flat land.
- Has the right geology and ground conditions for a reservoir, e.g., the site has enough thickness of underlying clay to retain large volumes of water.
- Is adjacent to a railway line and has major road links that could be used to deliver construction materials.

1.3.12 The reservoir location proposed by the WRMP is within the area bounded by the A34 and the village of Steventon to the east, the Great Western Main Line (London to Bristol) to the south, the A338 and village of East Hanney to the

[6] Water resources planning guideline - GOV.UK (www.gov.uk)
[7] Meeting our future water needs: a national framework for water resources - GOV.UK (www.gov.uk)

west, and the River Ock to the north.

1.3.13 SESRO is selected in the WRSE regional plan[8] and the Thames Water[9] and Affinity Water[10] revised draft plans. For further information (including timing of the need) refer to published WRMPs information.

1.3.14 A 150Mm^3 non-impounding raw water reservoir in the SESRO location has been selected through the WRMP process, therefore; the SESRO option appraisal studies relate to selection of preferred options for infrastructure associated with delivery of the reservoir.

National Infrastructure Planning

1.3.15 Some water resource options being developed in the SRO programme, such as SESRO, will automatically qualify as Nationally Significant Infrastructure Projects (NSIPs) under The Planning Act 2008 and must be consented by a DCO. DCO applications are examined by an Examining Authority appointed by the Planning Inspectorate, which will make a recommendation to the Secretary of State for the Environment, Food and Rural Affairs (Defra) who will determine whether to grant consent.

1.3.16 National planning policy was designated for water resources infrastructure projects in the National Policy Statement (NPS) for Water Resources Infrastructure in September 2023. The NPS sets out the need, and government's policies for, development of NSIPs for water resources in England.

1.3.17 Paragraph 1.4.5 of the NPS states:

'1.4.5 If a nationally significant infrastructure project is included in a published final water resources management plan, the 'need' for that scheme will have been demonstrated in line with government policy. The applicable statutory requirements, and 'need' would not be expected to be revisited as part of the application for development consent. The Examining Authority and the Secretary of State would then start their assessment of applications for infrastructure covered by the National Policy Statement on that basis.'

1.3.18 Section 3.5 of the NPS statement sets out requirements for assessment of alternatives and states the following:

'*3.5.1 The applicant should comply with the legal obligations and policy set out in the National Policy Statement on the assessment of alternatives as set out here:*

[8] Home | WRSE - Water Resource South East
[9] Our revised draft plan - Thames Water Resources Management Plan (thames-wrmp.co.uk)
[10] Plans - Water resources management plan - Affinity Water,

- *The Environmental Impact Assessment Regulations requires projects with significant environmental effects to include a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the significant effects of the project on the environment.*
- *Other specific legal obligations requiring the consideration of alternatives, for example, under the Habitats Regulations and Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Water Framework Directive Regulations).*
- *Policies in the National Policy Statement requiring consideration of alternatives, for example, the flood risk sequential test and the assessment of alternatives for developments in National Parks, the Broads, and Areas of Outstanding Natural Beauty (AONB).*

3.5.2 Information from the water resources management plan options appraisal process (and associated statutory assessments) will be relevant to demonstrate how alternative options have been considered.'

1.3.19 The NPS highlights several particular examples of policy expectations or protective designations that require applicants to consider alternatives, there are several tests that may require alternatives to a development proposed:

- Flood risk – Defra and the Environment Agency require a sequential test to be applied to establish the vulnerability of development to flooding. An initial test for the SESRO site is reported in the revised draft WRMP[11]. Further work at a project level will be undertaken and reported on as part of the Environmental Impact Assessment (EIA) and DCO application.
- Nature conservation – there are obligations to consider alternatives under the Habitats Regulations if a European protected site may be affected. Paragraph 3.3.2 of the NPS states that "*Where, despite a thorough consideration of avoidance and mitigation measures, a project level appropriate assessment cannot ascertain no adverse effect on site integrity, the consideration of the Imperative Reasons of Overriding Public Interest (IROPI) outlined in the National Policy Statement can apply but only in the absence of alternative solutions. The applicant should provide an assessment of alternative solutions, including option appraisals from the water resources management plan and project level avoidance and mitigation options. If no feasible alternatives exist that would result in lesser harm, the consideration of IROPI at project level should consider whether the public interest served by the nationally significant infrastructure project overrides the adverse effects identified by the assessment.*"

  In addition, consideration of alternatives is required where there would be significant harm to biodiversity resulting from a development (paragraph 180

[11] Our revised draft plan - Thames Water Resources Management Plan (thames-wrmp.co.uk)

of the National Planning Policy Framework (NPPF)). It is noted that SESRO does not directly affect any European sites.

- Water Framework Directive – for which one of the derogation tests is whether the benefits of the project cannot be achieved by a significantly better environmental option.
- Landscape – paragraph 3.5.1 of the NPS highlights the need to consider alternatives when contemplating development in an Area of Outstanding Natural Beauty (AONB) now National Landscapes. This is consistent with NPPF paragraph 177, advising that the consideration of such applications "*should include an assessment of . . . the cost of, and scope for, developing outside the designated area, or meeting the need for it in some other way . . .*".
- Cultural heritage – the requirement for 'clear and convincing justification' for the harm to or loss of a designated heritage assets (NPS section 4.8 and NPPF paragraph 200) can often include an assessment of alternatives.
- Agricultural land – an assessment of alternative sites and schemes might be required to substantiate why a loss of best and most versatile agricultural land is justified.
- Green Belt – consideration of alternatives is also critical where development may be proposed on a Green Belt site, but this is not applicable in the case of SESRO.

1.3.20 Although these points are highlighted by the NPS, there are a range of other environmental designations which can also trigger the need for applicants to consider alternatives to an aspect of a development proposal to avoid, mitigate or compensate for impacts. These are discussed further on the following pages.

1.3.21 At this Gate 3 stage, the NPS and the other applicable legislation and policy (discussed below) have been reviewed to inform the option appraisal methodology. This will be subject to review and consideration as the project progresses to ensure the process remains fit for purpose at later stages of project development to deliver a project that is in compliance with relevant national policy and legislation.

1.3.22 Consideration of alternatives and identifying the preferred development design to meet the need for water resources for this area are required for the DCO application, including as part of demonstrating what alternatives have been considered as part of the EIA. The EIA process is an iterative process that will continue as options for the SESRO project are assessed and identified, so that the preferred project can be assessed as part of the EIA and the outcomes of the process will inform the project design, which will continue in subsequent stages to this options appraisal. This options appraisal is therefore a step along the way in that iterative process.

1.3.23 For example, further consideration at the subsequent EIA stage is likely to involve design evolution as environmental constraints and opportunities are

identified in more detail and in response to consultation and engagement feedback. At the EIA stage, applicants are required to provide a description of the reasonable alternatives, for example in terms of alternative development design, technology, location, size and scale, that have been studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects[12]. This options appraisal should not be read as settling the final details of design matters which will be studied, with further assessment of alternatives as appropriate, at subsequent stages. It is expected, however, that this options appraisal will form a key piece of evidence that will be referenced in the DCO application. Its purpose is to establish preferred options for areas of the SESRO project, based on environmental, planning, social and engineering considerations, to inform consultation and decision making that will be progressed through the DCO application process.

1.3.24 This does not preclude design flexibility being retained at the consenting stage, within an envelope of development parameters being set for the purpose of assessment and consenting, where that may be appropriate, which is established practice for consenting NSIPs in accordance with the Planning Inspectorate's Advice Note 9 on the Rochdale Envelope[13]. However, the need for any flexibility in an application must be justified; the parameters of development must be clearly defined such that, in consultation and decision-making, the proposed development can be properly understood; and these parameters must be drawn with sufficient precision that likely significant environmental effects, and mitigation, can be identified.

1.3.25 With that in mind, early options appraisal of each part of the project is a crucial stage to consider options and identify those that are not suitable, as well as any preferred options, to inform consultation on the options and the process to identify them in advance of submitting a DCO application for the project.

1.3.26 It should also be noted that section 3.4 of the NPS sets out the requirements for Environmental Net Gain as set out below:

- *"Environmental net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. Biodiversity net gain is an essential component of environmental net gain. …*
- *…In addition to delivering biodiversity net gain, developments may also deliver wider environmental gains relevant to the local area, and to national policy priorities, such as reductions in greenhouse gas emissions, reduced flood risk, improvements to air or water quality, or increased access to natural greenspace.*

[12] Paragraph 3 of Schedule 4 to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
[13] https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/

- *Applications for development consent should be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into the design (including any relevant operational aspects) of the project.*
- *Where environmental net gain considerations have featured as part of the strategic options appraisal process in the water resources management plan to select a project, the statement should reference that information to supplement the site-specific details."*

Relevant Environmental Legislation, Policy and Guidance

1.3.27 There is a wide range of environmental legislation, policy and guidance, relevant to the SESRO project, which has informed the option appraisal criteria (discussed further in Section 3) to ensure that the options are assessed in relation to legal obligations, relevant policy and guidance, including planning policy. A summary of the key documents is set out below by environmental topic area.

1.3.28 Biodiversity: The legislation policy and guidance listed below aims to protect habitats and protected species from the negative effects of development by designating protected areas, setting out enforcement measures in relation to protected species and habitats, protecting trees and encouraging the enhancement of biodiversity by requiring development to deliver Biodiversity Net Gain (BNG). While there are no nationally or internationally designated sites within the footprint or immediate vicinity of the SESRO project, there are locally designated sites and priority habitats within the footprint and other designations in the wider area that could be affected by the proposals. It is therefore important that the options considered for the project, wherever possible, avoid or reduce adverse effects on these features and maximises environmental gain either by avoidance of effects or the implementation of mitigation and enhancement measures.

- Conservation of Habitats and Species Regulations (2017).
- Wildlife and Countryside Act (1981) (as amended).
- Protection of Badgers Act (1992).
- Natural Environment and Rural Communities Act (2006) Section 41 habitats and species of principal importance.
- Environment Act (2021).
- The Countryside and Rights of Way Act (2000) (as amended).
- The Infrastructure Planning (EIA) Regulations 2017 (as amended).

- Town and Country Planning Act 1990, Section 202C – Tree preservation regulations: prohibited activities.[14]
- Town and Country Planning (Tree Preservation) (England) Regulations 2012 Regulation 13 – Prohibited activities.
- NPS.
- Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework – Chapter 15 – Conserving and Enhancing the Natural Environment.
- The England Tree Action Plan 2021-2024.
- A Green Future: Our 25 Year Plan to Improve the Environment.

1.3.29 Habitat designations (which can indicate suitability for species) were considered in this option appraisal, but the presence of specific protected species did not form part of the options criteria because they are mobile, potentially occurring almost anywhere in areas suitable for them, and their presence would need to be identified through survey as part of the EIA process. The EIA process, as explained above, will include consideration of alternatives.

1.3.30 Historic Environment: The legislation policy and guidance listed below aims to protect historic buildings, historic landscapes and archaeological remains from the negative effects of development by designating protected areas (such as scheduled monuments, listed building, conservation areas and registered parks and gardens). They also set out how to assess impacts and effects in the light of establishing asset significance by considering a range of factors, including how much setting contributes to asset value and how development proposals should avoid / minimise both direct damage to historic assets and how changes to setting can affect asset values. While there are no nationally or internationally designated sites within the footprint of the SESRO project there are a number of listed buildings, conservation areas and scheduled monuments in proximity to the SESRO project and widespread non-designated (but potentially significant) archaeological evidence within the footprint. Non-designated historic buildings also occur, and paleo-environmental remains are present within the river valley sediments. It is important that, wherever possible, the preferred options for the project minimise adverse effects on these features and maximises environmental gain through avoidance of direct damage, wherever possible, and/or screening and filtering of views to minimise visual intrusion and changes to asset setting effects and/or through the implementation of mitigation and enhancement measures such as the provision of interpretation resources or asset restoration.

- Ancient Monuments and Archaeological Areas Act 1979.
- Planning (Listed Buildings and Conservation Areas) Act 1990.

[14] https://www.legislation.gov.uk/uksi/2012/605/contents/made

- The Infrastructure Planning (EIA) Regulations 2017 (as amended).
- NPS.
- Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework – Chapter 16 – Conserving and Enhancing the Historic Environment.
- Planning Practice Guidance 2019 Historic Environment.

