SESRO

Rail Siding and Materials Handling Area Options Appraisal Report

J696-DN-A01A-ZZZZ-RP-ZD-100008

July 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

Figures and Tables

Glossary

Term	Definition
Gate 3 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
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 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

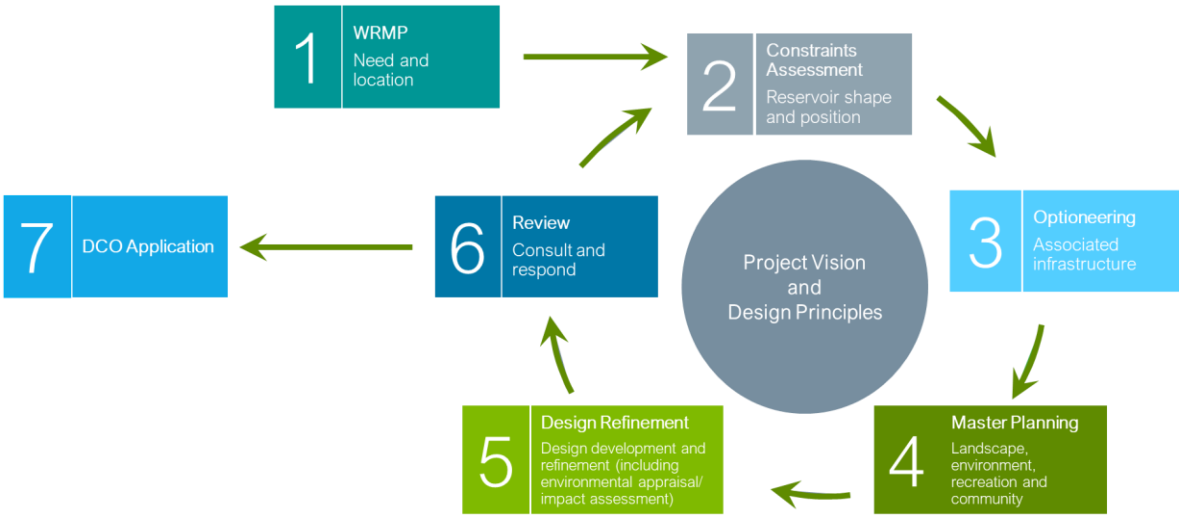
	against each of the appraisal criteria. The RAG 'score' represents a subject-matter expert judgement based on the evidence evaluated in the options appraisal.
Regulators' Alliance for Progressing Infrastructure Development (RAPID)	An alliance of the three water regulators Ofwat, Environment Agency and Drinking Water Inspectorate formed to help accelerate the development of 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.
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/
National Landscape	Revised name for Area of Outstanding Natural Beauty (AONB) – November 2023. Note in Appendices may still be referred to as AONB.

0 Executive Summary

The South East Strategic Reservoir Option (SESRO) is a strategic resource to the south east to secure water supplied 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.

Stage 3 of the SESRO Multi-Disciplinary Design Development Process in Figure 0.1 is the optioneering of associated infrastructure for the reservoir. A rail siding to support construction is considered to be essential associated infrastructure.

Figure 0.1: SESRO Multi-Disciplinary Design Development Process



Source: Thames Water Internal, 2024

This report sets out the options appraisal undertaken, working towards the Gate 3 submission, to identify a preferred option for the layout and location of a temporary rail siding and materials handling (RSMH) area. The rail siding is expected to be constructed early in the SESRO construction programme and be operational from 2031 to 2034, almost four years.

The RSMH area for the SESRO project is to import construction materials by freight train and therefore reduce the volume of material imported by road. The key materials to be imported by rail include:

- Rip-rap, gravel, and sand which would be placed on the inner face of the reservoir embankment to protect against erosion by wave action.
- Sand and gravel which would be placed within the reservoir embankment to form internal drainage and filtering elements as required for reservoir safety.

To identify the preferred option for master planning and consultation, the options appraisal process detailed fully in the SESRO Option Appraisal Context and Methodology Report

was followed. Options included a range of configurations for the RSMH area, incorporating options to join to either the existing four track section or two-track section of the Great Western Mainline, which runs roughly parallel to the southern extent of the 150Mm^3 reservoir embankment (based on the Gate 2 Indicative Design).

The Great Western Mainline is a busy and strategically important national rail route that is owned and operated by Network Rail. Any future connection to this railway has the potential to impact the existing infrastructure and rail operations and would need approval from Network Rail. Acceptance by Network Rail of a rail siding design proposal is therefore critical because without it a siding would not be permitted to be constructed or operated, regardless of any other permissions that are granted.

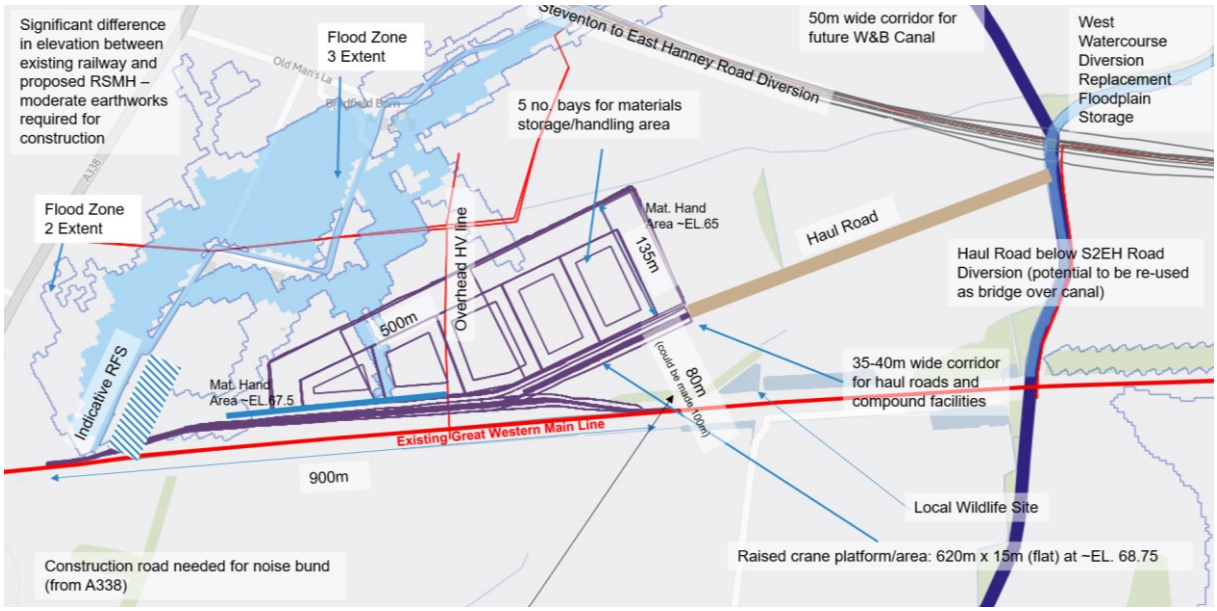
The outcomes for each of the options considered in this appraisal process is as follows:

- RSMH 1: RSMH 1 was the only option located off the four-mile two-track section of the railway and was discounted as the preferred option in this appraisal due to the much higher risk of this option being rejected by Network Rail.
- RSMH 2 and 3: Following the initial review of RSMH 2 and 3, RSMH 4 was developed. RSMH4 is located between RSMH 2 and 3 (as an amalgamation of the two options) and was therefore taken forwards in the options appraisal process instead of RSMH 2 and 3. Two variants of RSMH 4 (a and b) were developed that are in the same location but that have differing signalling arrangements. Option 4b was taken forward for the purposes of options appraisal as it requires less complex signalling modifications than 4a.
- RSMH 4a and 4b: Following the assessments of RSMH 4a and 4b, alternative layouts were investigated to reduce their potential impacts on the Cuttings and Hutchin's Copse Local Wildlife Site (LWS). In so doing, an additional option, RSMH 5, was developed and defined for assessment – this option rotates RSMH 4b (which requires less complex signalling modifications than RSMH 4a) away from the mainline to increase the distance between the RSMH area and the LWS. An option could be developed in the location of RSMH 5 that uses the signalling principles of either RSMH 4a or 4b.
- RSMH 5: In comparison with RSMH 4b, RSMH 5 was the preferred option under several environmental themes and also its concept of having an additional spur off the main rail siding gives it greater flexibility to refine its design. RSMH 5 was therefore the provisionally preferred option in this appraisal, acknowledging that further work will be needed to understand and minimise the potential impact of RSMH 5 on properties and land. This work will seek to identify the optimum configuration of the RSMH 5 design, balancing its operational requirements with impact on the operational railway, local wildlife / habitat, and local properties and land.

To summarise, RSMH 5 was therefore identified as the provisionally preferred option in for master planning and consultation, acknowledging that further work will be needed to refine the design.

Figure 0.2: Layout of RSMH 5 (370,000m^3 capacity)

Note that this layout is indicative only for the purposes of options appraisal[1].



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Following on from these options appraisals, working towards Gate 3 submission, the next stage in the SESRO design development process (as set out in Figure 0.1) is to develop the SESRO Gate 3 Interim Landscape and Environmental Master Plan for inclusion in the public consultation in 2024, using the outcome of options appraisals for the associated infrastructure for the reservoir.

It is expected that the options appraisals will be backchecked in Autumn 2024 to consider changes and/or additional information that may have been identified by that time through the Gate 3 design development work (including the development of the Gate 3 Interim Landscape and Environmental Master Plan) and/or the Summer 2024 non-statutory consultation.

A number of next steps have been identified specifically to follow on from this options appraisal for the RSMH area. These steps are included within Section 7.2 of this report.

[1] Potential noise mitigation is not shown in the figure.

1 Introduction

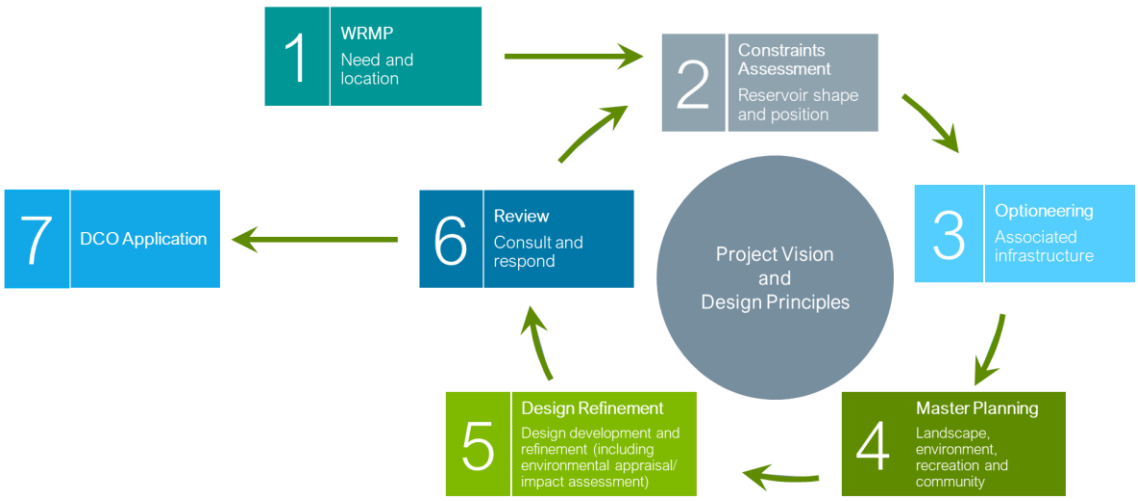
This section provides an overview of the purpose and status of this report and its relationship to other SESRO option reports.

1.1 Purpose of this Report

1.1.1 The South East Strategic Reservoir Option (SESRO) is a strategic 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.

1.1.2 The SESRO Design Development Process (shown in Figure 1.1 below) is outlined in the SESRO Option Appraisal Context and Methodology Report. Stage 3 of this process is the optioneering of associated infrastructure for Gate 3, and options appraisals were undertaken for infrastructure identified as being essential associated infrastructure for the reservoir.