1.3.31 Landscape and visual: The legislation, policy and guidance listed below recognises the character of the countryside and encourages good design to reduce landscape and visual effects of development and to protect and enhance valued landscapes and landscape features. Specific duties are set out in relation to designated landscapes, such as Areas of Outstanding Natural Beauty (AONB) (now National Landscapes) and designated features, such as trees with Tree Preservation Orders (TPO). While there are no designated areas within the indicative location of the SESRO project, there is intervisibility with the North Wessex Downs National Landscape located more than 2km to the south. The SESRO site is also visible from Public Rights of Way (ProW), residential properties and community facilities locally. It is therefore important that the assessment of options considers landscape and visual effects and, wherever possible, the preferred options avoid or reduce adverse effects by being designed sensitively given the various siting, operational, and other relevant constraints. The options appraisal process should also help to identify opportunities to mitigate effects, integrate the development into the surrounding landscape and enhance landscape character and visual amenity, as part of an overall aim to provide environmental gain.

- Countryside and Rights of Way Act 2000 (as amended) (CROW Act).
- The Infrastructure Planning (EIA) Regulations 2017 (as amended).
- NPS.
- Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework – Chapters 12 and 15.
- The England Tree Action Plan 2021-2024.
- HM Government: A Green Future: Our 25 Year Plan to Improve the Environment.
- The Landscape Institute and Institute of Environmental Management and Assessment (2013) – Guidelines on Landscape and Visual Impact Assessment (GLVIA3).

1.3.32 Air quality: The guidance listed below aims to reduce atmospheric pollution by reducing emissions from combustion sources (including traffic) and the emission of construction dust. There is an area on the A415 within the village of Marcham to the west of the proposed SESRO access road options, which is designated as an Air Quality Management Area (AQMA), where the local authority is required to put measures in place to reduce air pollution. Again, it is important

that the choice of options assesses the potential for air quality effects on sensitive receptors, such as residences and the AQMA, so that the preferred options can, wherever possible, minimise the effects and that effective construction practices are emplaced to control air quality and dust emissions.

- The Infrastructure Planning (EIA) Regulations 2017 (as amended).
- NPS, Section 4.2 – Air Quality.
- Environmental Protection UK (EPUK) & IAQM Land-Use planning & Development Control: Planning for Air Quality guidance (EPUK & IAQM, 2017).
- Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction (IAQM, 2016).

1.3.33 Noise and vibration: The Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF) and the NPS provide the government policy framework for the consideration of noise and vibration from new developments, as per the documents listed below. The NPPF states that planning decisions should mitigate, and reduce to a minimum, potential adverse impacts resulting from noise from new development. The NPS sets out the relevant assessment criteria for DCO projects. The other documents in the list below provide assessment methodologies and guidance for mitigation. The highways documents are relevant in relation to traffic noise generated by SESRO. It is important that the assessment of options considers potential operational and construction noise and vibration effects on sensitive receptors and, wherever possible, the preferred options seek to minimise those potential effects. This is primarily assessed through proximity of the source to sensitive receptors. Where adverse impacts are predicted, mitigation measures should be applied. This will be considered further as part of the EIA.

- Department for Environment, Food and Rural Affairs (Defra) (2010) Noise Policy Statement for England (NPSE).
- NPS.
- Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework (NPPF).
- National Highways (2020), Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, Revision 2.
- Department of Transport and Welsh Office (1988) Calculation of Road Traffic Noise.
- BSI, BS 5228-2:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.
- BSI, BS 5228-2:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.
- BSI, BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Guide to damage levels from groundborne vibration.

1.3.34 Soils, geology and contaminated land: The legislation and guidance listed below aims to protect geological sites of interest, soil (i.e., best and most versatile agricultural land) and controlled water resources. It includes the identification of potentially contaminated land (including land contaminated by unexploded ordnance (UXO)) and the protection of sensitive receptors including humans (e.g. construction workers and nearby residents), controlled waters and ecological sites through avoiding or reducing impacts, or appropriate mitigation and remediation. There are no geologically designated sites within the SESRO site. Desk study regarding agricultural land classification indicates that the majority of the SESRO site is likely to include best and most versatile agricultural land. Potential sources of contamination have been identified across the SESRO site, which could cause harm to sensitive receptors, including an area of potential UXO towards the northern side of the site.

- Part 2A of the Environmental Protection Act (EPA) 1990.
- Department for Environment, Food and Rural Affairs (Defra) (2012) Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.
- The Contaminated Land (England) Regulations 2006 (as amended).
- The Water Resources Act 1991 (as amended) Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework (NPPF).
- NPS– Sections 4.10: Land Use, Section 4.12: Resources and Waste Management, Section 4.15: Water Quality and Resources.
- Department for Environment, Food and Rural Affairs (Defra) (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.
- Contaminated Land Applications in Real Environments (CL:AIRE) (2011) The Definition of Waste: Development Industry Code of Practice, Version 2.
- Natural England (2021) Guide to Assessing Development Proposals on Agricultural Land.
- Environment Agency (2023) Land Contamination Risk Management (LCRM).
- Highways Agency (now National Highways) Design Manual for Roads and Bridges (DMRB) guidance documents LA 104 Environment Assessment and Monitoring (2020), LA 109 Geology and Soils (2019) and LA 113 Road drainage and the water environment (2020).

1.3.35 Socio-economics: The policy and guidance below highlights the need for a balanced economy, especially in a rural setting where access to local services and community facilities can be limited. There are increasing pressures on rural sustainable transport services and consideration should be given to sustainable forms of transport to improve and maintain access (including walking and cycling). This relates to many of the PRoW that link residential areas to one another and local services/community facilities in the local area. These are

affected by the proposals and, therefore, severance is a key consideration of the socio-economic optioneering assessment. In addition, access to green, open and recreational spaces are important to the community and provide benefits to people living in the area, and visitors from further afield. The option appraisal process will assess potential for options to provide socio-economic benefits and connections with existing PRoW; however, development of these opportunities and strategy for recreational facilities shall form part of SESRO Master Planning and design development for DCO. The NPS sets out the issues that socio economic assessment for water resources infrastructure needs to consider, which for reservoir development includes opportunities to create jobs and training, provision of educational and visitor facilities.

- NPS.
- Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework – Chapters 6 and 8.
- The Infrastructure Planning (EIA) Regulations (2017) – Population and human health.
- Highways England (now National Highways) (2020) DMRB LA112 – Population and human health.

1.3.36 Water environment: The legislation, policy and guidance listed below aims to protect and improve the water environment, promote the sustainable use of water, prevent the deterioration of aquatic ecosystems, restore water bodies to Good Status (WFD), enhance biodiversity of the aquatic environment by requiring development to deliver BNG and protect groundwater sources used to supply drinking water from pollution.

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
- Environment Act 2021.
- The Environment (Legislative Functions from Directives) (EU Exit) Regulations 2019 (Previously The Nitrates Directive (91/676/EEC)).
- NPS.

Compulsory Acquisition Powers

1.3.37 An application for a DCO for the project will be made, which will include the authorisation of compulsory acquisition powers to secure the land interests and rights necessary to deliver the project.

1.3.38 Applicants for a DCO must demonstrate the project proposed meets the criteria and thresholds to be an NSIP, as defined in the Planning Act 2008 (as amended). The Planning Act 2008 and relevant guidance on compulsory

acquisition[15] also set out tests that the applicant must meet in order for compulsory acquisition powers to be authorised, which includes that:

- The land is required for the development to which development consent relates, or is required to facilitate, or is incidental to, the development.
- That there is a compelling case in the public interest for compulsory acquisition; and
- That all reasonable alternatives to compulsory acquisition have been explored.

1.3.39 A robust optioneering process is essential for demonstrating compliance with the strict legal tests for the authorisation of compulsory acquisition powers, including that all reasonable alternatives have been explored and that there is a compelling case in the public interest for the acquisition of the interests.

1.3.40 As noted in the Department for Communities and Local Government (DCLG) guidance on compulsory purchase under the Planning Act 2008, *"The applicant should be able to demonstrate to the satisfaction of the Secretary of State that all reasonable alternatives to compulsory acquisition (including modifications to the scheme) have been explored"* and both that the extent of the land interests required are necessary and proportionate for the development proposed.

1.3.41 It is important that the evidence to meet these tests is developed so that any challenges to the authorisation of compulsory acquisition powers can be robustly defended and considered by the Secretary of State when determining whether to grant development consent for the project.

1.4 Stakeholder and public engagement

1.4.1 Since Gate 2, there has been public consultation on Thames Water's draft WRMP24, which included identification of SESRO as one of the preferred options to meet the water resources need in this area, amongst a range of other solutions and policies. This identified the size of the SESRO project in water resources planning terms and the proposed location for the project, but no assessment has been undertaken, or decisions made, on the preferred configuration of SESRO or the master plan.

1.4.2 Further engagement and consultation with consultees, including relevant technical bodies, on the project is planned for 2024 and 2025. Public consultations on SESRO are planned for summer 2024 and summer 2025, at key points in the design process, to gather feedback on the project, which will be considered as SESRO design development continues prior to submitting a DCO application.

[15] Planning Act 2008: Guidance related to procedures for the compulsory acquisition of land (publishing.service.gov.uk)

be considered as SESRO design development continues prior to submitting a DCO application.

1.4.3 A number of technical liaison groups (TLG), as detailed in Table 1.1 have been established with relevant stakeholders for liaison regarding the SESRO project. Where appropriate these groups have been used as a forum for discussions during development of options for assessment.

Table 1.1 Technical Liaison Groups

Technical Liaison Group	Stakeholders
Visual and Landscape	EA, NE, OCC – Ecologist, North Wessex Downs
Modelling, Licensing and WQ Model updates	Environment Agency, OCC – Flood Officer
Heritage	Historic England, OCC Archaeologist
Terrestrial Environment	EA, NE, BBOWT, OCC - Ecology
Aquatic Ecology	Environment Agency
Soils and Geology	EA, NE, VoWH - Contaminated Land
Rail	Network Rail, OCC - Rail
Road	National Highways, OCC – Traffic

Source: Thames Water Internal, 2024

1.4.4 Formal consultation on the options appraisal will be via the public consultation in summer 2024 when further comments will be captured and will be incorporated into future backchecking as detailed in paragraph 1.5.2.

1.5 Back-checking and changes to this report

1.5.1 This is the first issue of this report and therefore no back-checking has been undertaken. In future revisions this section will summarise any back-checking undertaken that is specific to the option appraisal work and any changes to the report since the previous revision.

1.5.2 It is expected that the next backcheck of the options appraisals will happen in Autumn 2024 to consider changes and/or additional information that may have been identified by that time through Gate 3 design development work. A timetable for backchecking beyond Autumn 2024 will be decided dependent on future need, with interim backchecks to be undertaken sooner if a significant change is identified before Autumn 2024.

2 Constraints Assessment – Development of Reservoir Shape and Position

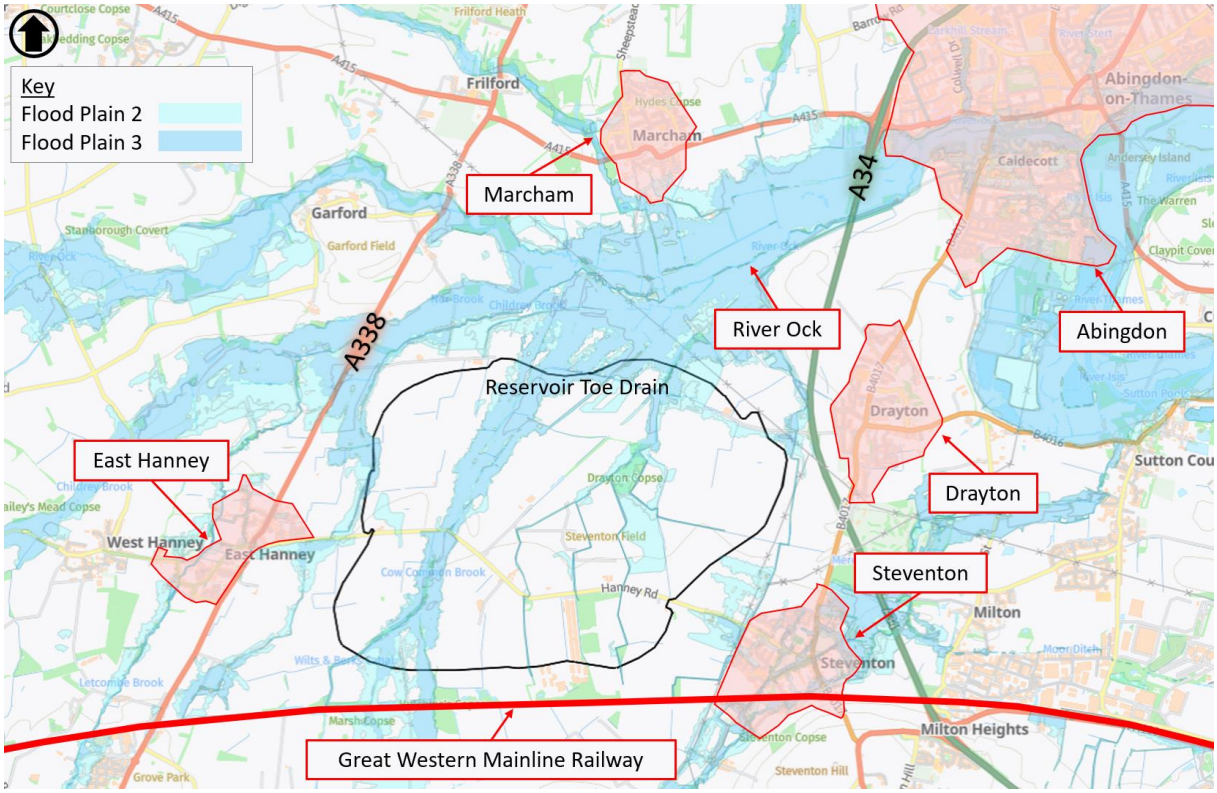
This section summarises Stage 2 of the SESRO Design Development Process, which is the Constraints Assessment – Development of reservoir shape and position.