Figure 1.1: SESRO Multi-Disciplinary Design Development Process



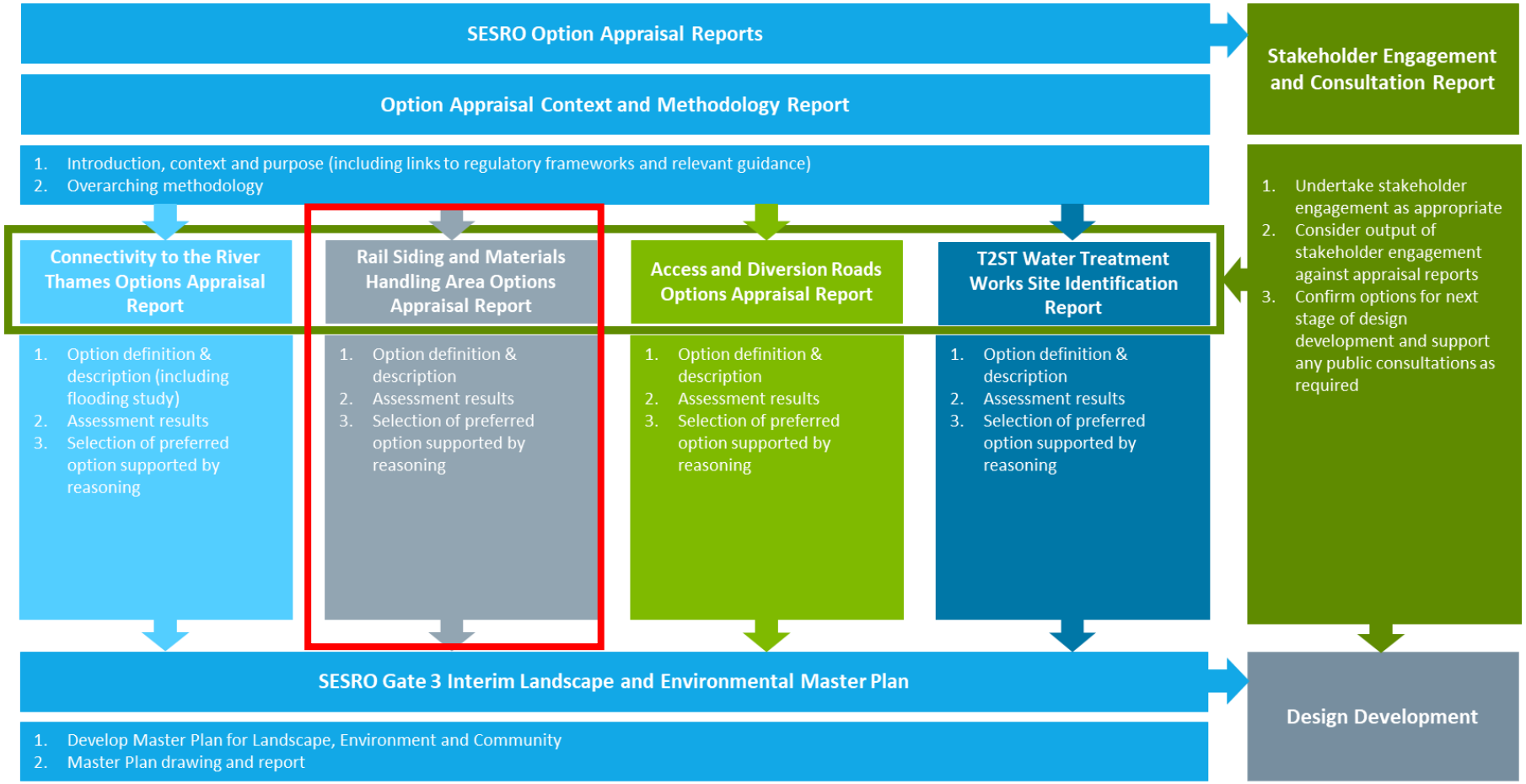
Source: Thames Water Internal, 2024

1.1.3 The rail siding and materials handling (RSMH) area is considered part of the essential associated infrastructure for the reservoir. There are options for the configuration and layout of the RSMH area. This report therefore describes the RSMH area options appraisal undertaken, working towards the Gate 3 submission, to identify a preferred location for master planning and consultation.

1.1.4 This report forms part of a suite of option reports, as shown in Figure 1.2. The overarching SESRO Option Appraisal Context and Methodology Report describes the approach and methodology adopted for the option appraisals.

Figure 1.2: SESRO Options Appraisal Document Suite

Note that this RSMH area report is outlined in red in the document suite.



Source: Thames Water Internal, 2024

1.2 Interaction with the Great Western Mainline

1.2.1 The Great Western Mainline, which runs for approximately 2.4km roughly parallel to the proposed southern extent of the 150Mm^3 reservoir embankment (based on the Gate 2 Indicative Design[2]), could facilitate the import of construction material by rail via a new rail siding connected to the mainline for deliveries to the SESRO site.

1.2.2 The Great Western Mainline is a busy and strategically important national rail route that is owned and maintained by Network Rail. Any future connection to this railway has the potential to impact the existing infrastructure and rail operations and would need approval from Network Rail. Acceptance by Network Rail of a rail siding design proposal is therefore critical because without it a siding would not be permitted to be constructed or operated, regardless of any other permissions that are granted.

Discussions with Network Rail

1.2.3 Liaison with Network Rail has been ongoing since Gate 1 to make them aware of the potential project and what is proposed, and to understand timetabling constraints and rail related health and safety and constructability issues.

1.2.4 Discussions were held during Gate 3 to inform Network Rail of this option appraisal study, ensuring they understood the appraisal process, an overview of the work undertaken to define options, as well as presenting to Network Rail the options (defined in Section 4) which were being assessed.

1.3 Backchecking and Changes to this Report

1.3.1 This is the first issue of this report and therefore no backchecking has been undertaken. In future revisions, this section will summarise any backchecking undertaken, which is specific to the RSMH area options appraisal, and any changes to the options since the previous revision. For example, indicative estimates of the stockpile capacity, which dictates the size of the RSMH area, have been used in this study (as detailed in Section 4.1), so the impact of a change in stockpile capacity and RSMH area extents would need to be reviewed.

1.3.2 It is expected that the next backcheck of the RSMH area options will happen in Autumn 2024 to consider changes and/or additional information, which may have been identified by that time through the 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.

1.3.3 It is noted that at the time of these appraisals, there had been limited access to

[2] SESRO Gate 2 documents are available online at https://www.thameswater.co.uk/about-us/regulation/strategic-water-resource-solutions/new-reservoir-in-abingdon

the SESRO site for surveys and investigations, such as terrestrial and aquatic ecological surveys due to landowner permissions being negotiated centrally which has taken time, and as such this appraisal has been completed using available desk-based information. These assessments will need to be backchecked following completion of surveys.

2 Assessment Methodology

The section outlines the options appraisal methodology for the RSMH area, following the appraisal steps in the common approach set out in the SESRO Option Appraisal Context and Methodology Report.

2.1 Overview of Appraisal Methodology

2.1.1 The SESRO Option Appraisal Context and Methodology Report sets out the appraisal methodology, which is a common approach that has been adopted for all the option appraisal studies for the essential associated infrastructure for the reservoir and working towards the Gate 3 submission.

2.1.2 A summary of the activities undertaken for the RSMH area option appraisal is provided below, in line with the steps in the appraisal methodology.

2.2 Appraisal Step 1: Define Scope and Objectives of Appraisal

2.2.1 The definition of the scope and objectives of options appraisal for Gate 3 was undertaken at a project level and reported in the SESRO Option Appraisal Context and Methodology Report. That report identifies the essential associated infrastructure for the reservoir and also sets out the overarching purpose of the options appraisals to support progress towards DCO submission and a Gate 3 submission to RAPID.

2.2.2 The objective of the options appraisal detailed in this report is to identify a preferred location and configuration for the RSMH area, which is considered essential associated infrastructure for the reservoir.

2.2.3 A temporary RSMH area is required for the SESRO project to import construction materials by freight train, and therefore reduce the volume of material imported by road. The key materials to be imported by rail include:

- Riprap, gravel, and sand which would be placed on the inner face of the reservoir embankment to protect against erosion by wave action.
- Sand and gravel which would be placed within the reservoir embankment to form internal drainage and filtering elements as required for reservoir safety.

2.3 Appraisal Step 2: Define Constraints on Option Definition

2.3.1 The constraints identified on the definition of options for the RSMH area are presented in Section 3 of this report.

2.4 Appraisal Step 3: Develop Appraisal Criteria

2.4.1 The SESRO Criteria Table developed for the options appraisals of associated infrastructure is within the SESRO Option Appraisal Context and Methodology Report.

2.4.2 Criteria descriptions in this table were developed under the themes of design acceptance (engineering), constructability, costs, carbon costs, environmental performance, community and planning considerations, and property and land acquisition.

2.4.3 In general, the criteria relate to key requirements and considerations for the SESRO project based on relevant legislation, policy and guidance, as well as operational and engineering requirements. They are therefore applicable across the different options appraisals for the associated infrastructure for the reservoir, including the water treatment works (WTW), RSMH areas, access and diversion roads, and connectivity to the River Thames.

2.4.4 In the RSMH area options appraisal, 20 of the 132 criteria in the SESRO Criteria Table were not assessed. 13 of these excluded criteria are specific criteria used for other appraisals and the remaining seven were not used they do not relate to the feasibility of the option, facilitate differentiation across options or are already assessed under another criteria.

2.4.5 Appendix H contains the full list of criteria excluded from the RSMH area options appraisal, alongside their reasons for exclusion.

2.4.6 For only the assessment of the RSMH area options, the following criteria were considered in the assessment:

- Design Acceptance – Risk that Network Rail would not accept the option – included to consider the risk that Network Rail will not accept the rail siding off the Great Western Mainline given that it is a busy and strategically important national rail route.
- Construction Complexity - Volume and / or complexity of rail signalling interventions required – included to assess the differing impacts the options have on the existing rail network.
- Logistics - Capacity of and layout for stockpiling at the materials handling area to reduce the risk of programme disruption and minimise double handling of material – included to assess how the differing layouts of the materials handling may impact on logistics.
- 3rd Party Impact - Potential to disrupt existing rail network during operation – included as there will be differing impacts on the existing network depending on whether an option connects from the existing two-track or four-track sections of the Great Western Mainline.

2.5 Appraisal Step 4: Define Options

2.5.1 This appraisal study builds on preliminary work undertaken in Gate 2 for the rail siding and materials handling requirements for construction of a reservoir. In this earlier work two general locations were identified with three options initially proposed. These options were reviewed (as detailed in Section 4.1) and further options developed for assessment in this Gate 3 study.

2.5.2 The options were defined over the course of several discussions amongst the Gate 3 SESRO team, which consisted of engineers (including rail specialists), terrestrial and aquatic environmentalists, and land, planning and property specialists.

2.5.3 Sand, gravel and rip-rap would need to be imported for the construction of the reservoir based on estimated rates of delivery of these materials and rates of transportation/placement to the desired locations on site. An appropriate arrangement was developed for each option using two indicative options for stockpile capacities for materials handling area, each derived to have a different approach to the level of acceptable risk related to the distribution of material delivery during construction – full details of the two storage capacities are set out in Section 4.1.

2.5.4 Each option was drawn up in a plan with accompanying descriptions ready for appraisal step 5 outlined below.

2.5.5 A summary of appraisal step 4 for the RSMH area is presented in Section 4 of this report.

2.6 Appraisal Step 5: Undertake Individual Assessments

2.6.1 In this appraisal step, each option was reviewed and assessed by specialists (identified above) against the applicable criteria in the SESRO Criteria Table, which was developed in appraisal step 3. For each of the applicable criteria, an option was given a red, amber, or green (RAG) score. The RAG score indicates the performance of an option within the ambit of each criterion and the RAG score definitions 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 in the SESRO Criteria Table 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.
- 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 the SESRO Criteria Table 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 the SESRO Criteria Table.