2.1 Constraints for the reservoir shape and position

2.1.1 As set out in Section 1.2 and Figure 1.3, the need for and the location of SESRO, including the reservoir capacity, are identified by the WRMP (Stage 1 of the SESRO Design Development Process) based on a indicative reservoir design. Development of the reservoir shape and position is Stage 2 of the development process.

2.1.2 The parameters summarised below were identified as constraining the shape and position of a reservoir at the SESRO location. Figure 2.1 is an indicative plan of the proposed new reservoir with several spatial constraints (detailed below) labelled for context.

Figure 2.1: Indicative plan of the proposed new reservoir showing spatial constraints.



Source: Esri, Intermap, NASA, NGA, USGS | Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS; Contains public sector information licensed under the Open Government Licence v3.24

2.1.3 The general alignment to watercourse diversions and location of replacement flood storage are also set by constraints. Diversions of existing watercourses impacted by the location of the reservoir need to pass via the constrained areas to the east or west of the reservoir. This is discussed further in Section 4.2.

Spatial constraints

2.1.4 The SESRO site is bounded to the north by the River Ock and its floodplain, to the west by the A338 and the village of East Hanney, to the south by the Great Western mainline railway and to the east by the village of Steventon and the A34. The reservoir should sit within these extents and the site must also accommodate necessary associated infrastructure such as a road diversion, watercourse diversions and replacement flood storage (i.e. replacing floodplain lost beneath the reservoir). Further environmental mitigations may also be identified as being required (such as potentially replacement planting for lost hedgerows). The design of the project may go beyond these initial requirements, but they largely determine the size and shape of the reservoir footprint as follows:

- North – moving the reservoir north would encroach onto the River Ock floodplain requiring increased replacement flood storage and higher embankments as the land falls towards the river.
- East – the south of the eastern embankment of the reservoir curves around Steventon to create a buffer between the village and the base of the embankment as well as retain an existing electricity sub-station. Further north the reservoir embankment extends further east towards the A34. It is necessary to retain a corridor between the base of the embankment and the village / A-road for the eastern watercourse diversion, diversion of utilities and operational access.
- South – the southern extent of the reservoir embankment is constrained by the need to accommodate watercourses, potential road diversion, utility diversions, and the construction rail siding in a corridor between the embankment and existing railway line (it is acknowledged that the rail and road option appraisals could impact the needs in this space, and the results of these studies will feed into review of the Interim Landscape and Environmental Master Plan that follows the option appraisals of associated infrastructure).
- West – the western side of the reservoir is shaped to curve around East Hanney and provide sufficient space for the western watercourse diversion, replacement flood storage and operational access.

Embankment height constraints

2.1.5 The embankment height for the Gate 2 indicative design ranges between 15m above existing ground level on the southern side of the reservoir, increasing to around 25m on the northern side of the reservoir (for further information refer to

the Gate 2 submission, particularly document A1 SESRO - Concept Design Report[16]). Embankments higher than those proposed in the SESRO 150Mm^3 reservoir concept can be engineered, and there are many examples of higher embankments of similar construction. However, an increase in height has a corresponding increase in the width of the embankment base to deliver structurally sound embankment slopes, and this in turn requires a greater volume of clay material.

2.1.6 The SESRO project is predicated on a cut and fill balance across the reservoir site and the reservoir embankment will be formed of clay that is dug out from the centre of the reservoir bowl and placed to form the embankments. Material dug from the site that is not suitable for the structural embankments will be used for landscaping. In this way no material would be imported to form the main structural and landscaping elements of the project, although imports are likely needed for other elements (wave protection and internal drainage zones of the embankment, along with other infrastructure such as tunnels, buildings, planting etc). Increasing the height of embankments increases the cut and fill volumes beyond those of the current 150Mm^3 concept, and whilst a minor change could be accommodated, an increase in embankment height that reduced the overall footprint of the reservoir cannot be easily achieved for the required live volume. It would require a significant increase in excavated clay volume which is constrained by the site geological constraints as described below.

Geotechnical constraints

2.1.7 A large deep hole will be formed by the clay extraction, referred to as the borrow pit. The location, size and orientation of the borrow pit is a function of the reservoir footprint (set by the spatial constraints) combined with the underlying ground conditions.

- Underlying ground – The reservoir arrangement is constrained by the thickness and alignment of the clay strata on the site. Those clay strata are underlain by a permeable and water-bearing stratum, and the elevation of the bottom of the clay dips towards the southeast of the site. There is a need to retain a sufficient thickness of bedrock clay under the bed of the reservoir to avoid problems with water pressures within the underlying strata. This requirement limits the maximum depth and also constrains the shape and extent of the borrow pit within the reservoir. The borrow pit shape and size is also defined by the objectives of enabling natural currents to develop in the reservoir to aid mixing of the water for the purpose of ensuring water quality, and to minimise the amount of 'dead' storage (water not available for supply).
- Embankment stability – The reservoir arrangement is also constrained by the need for the borrow pit excavation to be a sufficient distance from the reservoir embankment to avoid affecting embankment stability. A minimum distance of 100m between the internal side of the embankment and the

[16] New reservoir in Abingdon | Water resources | Thames Water

borrow pit has been adopted in the concept design, which also provides space for a temporary haul road inside the reservoir during construction.

- Embankment Foundation – The slopes of the structural perimeter embankment are designed to maintain embankment stability and are a function of the properties of the clay foundation at the site. The embankment will be constructed on the bedrock clay, which will form its foundation. The properties of the underlying geology and bedrock clay are understood through invasive ground investigation and understanding will increase as more data is collected and the design is developed. At this early stage, it is important to provide a sufficient buffer to the footprint sizing to allow for changes during later design development when more ground information becomes available.

2.1.8 To summarise the constraints assessment, the SESRO site is physically constrained and defined by A roads to the west and east, the village of Steventon to the southeast, the village of East Hanney to the southwest, the main line railway to the south and the floodplain of the River Ock to the north. The identification of the SESRO location (undertaken in the WRMP) and the location of the reservoir within the site is also informed by geological constraints (i.e., the presence of sufficient thickness of underlying clay), which limit the location and depth of the borrow pit excavation. Furthermore, there is a need to balance cut material and fill material in the earthworks design to minimise imported and exported soil from the project (no soil exports are expected). The villages of Drayton and Marcham are also local to the site.

2.2 Gate 2 Reservoir shape and position

2.2.1 The indicative shape, position and footprint for the 150Mm^3 reservoir was initially developed in the late 2000s, taking into account the above constraints, and an overall master plan for the project was also developed at this time.

2.2.2 To support the RAPID Gate 2 SRO submission[17] in 2022 a series of master planning workshops were held with engineering, environment and social, planning and land specialists. These workshops examined the previous design at high level to confirm that the arrangement of the reservoir, associated infrastructure and other facilities shown on the master plan remained feasible (based on available information) and appropriate for the Gate 2 submission.

2.2.3 Some changes were made to the landscape design and other elements shown on the overall site plan; however, the shape, position and footprint of the reservoir was not substantially altered by the Gate 2 review.

[17] Gate 2 Submission: https://www.thameswater.co.uk/about-us/regulation/strategic-water-resource-solutions/new-reservoir-in-abingdon

2.3 Reservoir shape and position for the Interim Landscape and Environmental Master Plan

2.3.1 Whilst the Gate 2 work largely focussed on a 150Mm^3 reservoir, other reservoir volumes were also submitted to the regional and company WRMP processes, based on high level design work to adapt the reservoir footprint and cost estimates. The revised draft WRMP24 report published in August 2023, selected a reservoir with 150Mm^3 volume.

2.3.2 The constraints detailed in Section 2.1 limit the reservoir such that 150Mm^3 is considered to be the largest storage volume that can be feasibly accommodated within the area defined by these constraints. These constraints determine both the size and position of the reservoir at the SESRO location. Therefore, options for the size and layout of the 150Mm^3 reservoir have not been explored through an option study in Gate 3.

2.3.3 As such, the 150m^3 reservoir shape and position developed at Gate 2 will be taken forward into the option appraisals of associated infrastructure and Interim Landscape and Environmental Master Plan.

2.3.4 It is noted that localised changes to the width and slopes of the reservoir embankment are achievable by placing topsoil and other superficial deposits won from the reservoir site on top of the structural clay embankment core. Therefore, there is flexibility to adapt the landscape design of the outer face of the reservoir embankment and this is considered in the Master Plan exercise and landscape design development.

2.3.5 New ground investigation is planned before Gate 3 submission to support design development. Ground conditions are a key constraint on embankment design (as described above) and the footprint of the reservoir; therefore back-checking of the reservoir shape and layout will be undertaken if new information leads to a change in embankment design.

Figure 2.2: Indicative Gate 2 Master Plan of 150Mm³ Reservoir Site

Source: Thames Water 'Strategic regional water resource solutions: detailed feasibility and concept design', 2022

3 Option Appraisal Methodology

This section explains the approach and methodology developed for option appraisal studies within the SESRO project.

3.1 Framework for Option Appraisal

3.1.1 The approach to option appraisal adopted for SESRO uses a qualitative multi-criteria analysis that develops a narrative for the performance of each identified option against a set of criteria. These include aspects related to Construction and Operation (i.e., Engineering), Cost, Carbon, Environmental, Community & Planning, Property & Land Acquisition.

3.1.2 Multi-disciplinary subject matter experts developed the criteria and documented the reasons for their inclusion (i.e., why the criteria were relevant to the SESRO option appraisals) with references to guidance, legislation, or general best practice (see Appendix A).

3.1.3 Red, Amber, Green (RAG) scoring categories were used to inform the scale of the impact or benefit of each option against each criterion. These are detailed in Appendix A. This overall 'RAG' assessment has been used to support discussions between discipline specialists, but options are not numerically 'scored'; instead, the 'score' represents a subject-matter expert judgement based on the evidence evaluated. No quantitative analysis of RAG scores is undertaken to identify preferred options and the preference of one option compared to another is a result of balanced appraisal across the different criteria and disciplines. This means that criteria are not numerically weighted in the initial assessment.