2.6.2 The SESRO Option Appraisal Context and Methodology Report contains further details on the RAG assessment method.

2.6.3 The RAG assessment for each RSMH area option was recorded in the format standard across the associated infrastructure options appraisals. The narratives from relevant specialists documenting the reasoning behind why each RAG score was given for each option are included within the appendices of this report.

2.6.4 A summary of appraisal step 5 for the RSMH area is presented in Section 5 of this report. In this report Section, the assessment performances of options are summarised into assessment subthemes, which are set out below.

Table 2.1: Criteria Subthemes for the RSMH Area

Key Theme	Subtheme
Design Acceptance (Engineering)	Network Rail
Constructability (Engineering)	Health and Safety
	Third Party Impact
	Logistics
	Programme
	Construction Complexity
Operability (Engineering)	Health and Safety
	Operational Complexity
	Operational Resilience
	Transport Planning
Cost and Carbon	Cost
	Carbon
Environmental	Air Quality
	Aquatic Environment
	Biodiversity and Nature Conservation
	Biodiversity and Nature Conservation and Landscape
	Flood Risk
	Historic Environment
	Land Quality
	Landscape and Visual
	Noise
	Pollution
Community, Planning and Land	Socio-Economic
	Consenting
	Transport Planning

	Property and Land Acquisition

2.6.5 Appraisals have been undertaken using available desktop or historical survey information (from the mid to late 2000's). Further site work is required to create an environmental baseline for the project and full environmental assessment of the project is planned for 2025. If findings diverge from the desktop information used, then backchecking of this options appraisal will be required as outlined in Section 1.2.

2.7 Appraisal Step 6: Workshop to Agree Preferred Option

2.7.1 Following the individual assessments in appraisal step 5, a workshop was held to bring together specialists to discuss the outputs of the assessments against the criteria, identify a consensus preferred option and start to record the collective reasons for the preferred option. The assessment subthemes were used to help identify how the different options performed and identify any relevant and material differentiations between the options.

2.7.2 A summary of appraisal step 6, including the workshop and appraisal outcome, is presented in Section 6 of this report for the RSMH area. The key theme and subtheme themes narratives presented in this report Section are intended to summarise the key points from assessment narratives, present the issues that provided differentiators between options and where possible provide a preferred option with a reasoned justification.

2.8 Appraisal Steps 7 and 8: Review against other SESRO appraisals and Masterplanning and Consultation

2.8.1 Appraisal steps 7 and 8 are not reported within this options appraisal report, but rather they are being undertaken as part of the Gate 3 Interim Landscape and Environmental Master Plan development, as set out in the SESRO Option Appraisal Context and Methodology Report.

3 Constraints on Option Definition

This section sets out the constraints on option development for the RSMH area, in accordance with step 2 of the appraisal methodology.

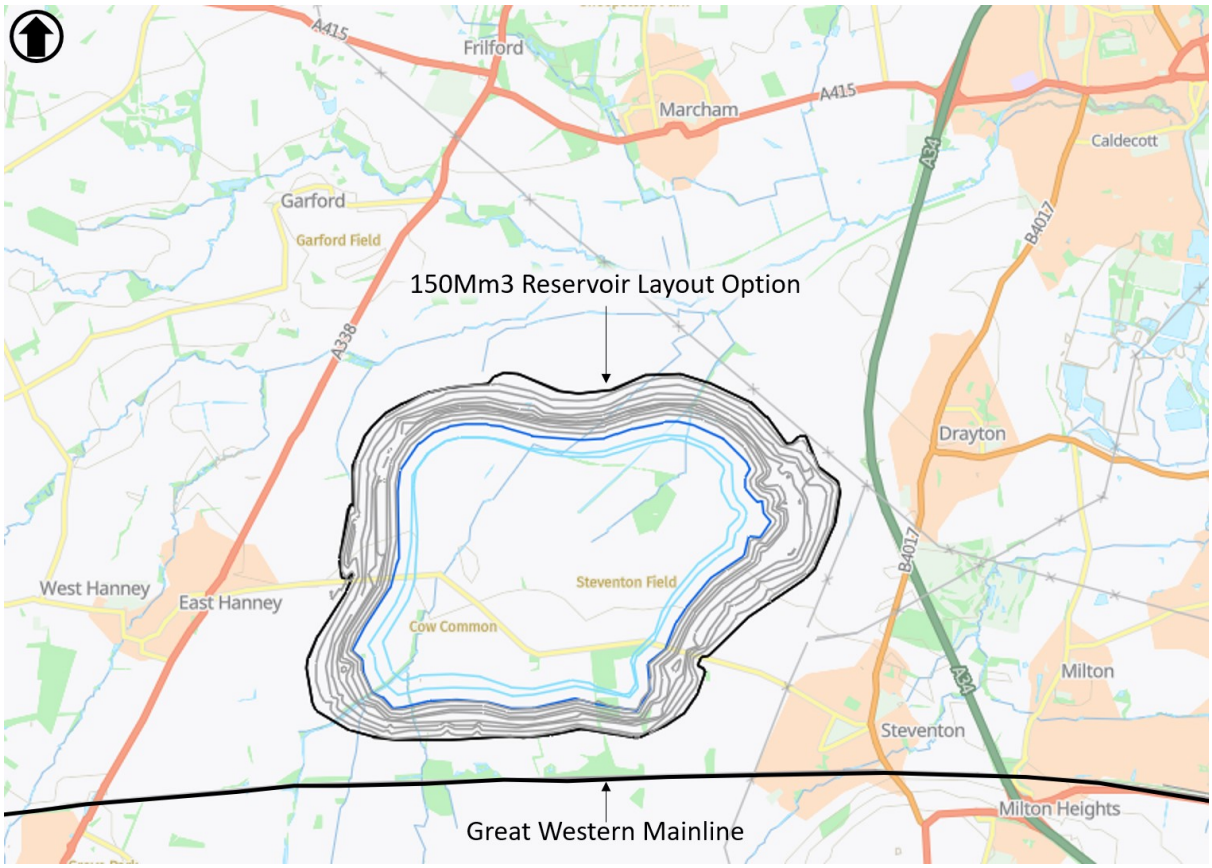
3.1 Introduction

3.1.1 The SESRO site has the advantage of the Great Western Mainline Railway running along its southern boundary (as shown on Figure 3.1 below), which could facilitate construction material deliveries by rail; however, there are various constraints that influence this approach:

- Topographic, environmental and location constraints - existing topography, including watercourses, ponds, and flood zones, as well as environmental and location features that would otherwise be unaffected by the SESRO project.
- SESRO and external scheme constraints and opportunities – other elements of the SESRO project and possible future external schemes were identified for consideration in the options appraisal of the RSMH area.