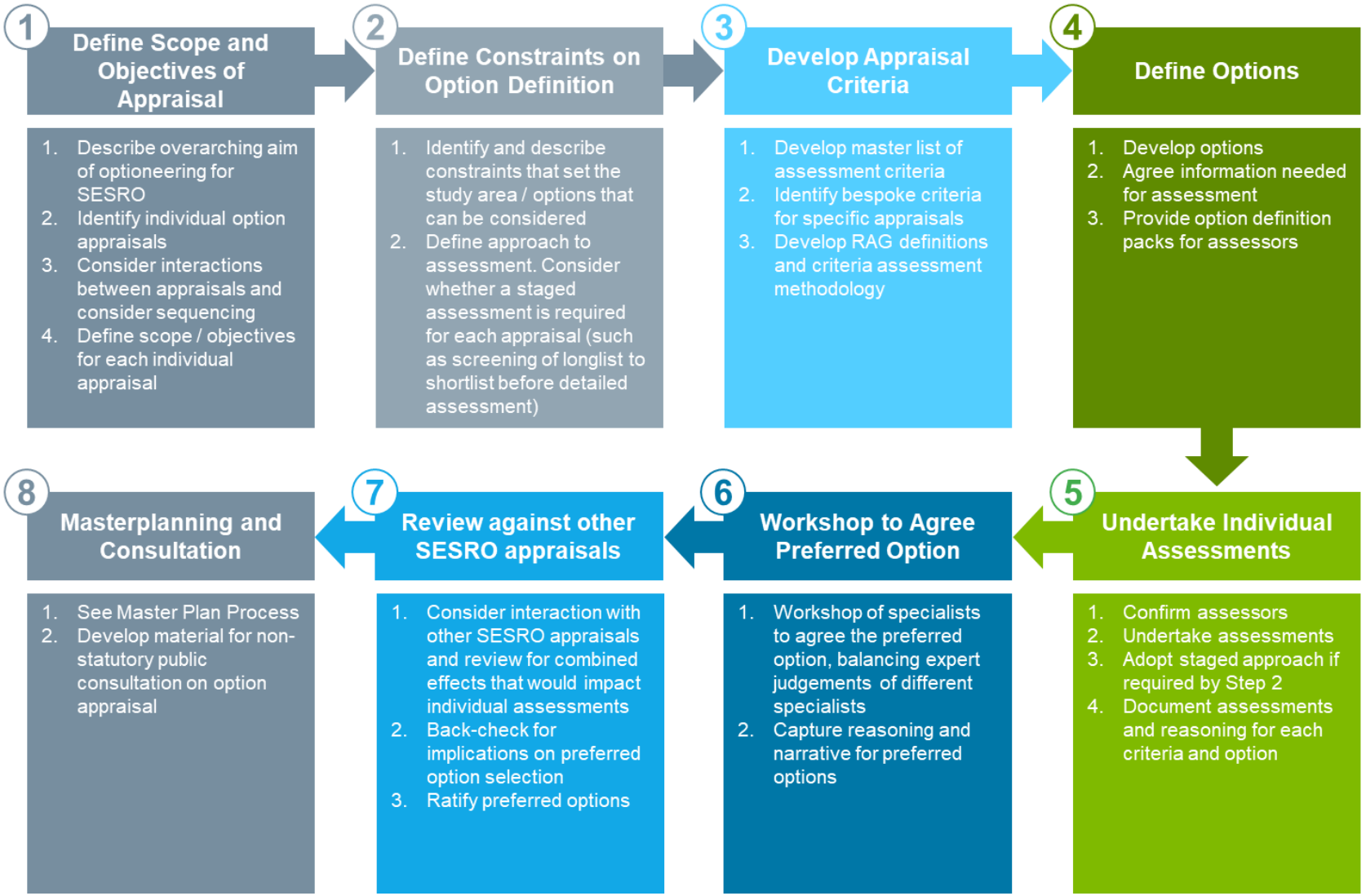
3.1.4 Preferred options were identified by technical discussion and consensus between subject matter experts, which included giving consideration to the relative importance of criteria in respect of their status under legislation and national policy.

3.1.5 The assessments and discussions are recorded in the option appraisal document suite (Documents 2 to 5 on Figure 1.2) to provide an evidence base for the conclusions reached. The ongoing process includes engagement with stakeholders and non-statutory public consultation in 2024. The option appraisal reports initially identify preferred options for consultation and will be reviewed and updated as appropriate based on feedback received from stakeholders and consultees.

3.2 Overview of assessment methodology

3.2.1 A common approach has been adopted for all option appraisal studies for the SESRO project, and the methodology is summarised in Figure 3.1.

Figure 3.1: Overview of Appraisal Methodology



Source: Thames Water Internal, 2024

3.2.2 Further context to each step is provided below.

- Step 1 – Define Scope and Objectives of Appraisal – this is undertaken at project level by identifying associated infrastructure requiring appraisal. This stage involves consideration of where alternatives need to be considered within the project and what the overall objectives are for the option appraisal exercise. The outcomes of this step are reported in Section 4 of this report.
- Step 2 – Define Constraints on Option Definition – this is undertaken for each option appraisal study and is reported in the individual study reports. At this stage, the need for a staged assessment (such as developing a long list of options, undertaking an initial screening stage to create a short list and then assessing the short list in detail) is reviewed for each option study.
- Step 3 – Develop Appraisal Criteria – a master list of assessment criteria has been developed for all SESRO studies taking into account relevant legislation, policy and guidance, see Appendix A. Further study specific criteria are identified to ensure that the option assessment takes into account the specific assets required and any other issues particular to the options under consideration.
- Step 4 – Define Options – options are defined for assessment based on the constraints identified and defined in Step 2. This may involve pre-screening if identified as required in Step 2. The option definition stage is reported in the individual study reports.
- Step 5 – Undertake Assessments – options are assessed by relevant competent experts in-line with the detailed method developed at Steps 2 and 3. This may involve staged assessment if identified as required in Step 2. Assessments are captured in a standard format and are given a score against the RAG rating for each criteria, and a narrative is recorded on the outcome of the assessment for each option and criteria, and a record of the evidence used in the assessment.
- Step 6 – Workshop – a workshop is held for each study to bring together subject matter experts for each criteria, discuss the outcomes of Stage 5 and identify a preferred option for consultation (and/or further work required to support identification of a preferred option). The outcome of the appraisal, including the workshop, is documented in the individual option appraisal reports.
- Step 7 – Consider outcome of all appraisals – identify whether all preferred options can be incorporated into a single masterplan, identify any adjustments to options required to enable their incorporation into the overall design as part of the Interim Landscape and Environmental Master Plan development, which is reported separately. If adjustments are required to options, return to Step 4 to redefine option and undertake assessments and workshop on adjusted option.
- Step 8 – Develop consultation material and Interim Landscape and Environmental Master Plan – the outputs of the various studies are brought

together in the Interim Landscape and Environmental Master Plan and material for non-statutory public consultation in 2024. A separate consultation report will be produced to document feedback and any changes required to the document suite following consultation.

Assessment criteria

3.2.3 Step 3 of the appraisal methodology detailed above requires the development of appraisal criteria. The criteria developed for the appraisals are set out in the SESRO Criteria Table in Appendix A. 132 criteria were developed, of which 18 are specific criteria relating to a single options appraisal. For each study the relevance of each criteria is considered, and those deemed not to be relevant or facilitate differentiation between options within the specific study are excluded. These are recorded within the Option Appraisal Reports.

3.2.4 The RAG score indicates the performance of the option within the ambit of each criterion. As noted above, this does not mean that individual red, amber or green evaluations are interchangeable or necessarily of equal importance between criteria. The relative importance of criteria, and hence the weight given to the RAG score for each when evaluating each option, was elicited through workshop discussion by subject matter experts. Their use in this manner to identify a preferred option therefore represents a collective application of professional judgement on key constraint, opportunity and risk factors.

3.2.5 RAG scores defined for each of the criteria in the SESRO Criteria Table are as follows:

- Red - A red RAG score is given for a specific option-criterion combination when the option performs poorly against the criterion. For each criterion a poor (or 'red') performance is defined, as set out in Appendix A, because it is criteria specific, and a red RAG rating does not necessarily equate to a constraint that makes the option infeasible. A red score would however generally indicate the introduction of a significant risk, which may not be easy to mitigate, to the project from the option being assessed. Each definition is criterion-specific so Appendix A should be referred to. As identified in Appendix A, there are red scores that are considered 'showstoppers' for an option, representing non-negotiable constraints that make the option unviable.
- Amber - An amber RAG score is given for a specific option-criterion combination when the option performs moderately against the criterion, neither poorly enough to warrant a red RAG score nor so well as to warrant a green score. For each criterion an amber score is defined fully in Appendix A because a 'moderate' performance is criteria-specific, so no generalisation of an amber score across the range of appraisal criteria can be made here.
- Green - A green RAG score is given for a specific option-criterion combination when the option performs well against the criterion. As with red

and amber scores, a green RAG score is defined for each criterion specifically, as set out in Appendix A.

3.2.6 The ‘planning’ criteria considered in the appraisal include various factors that would influence the prospect of obtaining development consent, including national and local policy and particular designations. The performance of an option from an engineering perspective, the potential for community and environmental impacts and the existing land use would, of course, all also be strongly influential on its consenting risks and prospects. The purpose of the ‘planning’ criteria is not to be syncretic or provide an overall judgement of each option’s performance in that regard, but rather to provide evidence to the appraisal conclusions regarding specific planning points not already addressed in the other criteria.

4 Option Appraisal Objectives

This section sets out the overall scope and objectives for the SESRO option appraisal exercise and confirms which technical areas of the project are subject to appraisal.

4.1 Overarching objective for the option appraisals

4.1.1 The overarching objective of the Gate 3 option appraisals is to assess options for the essential associated infrastructure for the reservoir and identify the preferred options for public consultation in summer 2024.

4.1.2 The option appraisals sought to achieve a consensus view amongst the relevant competent experts within the Thames Water team that supported identification of the preferred options. Specific objectives related to each of the essential associated infrastructure for the reservoir are detailed below.

4.1.3 Options considered for the associated infrastructure are required to support delivery of the overall outcomes required by the WRMP in terms of storage volume and timing. However, it is noted that the layouts and configurations can be varied from those illustrated in the Indicative Gate 2 Master Plan, and different layouts and configurations would potentially have different impacts and benefits to local people, environment, land, planning, construction and operation. This is considered through the option appraisal criteria and through development of the Interim Landscape and Environmental Master Plan. Further site work is required to create an environmental baseline for the project and full environment assessment of the project is planned for 2025, so option assessments are based on available desktop or historical survey information (from the mid to late 2000's).

4.1.4 Public consultation on the project will follow as set out in Figure 1.3; however there has been ongoing engagement with relevant stakeholders during the optioneering process as summarised in Section 1.4.

4.2 Replacement flood storage option appraisal objective

4.2.1 The SESRO footprint will sever existing watercourses and cover an area of existing floodplain and therefore it is necessary to divert the watercourses and replace the area of floodplain lost on a level for level basis. There is limited land available within the wider spatial constraints of the SESRO location (see Section 2) for this replacement flood storage and therefore it has been identified through constraints assessment rather than a full option assessment. It will be further refined through the interim landscape and environmental master planning exercise and consulted on as part of the proposed Interim Landscape and Environmental Master Plan.

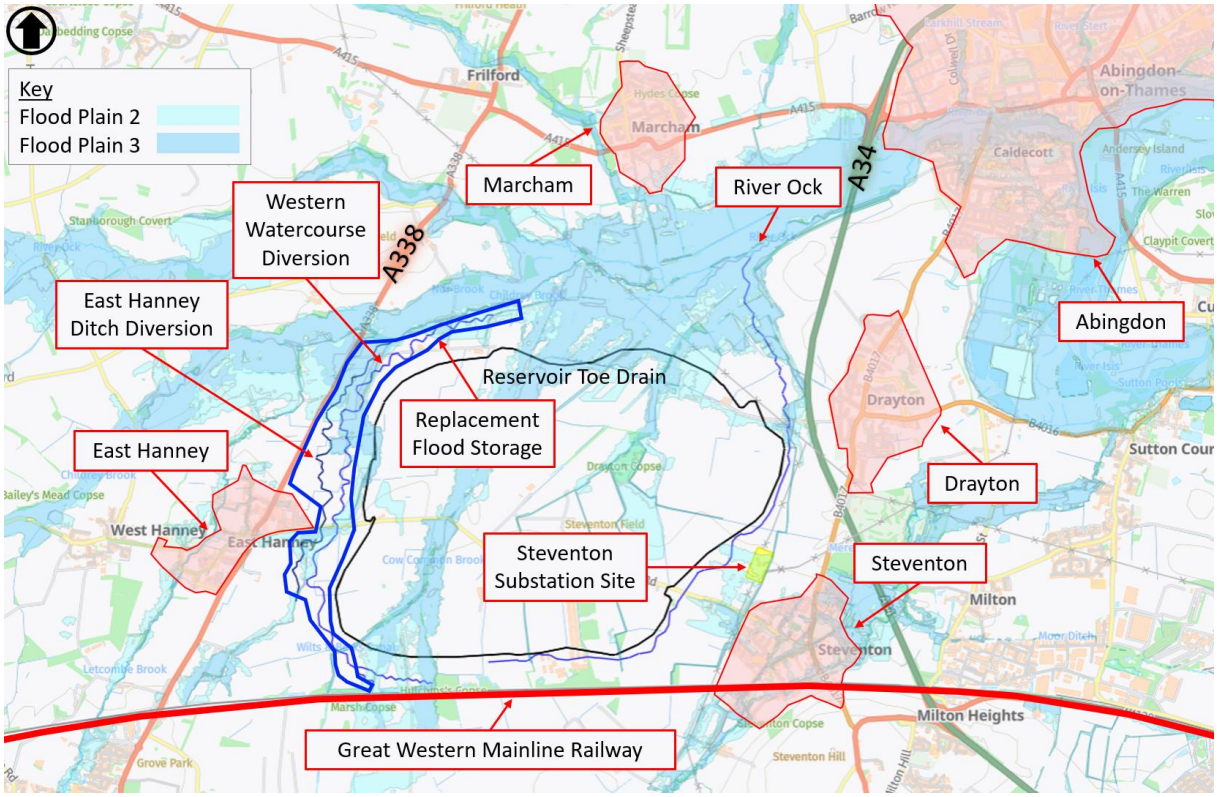
4.2.2 The replacement flood storage must be hydraulically connected to the watercourses that may flood. Other constraints considered were:

- The need to divert watercourses to both the east and west of the reservoir.
- Existing ground levels.
- Sufficient land area.

4.2.3 Consideration of these constraints (see Figure 4.1) indicates that the area to the west of the reservoir between the reservoir embankment and the A338 provides sufficient space and flexibility to adjust ground levels to provide the necessary flood storage capacity.

4.2.4 Within the replacement flood storage will be the diverted Cow Common Brook and Portobello Ditch, which will flow alongside a realigned East Hanney Ditch. To meet the scheme's WFD and BNG requirements, both watercourses will be improved as they are diverted. These improvements would be delivered early within the scheme's construction programme after which they would be protected from any further work so they can be (re)colonised by plants, fish and macroinvertebrates.

Figure 4.1: Constraints on the replacement flood storage



Source: Esri, Intermap, NASA, NGA, USGS | Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS; Contains public sector information licensed under the Open Government Licence v3.24

4.2.5 Initial modelling was undertaken in Gate 2 to establish the area and levels required and this will be further refined as the project is developed to support the DCO submission.

4.2.6 Initial flow and water quality modelling was also undertaken in Gate 2 for all watercourses underneath the reservoir site; the Childrey Brook, River Ock and River Thames.

4.3 Access and diversion roads option appraisal objective

4.3.1 The existing reservoir site mainly consists of fields, with the existing Hanney / Steventon Road running west / east across the site. SESRO will require creation of new permanent access road(s), permanent diversion of the Hanney / Steventon Road, and potentially temporary construction access roads.

4.3.2 The objective of this appraisal is to identify a preferred configuration for the new and diverted roads that are required to facilitate the SESRO project.

4.4 Rail siding and material handling area option appraisal objective

4.4.1 To facilitate the delivery of construction materials via the rail freight network, a new railway siding and associated materials handling area is proposed to be included within the SESRO project. This would be linked to the main construction site via temporary haulage roads. This freight delivery route helps to reduce the volume of road traffic required to construct SESRO.

4.4.2 The objective of this appraisal is to identify a preferred location and configuration for the rail siding and materials handling area.

4.5 Connectivity to the River Thames option appraisal objective

4.5.1 There are three elements of connectivity to the River Thames requiring consideration:

- The WRMP / Gate 2 concept for SESRO would fill the reservoir from the River Thames in times of high flow and discharge back to the Thames at times of low river flow to provide water for abstraction downstream. This is delivered by construction of a tunnel from the reservoir to the river, a pumping station buried just outside the reservoir footprint and an intake / outfall structure on the riverbank.
- In addition, the Severn Thames Transfer SRO (if it is implemented) would develop a pipeline from the River Severn to the River Thames at Culham and the last section of the pipeline would pass through the SESRO site and require an outfall in a similar location to SESRO. It is currently assumed that a shared outfall will be developed if both SROs are developed.
- The WRMP / Gate 2 SESRO concept also includes an Auxiliary Drawdown Channel (ADC), a new canal that connects the reservoir to the river. This

would be available to discharge large flows if the reservoir needed to be quickly emptied in an emergency (along with discharges through the tunnel) but would normally be navigable and therefore contribute to restoration of the Wiltshire and Berkshire Canal (with specific operating procedures to manage boat traffic in an emergency situation).

4.5.2 The objective of this appraisal is to model the various feasible configurations for the tunnel, ADC and outfall to ensure that any flood risk issues can be suitably managed and then to analyse them to identify the best combination and preferred options for the intake / outfall location and the emergency drawdown arrangement.

4.5.3 It is noted that the location of the pumping station that pumps from the tunnel into the reservoir is not subject to options appraisal. The pumping station is located near the north-east corner of the reservoir embankment. This was identified during the development of the Indicative Gate 2 Master Plan as the most efficient location for the pumping station, as it aligned with the lowest point of the borrow pit within the reservoir and meant the tunnel to the intake/outfall structure was as short as possible. The orientation of the dip in bedrock clay strata constrains moving the pumping station, particularly to the north-west. This is to enable the entire structure and connecting tunnels to be constructed within the Kimmeridge Clay and not interface with the underlying Corallian aquifer. As such it is considered that the location of the pumping station is set by its relationship with other assets (i.e., the reservoir and the tunnel) and the geological constraints.

4.6 Thames To Southern Transfer water treatment works site identification objective

4.6.1 Southern Water are developing the Thames to Southern Transfer (T2ST) Strategic Resource Option that would transfer water from SESRO for use in the Southern Water area. The Gate 2 T2ST submission required a water treatment works (WTW) on the SESRO site and therefore a location is required for this facility.

4.6.2 The purpose of this appraisal study is to identify preferred location(s) for the T2ST WTW within the SESRO site, to enable an appropriate location to be taken into account in the design and assessment required for the SESRO DCO. Currently, the T2ST WTW would not be consented as part of the SESRO DCO.

4.6.3 There may be other local treatment requirements for Thames Water customers in the future; however, this is not currently required in the revised draft WRMP and therefore space for local treatment does not form a core objective for this study.

5 Next Steps

5.1.1 The methodology outlined in this document will be used within the following options appraisals as outlined in Section 4:

- Connectivity to the River Thames.
- Rail Siding and Materials Handling Area.
- Access and Diversion Roads.
- Water Treatment Works Site Identification.

5.1.2 Each appraisal will be documented within a dedicated Options Appraisal Report, as shown in Figure 1.2.

5.1.3 Once a preferred option for each of the above is identified then the location of elements, such as amenity/recreational activities and associated buildings, can be considered as part of the development of the landscape and environmental master plan for the whole project. In this way, the options appraisal work will be used to support the development of an overarching project concept, vision and master plan.

Appendix A SESRO Criteria Table

Engineering Criteria		RAG Scoring Definition		
Design Acceptance (Engineering)		**Red**	**Amber**	**Green**
ENG1	Network Rail - Risk that Network Rail would not accept the option	High risk that Network Rail would not accept the option	Low to Medium risk that Network Rail would not accept the option	No risk that Network Rail would not accept the option (meaning that Network Rail have accepted the option)
Constructability		**Red**	**Amber**	**Green**
CON1	Safety - Risk of endangering construction workers or members of the public during construction e.g. water, ground, height, rail, road and utilities	N/A - would not take option forward if works cannot be undertaken safely	Works can be constructed safely but enhanced control measures required	Works can be constructed safely without enhanced control measures
CON2A	Programme - Duration, longest /shortest, but also consider whether the longer duration has an impact on the overall scheme programme	Likely to impact the critical path of the Gate 2 SESRO programme and therefore the estimated overall duration of the SESRO construction works.	Likely to extend the duration of the relevant area of works (e.g. road, rail siding or intake/offtake construction) compared to the Gate 2 SESRO programme but unlikely to impact on the critical path of the Gate 2 SESRO programme.	Unlikely to extend the duration of the relevant area of works (e.g. road, rail siding or intake/offtake construction) compared to the Gate 2 SESRO programme and unlikely to impact on overall SESRO Gate 2 programme.
CON2B	Programme - Opportunities for construction programme acceleration through efficiencies	The option has no potential to introduce programme efficiencies and reduce the construction programme	The option has limited potential to introduce programme efficiencies and reduce the construction programme	The option has the potential to introduce programme efficiencies and reduce the construction programme
CON2C	Programme - Dependencies i.e. proximity or physical relationships between elements of scope that introduce programme dependencies	Multiple major programme dependencies	Several major dependencies/ multiple minor dependencies	Minor programme dependencies
CON2D	Programme - Risk	Major programme risk	Moderate programme risk	Minor programme risk
CON2E	Programme - Use of existing assets to reduce the amount of construction required	N/A - Options should not be scored red if they cannot use existing assets	Option does not make use of existing assets	Option makes use of existing assets
CON3A	Logistics - Space available for construction and materials storage	Insufficient space	Limited / restricted space	Adequate space
CON3B	Logistics - Suitable and efficient access for construction workers, deliveries and waste removal including minimisation of lengths of new roads for access during construction	N/A - options would not be taken forwards if suitable access cannot be provided	Due to restricted access, an additional length of road is likely required for construction of the option.	Adequate access is available with no or minimal additional road length required for construction of the option.
CON3C	Logistics - Import of materials or resources during construction	Large amount of import materials required and/or one or several logistical challenges identified for the import of material.	Moderate amount of import materials required.	No (or minimal) import of materials required.
CON3D	Logistics - Haulage distance required for construction materials arrival on site to the placement location	For River Thames Connectivity: More than two main site locations are used for the construction of the option. For Rail: There is a > 2km distance from the materials handling area to the outer perimeter haul road. For WTW: Large haulage distance required.	For River Thames Connectivity: Two main site locations are used for the construction of the option. For Rail: There is a 250m to 2km distance from the materials handling area to the outer perimeter haul road. For WTW: Moderate haulage distance required.	For River Thames Connectivity: One main site location is used for construction of the option. For Rail: There is a minimal distance (<250m) from the materials handling area to the outer perimeter haul road. For WTW: No or minimal haulage distance required.
CON3E	Logistics - Vehicle movements	Construction works likely to require a large number of vehicle movements and vehicle movements may be difficult.	Construction likely to add vehicle movements.	Construction unlikely to add vehicle movements.
CON3F	Logistics - Capacity and layout for stockpiling at the materials handling area to reduce the risk of programme disruption and minimise double handling of material	N/A - options would not be taken forward which did not have sufficient capacity and minimise double handling	Sufficient capacity for required storage, but there is limited additional capacity, and the double handling of material cannot be entirely minimised	Sufficient capacity for greater than the necessary storage with an option for additional capacity, and double handling of material can be minimised as far as possible
CON4A	Construction Complexity - Temporary conditions/works requirements e.g. embankment slope stability and moisture outside of placement seasons.	No acceptable Temporary Works available to enable construction	Temporary Works requirements extensive and in some cases complicated and extend the programme	Temporary Works requirements minimal and can be used in the permanent state and no extension to the programme
CON4B	Construction Complexity - Location conflict/opportunity with another engineering component of the scheme or other SRO/non-SRO schemes, e.g. Severn to Thames Transfer (STT), Thames to Southern Transfer (T2ST), TW Swindon and Oxfordshire supply zone transfer, Transfer to Farmoor Reservoir	Location / layout of option clashes with another component of this scheme (or another scheme) which is already set or would be difficult to change	Location / layout of the option neither clashes nor provides an opportunity to be developed with another component of this scheme (or another scheme)	Location / layout of option provides an opportunity to be developed along with another component of this scheme (or another scheme)
CON4C	Construction Complexity - Minimise the number and complexity of additional structures/assets required or modifications to the existing structures/assets in order to facilitate the option, e.g. bridges, culverts, crossings	Option requires a complex and/or high number of additional structures and/or modifications to existing structures.	Option requires a moderately complex (mitigation likely) and/or moderate number of additional structures and/or modification to existing structures.	Option requires no or few additional structures and/or modifications to existing structures. None required are likely to be complex.
CON4D	Construction Complexity - Volume and / or complexity of rail signalling interventions required	Significant modifications and additional infrastructure required	Moderate modifications and additional infrastructure required	Little/limited modifications and additional infrastructure required