3.1.2 The location of options for the RSMH area were determined by the area required, space available, topography, rail, and materials handling and operational constraints. The implications for environment, planning and land are considered in the assessment of options defined for the RSMH area.

Figure 3.1: Overview of SESRO Site and Location of Great Western Mainline Railway



Source: Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri Spatial Constraints

3.2 Topographic, Environmental and Location Constraints

3.2.1 Topographic, environmental and location features in the area between the Great Western Mainline and reservoir embankment, which may constrain the location of a RSMH area, were identified, as listed below.

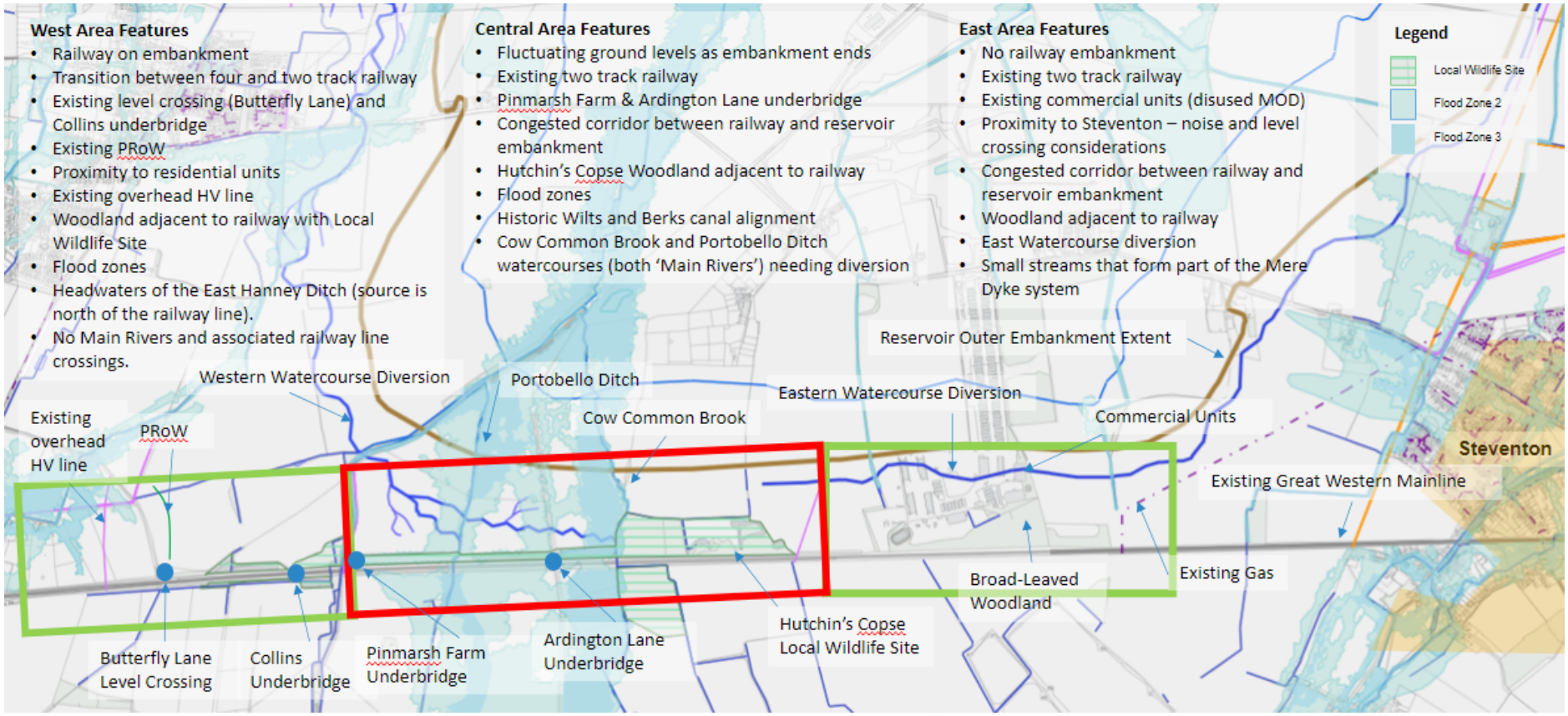
- Parts of the existing Great Western Mainline alongside the site are on an embankment.
- Existing crossings of the Great Western Mainline should remain operable with the exception of Butterfly Lane unmanned level crossing. Prior to this appraisal study, it was established that Network Rail did not wish to keep the unmanned level crossing at Butterfly Lane in operation, and that there were existing plans for rerouting the Public Right of Way (PRoW) through Butterfly Lane via the Collins underbridge. Hence there was no need to keep it operable as part of the appraisal work.
- Two 'Main River' watercourses cross under the railway from the south and continue north across the SESRO site, these are Portobello Ditch and Cow Brook Common. The Indicative Gate 2 Master Plan includes diversion of these watercourses around the reservoir embankment and these diversions will start in the vicinity of the railway.