CON4E	Construction Complexity - Complexity of construction technique e.g. construction of tunnels, Auxiliary Drawdown Channel (ADC) or both for the emergency discharge	Complex construction technique required that carries a high risk that may be difficult to mitigate. Examples of high risk activities (for intake/outfall) include: infilling of existing gravel pits.	Moderate construction technique required that carries a moderate risk but risk which is likely mitigable. Examples of moderate risk activities (for intake/outfall) include: Construction across existing gravel pits and/or extension of the tunnel below the River Thames. Examples of moderate risk activities (for emergency discharge) include: construction of structures such as locks, gated structures and box culverts, as well as major road crossings.	Simple construction technique required that carries low risk. Simple construction techniques would not include, for example (for the intake/outfall), infilling of existing gravel pits, construction across existing gravel pits or extension of the tunnel below the River Thames.
CON5A	3rd Party Impact - Potential to disrupt existing road network during enabling works and construction	Disruption likely to be significant	Disruption likely to be moderate	Disruption likely to be limited
CON5B	3rd Party Impact - Potential to disrupt existing rail network during enabling works and construction	Disruption likely to be significant	Disruption likely to be moderate	Disruption likely to be limited
CON7A	Ground - Terrain of site, and implications for the need for earthworks and engineered slopes	N/A - would not take option forward if terrain would not accommodate proposed assets	Terrain is unfavourable to the design of assets and therefore increases the amount of earthworks required	Terrain is favourable to the design of assets and therefore reduces the amount of earthworks required
CON7B	Ground - Risk of unexpected conditions	High exposure to risk of unexpected ground conditions.	Moderate exposure to risk of unexpected ground conditions.	Low exposure to risk of unexpected ground conditions.
CON7C	Ground - Impact of ground conditions on the complexity of design and construction	There are complex engineering and design considerations due to ground conditions that likely result in high costs and/or a requirement for large quantities of materials that are difficult to source.	Ground conditions may impact the complexity of design and construction to a limited extent resulting in, for example, increased costs and a requirement for materials that are difficult to source.	Ground conditions are unlikely to increase the complexity of design and construction with likely only a minimal (if any) impact on cost or requirement for materials that are difficult to source
CON7D	Ground - Risk of ground settlement above line of tunnel affecting other structures/houses	N/A - would not take option forward if there is significant risk of ground settlement causing significant damage to other structures	Risk level acceptable or can be reduced with mitigation	No risk of ground settlement affecting other structures
CON7E	Construction Complexity - Complexity of pipeline installation with corridors	N/A - would not take option forward if pipeline route would not accommodate proposed assets	The pipeline route faces several challenges that increase its complexity and risk. These include passage through congested pinch points, risk of ground settlement, and/or obstacle avoidance	Pipeline route has few challenges with few complex obstacles and pinch points
CON8A	STT Integration Complexity - Complexity of connecting STT directly into the intake/outfall structure.	For the intake/outfall: The intake/outfall structure is a far away and/or complex construction is required to achieve connection to the intake/outfall structure. For the emergency discharge: Option makes it impossible for the STT pipeline to connect to the Intake/Outfall Structure	For the intake/outfall: The intake/outfall structure is a moderate distance away and/or moderately complex construction required to achieve connection to the intake/outfall structure. For the emergency discharge: Option makes it difficult for the STT pipeline to connect to the Intake/Outfall Structure	For the intake/outfall: The intake/outfall structure is close with simple construction required to achieve connection to the intake/outfall structure. For the emergency discharge: Option makes it simple for the STT pipeline to connect to the Intake/Outfall Structure
Operability		**Red**	**Amber**	**Green**
OPS1A	Safety - Risk of endangering operational staff, visitors or members of the public during operation	N/A - would not take option forward if works cannot be undertaken safely	Works can be operated safely but enhanced control measures required	Works can be operated safely without enhanced control measures
OPS1B	Safety - Access and egress for operational staff, visitors, deliveries and waste removal during normal operations and emergencies	N/A - would not take option forward if access/egress cannot be provided	Access/egress can be provided, however it is challenging / restricted	Access/egress can be provided
OPS2A	Maintenance - Ease of maintenance	Maintenance would be challenging and / or would require long closure periods and / or disruption	Majority of maintenance activities could be undertaken during moderate closure periods and / or with moderate disruption	Majority of maintenance activities could be undertaken during limited closure periods and / or with limited disruption
OPS3A	Performance - Impact of intake location on removal of screenings and large floating debris e.g. rate of removal and volume to be removed	Significant reduction of screen capacity during high flows (intake blockage and reduced transfer capacity)	Moderate reduction of screen capacity during high flows (partial intake blockage and reduced transfer capacity)	Sufficient screen capacity during high flows (no intake blockage and sufficient transfer capacity)
OPS4A	Reliability - Footprint of the option within flood zones (as an indication of the potential for damage and the challenge of operation / maintenance during flood events)	Option is within the flood zone, and damage is a significant risk	Option is within the flood zone, however damage is not considered to be a significant risk	Option is outside the flood zone
OPS4B	Reliability - The option does not have a single point of failure but rather includes backup infrastructure so that it can remain in operation if the primary infrastructure is unavailable, e.g. siphons in addition to tunnel for emergency discharge or alternative road route to reservoir crest	There is a single point of failure and no mitigation measures.	There is a single point of failure but mitigation measures can be introduced to allow for continued operation, which might be a delayed or reduced service	No single point of failure and several backup options are available should the primary infrastructure become unavailable
OPS4C	Reliability - Impact of WTW location on gravity discharge of excess water e.g. overflows and contingency / commissioning discharges	N/A - would not take option forward if excess water could not be safely disposed.	Pumping is required potentially introducing a single point of failure but mitigation measures can be introduced to avoid interruption to supply.	No pumping required / single point of failure or several backup options are available should the primary infrastructure become unavailable.

OPS5A	Adaptability - Space available for future expansion of social / recreation infrastructure	No opportunity / space available for expansion	Limited opportunity / space available for future expansion (however this expansion is unlikely to be required)	Opportunity / adequate space for envisaged expansion
OPS5B	Adaptability - Flexibility for future modifications e.g. increasing reservoir storage volume, rail station at wantage and grove, construction of Marcham Bypass	Option includes no flexibility for future modifications	Option includes a limited degree of flexibility for future modifications	Option includes a large degree of flexibility for future modifications
OPS6A	Evolvability - Risk to operation from future climate change, e.g. losses from evaporation due to higher temperatures, impact of higher rainfall, intake/outfall flood risk perspective	Option could be significantly impacted by future climate change impact	Option could be slightly impacted by future climate change impact	Option will not be impacted by future climate change impact
OPS7A	Sustainability - Reuse of assets or temporary works for permanent items, e.g. materials storage slab, haulage roads, compound car park	Option does not include for reuse of assets/temporary works	Some potential for reuse of assets/temporary works	Option includes for reuse of assets/temporary works
OPS7B	Operability - Power required for operational energy use	Option requires large amount of energy to operate	Option requires moderate amount of energy to operate	Option requires limited amount of energy to operate
OPS8A	3rd Party Impact - Potential to disrupt existing road network during operation	Disruption likely to be significant	Disruption likely to be limited	No disruption likely / possibility of enhancement
OPS8B	3rd Party Impact - Potential to disrupt existing rail network during operation	Disruption likely to be significant	Disruption likely to be limited	No disruption likely / possibility of enhancement
OPS8C	3rd Party Impact - Option facilitates infrastructure for other modes of transport, including pedestrians, cyclists and other non-motorised users	Option provides less than a 2m wide footway on either side of the carriageway and no segregated cycle infrastructure. There is also an absence of improvements for other non-motorised users, such as bridleway users	Option provides a shared footway for both cyclists and pedestrians along at least one side of the carriageway. Bridleways are partly improved	Option provides segregated cycle facilities, a footway that is wider than 2m, and suitable crossing infrastructure is provided for pedestrians and cyclists. Additional Bridleways or improvements or maintenance provided to existing bridleway routes are also included
OPS8D	3rd Party Impact - Congestion at the relevant junctions for all movements, and the effective use of the transport network through innovative solutions	Option fails to consider the impact of traffic joining at key junctions, including failing to consider how the routing could provide beneficial routes for other purposes not relating to access to the SESRO site	Option provides a partial solution to delivering roads that will be effectively able to deal with traffic upon completion. However, the junctions designed may be unable to cope with traffic flows in future years.	Option can support traffic flows at key junctions where the development connects with the existing road network once completed and in future years. The option will also help to divert existing traffic in a suitable way to support local traffic growth
OPS8E	3rd Party Impact - Impact on journey time reliability	Option increases journey times for road users on the road network severely	Option is not expected to either increases or improve journey times for road users on the road network	The scheme is expected to alleviate and improve the journey times for road users on the road network by providing alternative routes for traffic on non-strategic roads
OPS10	Quality - Impact on water quality received by the reservoir from the intake	Design requires large amounts of interventions to ensure water quality	Design requires moderate amounts of interventions to ensure water quality	Design requires little amounts of interventions to ensure water quality
OPS11	Performance - Geomorphological impacts, e.g. potential sedimentation around the structure	Geomorphology is likely to have a large impact on the performance of the structure.	Geomorphology is likely to have a moderate impact on the performance of the structure	Geomorphology is not likely to impact the performance of the structure
OPS12A	STT Integration Complexity - Complexity of operating STT directly into the intake/outfall structure.	Intake/outfall: Operability and/or resilience of SESRO and/or STT compromised. Emergency discharge: Increases complexity of operating SESRO and/or STT.	Intake/outfall: Operability and/or resilience of SESRO and /or STT partially affected but can be resolved with mitigation. Emergency discharge: Increases complexity of operating SESRO and/or STT but can be mitigated.	Intake/outfall: Operability and/or resilience of SESRO and/or STT unaffected. Emergency discharge: No impact on operating SESRO and/or STT.
Relative Costs		**Red**	**Amber**	**Green**
COS1	Capex cost of the option	CAPEX estimated to result in a an increase of >5% of the CAPEX for the overall SESRO project compared to the lowest cost option	CAPEX estimated to result in a an increase of >1% and <5% of the CAPEX for the overall SESRO project compared to the lowest cost option	CAPEX estimated to result in an increase of <1% of the CAPEX for the overall SESRO project compared to the lowest cost option
COS3	Opportunity for cost-sharing with other SROs, NSIPs and local non-SRO schemes/plans, e.g. STT, T2ST, SWOX/Farmoor, Abingdon flood storage	No identified opportunities for cost sharing.	Limited opportunities identified for cost saving.	Multiple opportunities identified for cost saving.
Carbon Costs		**Red**	**Amber**	**Green**
CAR1	Carbon costs associated to the Capex of the option	Emissions (tCO2e) estimated to result in an increase of >5% of the emissions (tCO2e) for the overall SESRO project compared to the lowest emissions (tCO2e) option	Emissions (tCO2e) estimated to result in an increase of >1% and <5% of the emissions (tCO2e) for the overall SESRO project compared to the lowest emissions (tCO2e) option	Emissions (tCO2e) estimated to result in an increase of <1% of the emissions (tCO2e) for the overall SESRO project compared to the lowest emissions (tCO2e) option
CAR3	Opportunity for mitigation e.g. smaller earthworks may lead to less carbon	No likelihood of mitigation opportunity.	Limited likelihood and magnitude of mitigation opportunity.	High likelihood and magnitude of mitigation opportunity.
Environmental Performance		**Red**	**Amber**	**Green**

ENV1A	Minimise impacts on Special Area of Conservation (SAC)	Substantial overlap with statutory designated site boundaries makes option unlikely to be feasible OR statutory designated site significantly impacted indirectly and no mitigation feasible	Construction area or access road located within statutory sites; mitigation may be required but option still feasible OR designated site indirectly impacted but mitigation likely to be effective	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site
ENV1B	Minimise impacts on Special Protection Area (SPA)	Substantial overlap with statutory designated site boundaries makes option unlikely to be feasible OR statutory designated site significantly impacted indirectly and no mitigation feasible	Construction area or access road located within statutory sites; mitigation may be required but option still feasible OR designated site indirectly impacted but mitigation likely to be effective	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site
ENV1C	Minimise impacts on Ramsar	Substantial overlap with statutory designated site boundaries makes option unlikely to be feasible OR statutory designated site significantly impacted indirectly and no mitigation feasible	Construction area or access road located within statutory sites; mitigation may be required but option still feasible OR designated site indirectly impacted but mitigation likely to be effective	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site
ENV1D	Minimise impacts on Site of Special Scientific Interest (SSSI)	Substantial overlap with statutory designated site boundaries makes option unlikely to be feasible OR statutory designated site significantly impacted indirectly and no mitigation feasible	Construction area or access road located within statutory sites; mitigation may be required but option still feasible OR designated site indirectly impacted but mitigation likely to be effective	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site
ENV1E	Minimise impacts on National Nature Reserve (NNR)	Substantial overlap with statutory designated site boundaries makes option unlikely to be feasible OR statutory designated site significantly impacted indirectly and no mitigation feasible	Construction area or access road located within statutory sites; mitigation may be required but option still feasible OR designated site indirectly impacted but mitigation likely to be effective	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site
ENV1F	Minimise impacts on Local Nature Reserve (LNR)	Substantial overlap with statutory designated site boundaries makes option unlikely to be feasible OR statutory designated site significantly impacted indirectly and no mitigation feasible	Construction area or access road located within statutory sites; mitigation may be required but option still feasible OR designated site indirectly impacted but mitigation likely to be effective	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site
ENV2A	Minimise impacts on Ancient Woodland	Large area of ancient woodland impacted	Individual or small areas of ancient woodland impacted	No ancient woodland impacted
ENV2B	Minimise impacts on Ancient and Veteran Trees	Development will directly impact ancient or veteran trees	Development in close proximity with potential indirect impact to ancient or veteran trees	No presence of ancient or veteran trees
ENV2C	Minimise impacts on Protected Trees	Significant number of protected trees impacted	Individual or small numbers of protected trees impacted	No protected trees impacted
ENV2D	Minimise impacts on vegetation (including trees, woodland, hedges and shrubs)	Direct impact on vegetation within large proportion of construction footprint, which is of high arboricultural/amenity value (e.g. A or B grade) or biodiversity habitat in good condition.	Direct impact on vegetation within a moderate proportion of construction footprint, which is of high arboricultural/amenity value (e.g. A or B grade) or biodiversity habitat in good condition. OR Direct impact on vegetation within large proportion of construction footprint, which is of lower arboricultural/visual amenity value (e.g. C grade) or biodiversity habitat in poor condition.	No direct impact on vegetation which is of high arboricultural/amenity value (A or B grade) or biodiversity habitat in good condition. OR Limited direct impact on vegetation which is of lower arboricultural/visual amenity value (e.g. C grade) or biodiversity habitat in poor condition.
ENV3	Minimise impacts on Local Wildlife Sites (LWS)	LWS impacted and mitigation not feasible	LWS are impacted but mitigation is feasible	No impacts to LWS
ENV4A	Minimise impacts on Scheduled monuments or activities which could lead to a loss of significance	Permanent infrastructure likely to result in loss of significance of heritage asset with mitigation unlikely. Construction area results in loss of designated heritage assets	Permanent infrastructure within 500m of designated heritage asset with potential for setting effects. Construction area located within designated heritage asset; mitigation may be required but option still feasible	Permanent infrastructure more than 500m from designated heritage asset and/or no likely setting effects. Construction area not located within 100m of designated heritage assets
ENV4B	Minimise impacts on listed buildings or activities that could lead to a loss of significance	Permanent infrastructure likely to result in loss of significance of heritage asset with mitigation unlikely. Construction area results in loss of designated heritage assets	Permanent infrastructure within 500m of designated heritage asset with potential for setting effects. Construction area located within designated heritage asset; mitigation may be required but option still feasible	Permanent infrastructure more than 500m from designated heritage asset and/or no likely setting effects. Construction area not located within 100m of designated heritage assets
ENV4C	Minimise impacts on Registered Parks and Garden or activities that could lead to a loss of significance	Permanent infrastructure likely to result in loss of significance of heritage asset with mitigation unlikely. Construction area results in loss of designated heritage assets	Permanent infrastructure within 500m of designated heritage asset with potential for setting effects. Construction area located within designated heritage asset; mitigation may be required but option still feasible	Permanent infrastructure more than 500m from designated heritage asset and/or no likely setting effects. Construction area not located within 100m of designated heritage assets
ENV4D	Minimise impacts on Registered Battlefields or activities that could lead to a loss of significance	Permanent infrastructure likely to result in loss of significance of heritage asset with mitigation unlikely. Construction area results in loss of designated heritage assets	Permanent infrastructure within 500m of designated heritage asset with potential for setting effects. Construction area located within designated heritage asset; mitigation may be required but option still feasible	Permanent infrastructure more than 500m from designated heritage asset and/or no likely setting effects. Construction area not located within 100m of designated heritage assets

ENV4E	Avoid impacts on World Heritage Sites or activities that could lead to a loss of significance, including setting	Permanent infrastructure likely to result in loss of significance of heritage asset with mitigation unlikely. Construction area results in loss of designated heritage assets	Permanent infrastructure within 500m of designated heritage asset with potential for setting effects. Construction area located within designated heritage asset; mitigation may be required but option still feasible	Permanent infrastructure more than 500m from designated heritage asset and/or no likely setting effects. Construction area not located within 100m of designated heritage assets
ENV4F	Minimise impacts on conservation areas which could result in loss of significance	Permanent infrastructure likely to result in loss of significance of heritage asset with mitigation unlikely. Construction area results in loss of designated heritage assets	Permanent infrastructure within 500m of designated heritage asset with potential for setting effects. Construction area located within designated heritage asset; mitigation may be required but option still feasible	Permanent infrastructure more than 500m from designated heritage asset and/or no likely setting effects. Construction area not located within 100m of designated heritage assets
ENV5A	Minimise loss to non-designated built heritage	Extensive scale of loss of non-designated built heritage of high value within the permanent infrastructure zone and adverse changes to setting in a 500m area around the permanent infrastructure	Extensive loss of non-designated built heritage of medium value within the permanent infrastructure zone and adverse changes to the setting within a 500m area from the edges of the permanent infrastructure OR more limited effects on remains of non-designated built heritage of high value	Extensive loss of non-designated built heritage of low value within the permanent infrastructure zone and adverse changes to within a 500m area from the edges of the permanent infrastructure OR more limited effects on non-designated built heritage of medium value
ENV5B	Minimise loss to paleoenvironmental remains	Extensive scale of loss or damage to high value remains within the construction area and adverse changes to similar buried remains in a 1km area around the permanent infrastructure from temporary and permanent changes to local hydrogeological regimes	Extensive scale of loss or damage to medium value remains within the construction area and adverse changes to similar buried remains in a 1km area around the permanent infrastructure from temporary and permanent changes to local hydrogeological regimes OR more limited effects on remains of high value	Extensive scale of loss or damage to low value remains within the construction area and adverse changes to similar buried remains in a 1km area around the permanent infrastructure from temporary and permanent changes to local hydrogeological regimes OR more limited effects on remains of medium value
ENV5C	Minimise loss to non-designated historic landscapes	Extensive scale of loss or extensive changes to high value non-designated historic landscapes within the construction area and extensive changes to the setting of the same resource outside the permanent infrastructure	Extensive scale of loss or extensive changes to medium value non-designated historic landscapes within the construction area and extensive changes to the setting of the same resource outside the permanent infrastructure OR more limited effects on non-designated historic landscapes of high value	Extensive scale of loss or extensive changes to low value non-designated historic landscapes within the construction area and extensive changes to the setting of the same resource outside the permanent infrastructure OR more limited effects on non-designated historic landscapes of medium value
ENV5D	Minimise loss of non-designated archaeological remains	Permanent infrastructure and construction area will result in extensive loss and / permanent damage to non-designated buried and extant archaeological remains worthy of national significance which can't be adequately mitigated through preservation by record	Permanent infrastructure and construction area will result in the loss and / permanent damage to non-designated buried and extant archaeological remains worthy of regional significance which can only be partially mitigated through preservation by record	Permanent infrastructure and construction area will result in the loss and / permanent damage to non-designated buried and extant archaeological remains worthy of local significance which can be adequately mitigated through preservation by record
ENV6A	Minimise loss of fluvial flood storage within Flood Zone 2 or 3	Site is within flood zone 2 and 3 and replacement flood storage is required but not available	Site is within flood zone 2 and 3 but loss of storage is minor or mitigation is available	Site is outside flood zone 2 and 3
ENV6B	Minimise impacts of pluvial flood risk.	Significant or adverse impacts on pluvial flood risk and mitigation is not possible	Significant or adverse impacts on pluvial flood risk but mitigation is possible	No predicted impacts on pluvial flood risk
ENV6C	Minimise impacts of groundwater flood risk.	Significant or adverse impacts on groundwater flood risk and mitigation is not possible	Significant or adverse impacts on groundwater flood risk but mitigation is possible	No predicted impacts on groundwater flood risk
ENV7A	Minimise disturbance of potentially contaminated land	Disturbance of potentially contaminated land with one or more of the following properties: -Likely to have significant cost or program implications -Likely to cause significant harm to potential receptors -Cannot be easily mitigated or remediated	Disturbance of potentially contaminated land with one or more of the following properties: -Unlikely to have significant cost or program implications -Unlikely to cause significant harm to potential receptors -Can be easily mitigated and remediated	Minimal or no disturbance of contaminated land, unlikely to cause cost or program implications or harm to receptors. No remediation required.
ENV7B	Minimise disturbance of potentially contaminated land specifically in relation to authorised and historic landfills	Within authorised landfills or previous industrial sites	Within authorised and historic landfills or previous industrial sites or within 250m of historic and authorised landfills or previous industrial sites. Impacts are likely to be managed or mitigated	Not within authorised and historic landfills or previous industrial sites or within 250m of authorised and historic landfills or previous industrial sites
ENV8	Minimise disturbance of land with known potential for Unexploded Ordnance (UXO)	Disturbance of a moderate / high quantity of UXO which cannot be easily managed / remediated. Likely to have significant cost or program implications	Disturbance of a low quantity of UXO which can be easily managed / remediated. Unlikely to have significant cost or program implications	No disturbance of land contaminated by UXO
ENV9A	Minimise loss of terrestrial priority habitats (use narrative to describe type and quantum)	Priority habitat directly impacted	Priority habitat directly impacted but mitigation feasible	No priority habitat directly impacted by proposed option footprint
ENV9B	Minimise loss of aquatic priority habitats (use narrative to describe type and quantum)	Priority habitat directly impacted	Priority habitat directly impacted but mitigation feasible	No priority habitat directly impacted by proposed option footprint
ENV10A	Reduce effects on North Wessex Downs Area of Outstanding Natural Beauty (AONB) and its setting	AONB and its setting likely to be affected. Effect is likely to be significant.	AONB and its setting likely to be affected. Effect is unlikely to be significant.	AONB and its setting would not be affected.

ENV10B	Reduce effects on local landscape character	Effect on local landscape character is likely to be significant.	Effect on local landscape character is unlikely to be significant.	Effect on local landscape character is likely to be negligible.
ENV11A	Reduce effects on panoramic views from national trail, open access land and important viewpoints in AONB	Effect on panoramic views from national trail, open access land and important viewpoints in AONB likely to be significant.	Effect on panoramic views from national trail, open access land and important viewpoints in AONB unlikely to be significant.	Panoramic views from national trail, open access land and important viewpoints in AONB unlikely to be affected or the proposal is likely to be barely discernible in views.
ENV11B	Reduce effects on sensitive local visual receptors	Effect on local views of sensitive visual receptors likely to be significant.	Effect on local views of sensitive visual receptors unlikely to be significant.	Local views of sensitive visual receptors unlikely to be affected or the proposal is likely to be barely discernible in views.
ENV12	Minimise disturbance/encroachment into Air Quality Management Area (AQMA)	Located within an AQMA OR all construction traffic must go through an AQMA	Within 1km of an AQMA OR some construction traffic must go through an AQMA	Site is located further than 1km from AQMA OR no construction traffic must go through an AQMA
ENV13	Minimise disturbance/encroachment into Groundwater Source Protection Zone (SPZ)	Site is within Zone 1	Site is within Zone 2	Site is within Zone 3 or not within a SPZ
ENV14A	Option does not affect Water Framework Directive (WFD) Quality Elements within the 'Cow Common Brook and Portobello Ditch' WFD waterbody (GB106039023360) to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV14B	Option does not affect Water Framework Directive (WFD) Quality Elements within the 'Ock and tributaries (Land Brook confluence to Thames)' WFD waterbody (GB106039023430) to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV14C	Option does not affect Water Framework Directive (WFD) Quality Elements within the 'Thames (Evenlode to Thame)' WFD waterbody (GB106039030334) to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV14D	Option does not affect Water Framework Directive (WFD) Quality Elements within the 'Sandford Brook (source to Ock)' WFD waterbody (GB106039023410) to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV14E	Option does not affect Water Framework Directive (WFD) Quality Elements within the 'Childrey Brook and Norbrook at Common' WFD waterbody (GB106039023380) to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV14F	Option does not affect Water Framework Directive (WFD) Quality Elements within the 'Ginge Brook and Mill Brook' WFD waterbody (GB106039023660) to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV14G	Option does not affect Water Framework Directive (WFD) Quality Elements within one of WFD waterbodies downstream of the River Thame to a degree that there is a risk of deterioration; or compromise the ability to attain Water Framework Directive objectives. These WFD waterbodies include: - Thames Wallingford to Caversham - WFD waterbody GB106039030331 - Thames (Reading to Cookham) - WFD waterbody GB106039023233 - Thames (Cookham to Egham) - WFD waterbody GB106039023231 - Thames (Egham to Teddington) - WFD waterbody GB106039023232	Major adverse impacts likely; high risk to ability to attain Water Framework Directive objectives for this waterbody	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody
ENV15A	Maximise potential for future environmental benefits (terrestrial), e.g. increase tree planting	Site allows only the minimum environmental benefits to be realised	Site allows some additional environmental benefits to be realised	Site allows substantial additional environmental benefits to be realised
ENV15B	Maximise potential for future environmental benefits (aquatic), e.g. increase wetlands area	Site allows only the minimum environmental benefits to be realised	Site allows some additional environmental benefits to be realised	Site allows substantial additional environmental benefits to be realised