- The watercourses have an associated floodplain alongside the railway, there are also some small existing ponds.
- The historic line of the Wilts & Berks Canal crosses the railway and SESRO site from the southwest to the northeast. The Indicative Gate 2 Master Plan includes a realigned reserved canal corridor around the reservoir; however, the railway crossing point would remain the same.
- The southern extent of the 150Mm^3 reservoir embankment concept design runs roughly parallel with the railway for approximately 2.4km creating a relatively narrow corridor that is expected to contain the Steventon to East Hanney road diversion, watercourse diversions and other utility diversions.
- The Cuttings and Hutchin's Copse Site Local Wildlife Site (LWS) and small areas of woodland are also present alongside the existing railway.
- Steventon is situated to the southeast of the reservoir. The location of the railway siding is constrained by Steventon as the noise generated from unloading freight trains should not adversely impact on the village. There are also several level crossings within Steventon – the placement of a railway siding along the Great Western Mainline should not adversely impact on the control and signalling operations of the existing level crossings.
- A group of commercial units is located at the site of a disused MOD site, which once had a rail head. These units impinge on the concept design for the reservoir itself and will therefore be removed by the project, on this basis they are not considered to form a constraint on the railway siding location.

3.2.2 The considerations above lead to two areas alongside the Great Western Mainline that could be considered for detailed options as shown in Figure 3.2, the west and east areas. The central area has been discounted for the following reasons:

- The area contains flood zones which would require both mitigation and replacement flood storage volume if a railway siding and materials handling area were constructed in this location.
- The area includes large areas of woodland (Hutchin's Copse).
- As part of the reservoir construction, several watercourses require diversions in this area, introducing a railway siding would add to the complexity during construction.
- Lack of space in the north of the area, due to the presence of the proposed reservoir embankment.

Figure 3.2: Location Areas Identified for a RSMH Area



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3.3 SESRO and External Scheme Constraints and Opportunities

3.3.1 One element of the SESRO works and one possible future external scheme was identified for consideration in the options appraisal for the SESRO RSMH area.

- Steventon to East Hanney Road Diversion: For the purposes of this rail study the route of the diversion road in the Indicative Gate 2 Master Plan was assumed. The options appraisal of this road diversion for the SESRO project is covered within the SESRO Access and Diversion Roads Options Appraisal Report[3], which confirms a very similar route to Gate 2 as the preferred option for consultation.
- Grove Station: It is noted that in the Vale of White Horse (VoWH) Local Plan 2031 Part 2 (LPP2)[4], the consultation draft VoWH and South Oxfordshire Joint Local Plan 2041[5] and OCC's local transport and connectivity plan[6] there is an aspiration for a new passenger railway station at Grove.

3.3.2 Several possible locations are safeguarded for Grove Station in the existing and emerging local planning policy, all southwest of the expected SESRO construction area based on the indicative Gate 2 design (including reservoir, road diversion, watercourse diversion and landscaping), ie. before considering RSMH locations in this study. In the adopted Local Plan 2031, Core Policy 19a safeguards three locations as illustrated in Figure 3.3 (marked as CP19a and with the red cross-hatching) and listed below:

- one north east of Grove, just east of the A338;
- one north of Grove, just east of the A338; and
- one northwest of Grove, further west of the A338.

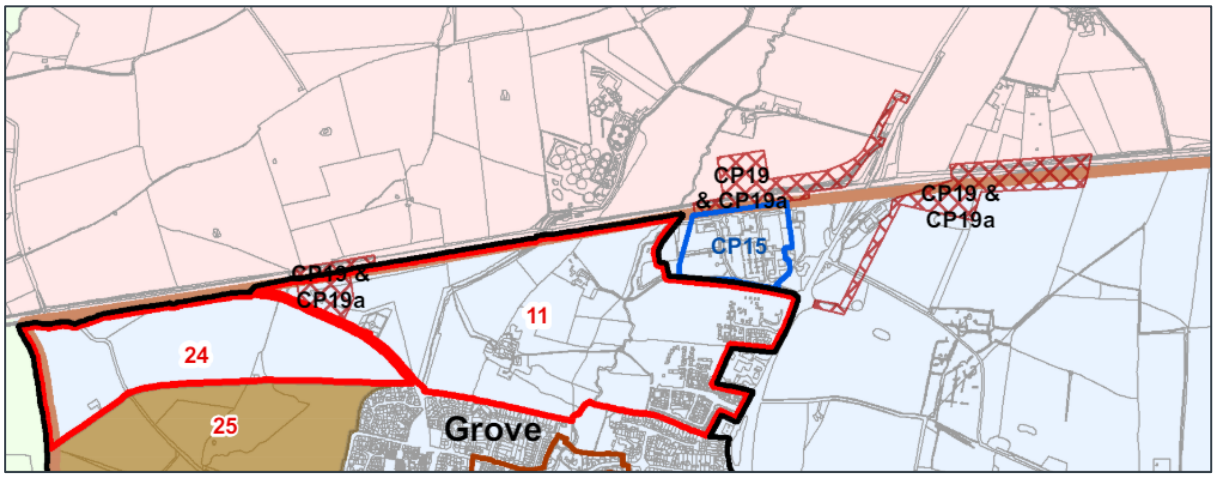
3.3.3 In the consultation draft VoWH and South Oxfordshire Joint Local Plan 2041, this is proposed to be refined to safeguarding just the middle of these three sites, shown in Figure 3.4 (pink cross-hatching).

3.3.4 In this options appraisal report, the aspiration for a possible future passenger rail station to serve Wantage and Grove as envisaged in the local planning policy (referred to as Grove Station in the policy and throughout this report) has been considered in two ways: firstly in the narrow sense of whether the RSMH would physically overlap with or be in sufficiently close proximity to conflict with rail movements to/from one of the safeguarded sites; but secondly more broadly with respect to the aspiration for a passenger rail station in this general area,

[3] SESRO Access and Diversion Roads Options Appraisal Report, J696-DN-A01A-ZZZZ-RP-ZD100009
[4] VoWH District Council, *Local Plan 2031 Part 2 Detailed Policies and Additional Sites* (October 2019), page 58. Available online: https://www.whitehorsedc.gov.uk/wp-content/uploads/sites/3/2021/03/VOWHDC-Master-1.pdf
[5] VoWH and South Oxfordshire District Councils, Joint Local Plan 2041 – Preferred Options Consultation (Regulation 18 Part 2), January 2024.
[6] Oxfordshire County Council, *Connecting Oxfordshire – Local Transport Plan 2015-2031, Volume 3 – Rail Strategy* (2016), page 52. Available online: https://www.oxfordshire.gov.uk/sites/default/files/file/roads-and-transport-connecting-oxfordshire/ConnectingOxfordshireRailStrategy.pdf