ENV16	Maximise flexibility in routing diverted watercourses so their habitats can be of sufficiently high quality to contribute to catchment Water Framework Directive objectives	Site allows no flexibility in routing watercourses / Only poor-quality options are available	Site allows some flexibility in routing watercourses / Good quality habitat options are available	Site allows significant flexibility in routing watercourses / Good or high quality habitat options are available
ENV17	Minimise disturbance/encroachment into Local Geological Sites (LGS)	Site is located on or encroachment upon a local geological site	Site is within 250m of LGS	Site is located more than 250m from LGS
ENV18A	Minimise impacts associated with Noise and Vibration as a consequence of the construction of the option	Significant effects likely which would be difficult to mitigate	Potential for significant effects but likely to be mitigated if they occur	Impacts unlikely, or adverse impacts are likely to be mitigated if they occur
ENV18B	Minimise impacts associated with Noise and Vibration as a consequence of the operation of the option	Significant effects likely which would be difficult to mitigate	Potential significant effects but likely to be mitigated if they occur	Impacts unlikely, or adverse impacts likely to be mitigated if they occur
ENV19A	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the construction of the option	Based on the scale of the activities and number, proximity and sensitivity of nearby sensitive receptors (including the nearby Marcham AQMA), there is likely to be a significant effect, which may be difficult to mitigate (i.e. significant residual effects would be likely even with mitigation).	Based on the scale of the activities and number, proximity and sensitivity of nearby sensitive receptors (including the nearby Marcham AQMA), there is the potential for a significant effect, but can be appropriately mitigated. Residual significant effects are avoided or are not likely.	Based on the on the scale of the activities and number, proximity and sensitivity of nearby sensitive receptors (including the nearby Marcham AQMA), the potential for a significant effect is unlikely / air quality impacts are negligible. An appropriate level of mitigation may still be required to reduce risk of impacts occurring.
ENV19B	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the operation of the option	Based on the scale of the activities and number, proximity and sensitivity of nearby sensitive receptors (including the nearby Marcham AQMA), there is likely to be a significant effect, which may be difficult to mitigate (i.e. significant residual effects would be likely even with mitigation).	Based on the scale of the activities and number, proximity and sensitivity of nearby sensitive receptors (including the nearby Marcham AQMA), there is the potential for a significant effect, but can be appropriately mitigated. Residual significant effects are avoided or are not likely.	Based on the on the scale of the activities and number, proximity and sensitivity of nearby sensitive receptors (including the nearby Marcham AQMA), the potential for a significant effect is unlikely / air quality impacts are negligible. An appropriate level of mitigation may still be required to reduce risk of impacts occurring.
ENV20A	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the construction of the option	Complete or very noticeable changes to visual amenity of local community	Noticeable changes to visual amenity of local community	Barely perceptible changes to visual amenity, with no or little effect on local community
ENV20B	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the operation of the option	Complete or very noticeable changes to visual amenity of local community	Noticeable changes to visual amenity of local community	Barely perceptible changes to visual amenities, with no or little effect on local community
ENV21A	Minimise impacts associated with solid discharge during construction.	Significant effects likely which would be difficult to mitigate	Potential significant effects but likely to be mitigated if they occur	Impacts unlikely, or adverse impacts likely to be mitigated if they occur
ENV21B	Minimise impacts associated with solid discharge during operation.	Significant effects likely which would be difficult to mitigate	Potential significant effects but likely to be mitigated if they occur	Impacts unlikely, or adverse impacts likely to be mitigated if they occur
ENV22A	Minimise impacts associated with liquid discharge during construction,.	Significant effects likely which would be difficult to mitigate	Potential significant effects but likely to be mitigated if they occur	Impacts unlikely, or adverse impacts likely to be mitigated if they occur
ENV22B	Minimise impacts associated with liquid discharge during operation.	Significant effects likely which would be difficult to mitigate	Potential significant effects but likely to be mitigated if they occur	Impacts unlikely, or adverse impacts likely to be mitigated if they occur
Community and Planning Considerations		**Red**	**Amber**	**Green**
CPC1	Distance to the nearest property that will stay during construction (metres)	Less than 250m from the nearest property	Between 251m and 500m from the nearest property	501m plus from the nearest property
CPC2	Minimise impacts on local community during construction associated with disturbances of community assets such as schools, hospitals, GP surgeries, schools, libraries, youth centres, Country Parks, allotments, green open spaces and disruptions to recreation	Community access/use of community assets is severed, without alternative access, during construction	Community access/use of community assets is disrupted during construction	Community access/use of community assets is not disrupted during construction
CPC3	Minimise impacts on local community during operation associated with disturbances of community assets such as schools, hospitals, GP surgeries, schools, libraries, youth centres, Country Parks, allotments, green open spaces and disruptions to recreation	Community access/use of community assets is severed, without alternative access, during operation	Community access/use of community assets is disrupted during operation	Community access/use of community assets is not disrupted during operation
CPC4A	Are public rights of way (PRoW) disrupted or adversely affected?	Recreational resources / rights of way of national or regional importance are disrupted or affected	Recreational resources / rights of way of local importance are disrupted or affected. The site is likely to affect public rights of way	No recreational resource / right of way are disrupted or affected. Sites with no recreational activities
CPC4B	Are there opportunities to create or improve linkages of Public Rights of Way (PRoW) and recreational routes?	No opportunity to create or enhance PRoW or links to recreational resources	Links to a recreational resource / right of way of local importance can be enhanced	Links to a recreational resource / right of way of national or regional importance can be enhanced
CPC5	Maximise potential opportunity for recreational benefits	Option allows only the minimum recreational benefits to be realised	Option allows some additional recreational benefits to be realised	Option allows significant additional recreational benefits to be realised
CPC6	Support the realisation of socio-economic incentives on SESRO, including employment, skills, tourism, sustainable travel, connecting people with nature and environmental education	Site does not support the social-economic incentives of the overall scheme	Site supports some of the social-economic incentives of the overall scheme	Site supports the social-economic incentives of the overall scheme

CPC7	Minimise overall SESRO Order Limits extent and land acquisition, without compromising SESRO needs and project benefits	Requires substantially greater Order Limits extent	Requires minor additional Order Limits extent	Requires minimum Order Limits extent
CPC8	Aim for consistency with published and (insofar as possible) emerging Local Plan land use allocations	Can not be reconciled with Local Plans	Negotiation required with LPA to accommodate scheme within Local Plan	Low or no impact
CPC9	Aim for consistency with any adopted Neighbourhood Plan policy applicable to the land area affected	Can not be reconciled with Neighbourhood Plans	Negotiation required with Parish Council to accommodate scheme within Neighbourhood Plan	Low or no impact
CPC10	Avoid development of infrastructure within specifically designated areas or their setting, as applicable (e.g. Green Belt, AONB, Common Land, Open Space)	Requires development of major infrastructure within the designation, particularly above ground, or development likely to have a significant effect on setting (where applicable)	Requires development of minor above-ground infrastructure within the designation, which is sympathetic with surroundings and access, or likely to have a less than significant impact on the setting (where applicable)	Does not require development of above-ground infrastructure within these designations or development likely to have more than a negligible effect on the setting (where applicable)
CPC11	Avoid encroachment on any safeguarded land in minerals and waste policy, unless the minerals can be beneficially utilised as a result	Partly or fully encroaches on safeguarded minerals or waste allocations	Potential conflict with development or use of safeguarded minerals or waste allocations	Low or no impact
CPC12	Ability to integrate with existing nationally-significant infrastructure, statutory undertakers' major infrastructure, or any proposed future Nationally Significant Infrastructure Projects (NSIP) (such as that of National Highways, Environment Agency, Network Rail)	Can not be reconciled with existing infrastructure or proposed Nationally Significant Infrastructure Project (NSIP) without significant alterations to them	Negotiation required with existing infrastructure owner / Nationally Significant Infrastructure Project (NSIP) owner/promoter to accommodate scheme	Low or no interaction with existing infrastructure or proposed Nationally Significant Infrastructure Project (NSIP)
CPC13	Minimise the consenting complexity due to the need for additional consents and licenses that may be required outside the Development Consent Order (DCO), e.g. additional Flood Risk Activity Permit, Environmental Permit, abstraction/discharge Licence, European protected species licence, etc	More than one additional consent/license required which cannot be or would be challenging (new precedent) to be delivered through the Development Consent Order (DCO)	One or more additional consent/license required	No additional consents/licenses required
CPC14	Avoid or minimise the need for any consequential development consenting (i.e. displacement or alteration of other development)	Existing Major Development requires planning permission to relocate or alter	Other existing development requires planning permission to relocate or alter	No existing development requires planning permission to relocate or alter
CPC15	Minimise interfaces/reliance on external governing/third parties (e.g. Removing the canal removes a stakeholder, reducing interfaces and permissions required from Network Rail, National Highways, National Grid)	Multiple complex interfaces with others may complicate or delay progress	Several manageable interfaces with others	Interfaces with others kept to a minimum or removed
CPC16	Potential for contribution to long-term infrastructure aims	None	Small contribution	Large contribution
CPC17	The option provides economic benefits by directing traffic through local town centres which will boost their footfall and potential for people to stop and utilise their local economy	The routes for this option provide a bypass to local towns, which while reducing traffic for local villages, will mean that potential customers of local businesses will not be encouraged to shop in these towns. Therefore, the local economy of these local towns and villages will not benefit from this option	The routes for this option provide a bypass to some of the local towns, which means some of the visitors may be encouraged to shop in only some of these towns and only some towns may experience boosts to their local economy	The routes for this option do not provide a bypass of local towns and villages. Therefore, this option may boost the local economy of these towns and villages as people may be more likely to stop and visit the local businesses here.
CPC18	Influence the location and layout of development to maximise the use and value of existing and planned sustainable transport investment	Option does not support existing and planned public transport infrastructure between key destinations	Option partially supports existing and planned public transport infrastructure between key destinations	Option supports existing and planned public transport infrastructure between key destinations
CPC19	Maximise the benefits of travel for non-motorised users between key destinations	Provides no suitable routes that will encourage users to consider walking, cycling or using bridleways between key local destinations for various purposes	Provides some routes that would encourage some users to walk, cycle or use bridleways but could be improved further to prioritise a modal shift away from trips undertaken by private vehicles	Provides numerous routes with infrastructure that prioritises non-motorised users to encourage users to walk, cycle or use bridleways
Property and Land Acquisition		**Red**	**Amber**	**Green**
PRP1	Minimise loss of sensitive properties, e.g. residential, commercial, green belt, common land, historical or community assets due to project delivery	Permanent loss of sensitive properties	Temporary loss of sensitive properties	No permanent or temporary loss of sensitive properties
PRP2	Minimise loss of land allocated within the Local Plan for alternative higher value / social / cultural value uses, e.g. residential, historical or community assets due project delivery	Permanent loss of allocated land for higher value or social value properties	Temporary loss of allocated land for higher value or social value properties	No permanent or temporary loss of allocated land for higher value or social value properties
PRP3	Minimise permanent loss of best and most versatile agricultural land (grades 1, 2 and 3)	Results in any loss of Grade 1 agricultural land	Results in loss of any Grade 2 agricultural land or >50% Grade 3 agricultural land	No Grade 1 or 2 agricultural land is affected and loss of <50% Grade 3 agricultural land
PRP4	Assessment of Land and Property asset costs and associated compensation due under the Compensation Code	Land acquisition costs likely to be relatively high.	Land acquisition costs likely to be relatively moderate.	Land acquisition costs likely to be relatively low.

PRP5	Assessment of Special Category Land	Nature and / or extent Special Category Land is likely to cause high consenting risk	Nature and / or extent Special Category Land is likely to cause moderate consenting risk	Nature and / or extent Special Category Land is likely to cause low consenting risk
PRP6	Assessment of disruption to landowners' access to their land during construction and operation	High disruption to landowners' access to their land during construction and operation	Moderate disruption to landowners' access to their land during construction and operation	Low disruption to landowners' access to their land during construction and operation

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