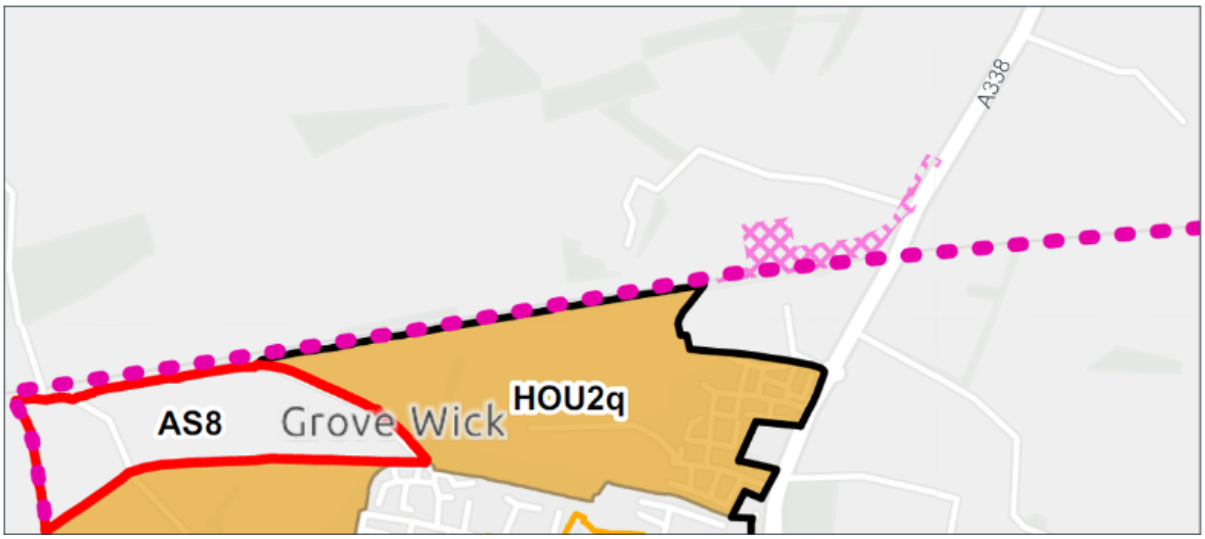
which need not necessarily be within a specific land parcel currently safeguarded.

Figure 3.3: VoWH Local Plan 2031 Part 2, Core Policy 19a Safeguarded Areas.



Source: VoWH Local Plan 2031 Part 2 Policies Map

Figure 3.4: Consultation Draft VoWH and South Oxfordshire Joint Local Plan 2041, Strategic Policy IN3 Safeguarded Area.



Source: VoWH and South Oxfordshire Consultation Draft Joint Local Plan 2041 Policies Map

4 Options Definition

This section summarises the options developed for assessment, in accordance with step 4 of the appraisal methodology.

4.1 Option Development Assumptions

4.1.1 A number of assumptions have been made to develop the RSMH options and these are listed and discussed further below:

- RSMH Requirements - impact on operation of the railway and overarching RSMH requirements.
- RSMH Area Assumptions - area required to form a RSMH area and the space available on the SESRO site for a RSMH area without impacting embankment construction, construction of other facilities associated with the project or construction programme.
- Rail siding assumptions – assumptions regarding track layout.
- Materials handling area assumptions – layouts for stockpiling and maintaining materials and transferring to the reservoir for placement.

RSMH Requirements

4.1.2 The Great Western Mainline effectively forms the southern boundary to the SESRO site (as shown on Figure 3.1 above); however, there is no station or existing siding sufficiently close to the site, that has the required capacity, suitability of access and that minimises road haulage movements to be used in construction, hence a new rail siding is proposed to import construction material to site.

4.1.3 All RSMH area options will require:

- Track and point amendments to the mainline track.
- Signalling amendments to the mainline track.
- Modifications to Overhead Line Electrification (OLE) and supporting gantries.
- Additional rail infrastructure to divert trains away from the mainline to a siding area for unloading.
- A materials handling and storage area to allow material to be unloaded and stockpiled until needed.
- Internal haul roads for vehicles to manage the stockpiled materials, as well as a haul road to link the RSMH area to the main site haul roads, to transport materials where they are needed for placement.

RSMH Area Assumptions

4.1.4 The necessary space estimated for the RSMH area for this options appraisal is based on indicative initial estimates of the stockpile volume needed for inner-

face protection materials delivered by rail.

4.1.5 Two indicative stockpile volumes have been used to consider potential RSMH area locations within the SESRO site, each derived to have a different approach to the level of acceptable risk towards the distribution to material delivery:

- A larger volume of storage based on one year's stockpiled material (370,000m^3) – this storage capacity would ensure that enough material was stockpiled before reservoir construction, to allow continued placement of material on site for a year, in a scenario where delivery of material by rail to site is disrupted or halted. This option presents a conservative approach to the risk of material delivery disruption.
- A smaller volume of storage based on the rate of delivery of materials versus the rate of placement of material (220,000m^3) – this storage capacity is smaller as it balances the rate of delivery of material to site against when it is needed for placement. In simple terms, when material is delivered to the rail sidings, it is then transported and placed on site shortly afterwards. Material must still be stockpiled to achieve this, but less than a year's worth. This option presents a less conservative approach to the risk of material delivery disruption.

4.1.6 It should be noted that the volumes of storage are indicative values for options appraisal only and the stockpile capacity and approach will be reviewed during design development.

4.1.7 In this appraisal study, options for the RSMH area are assessed using both capacity values for stockpiled material, as the stockpile capacity will depend on the level of acceptable risk to material delivery interruption via rail, which is still to be determined. Appropriate configurations for the options are considered later in this section.

Rail Siding Assumptions

4.1.8 For the rail siding, options for appraisal were initially developed based on the following assumptions:

- The rail sidings consist of two level (flat) tracks, to allow space for two 300m long trains. A minimum of 450m is required to permit shunting for unloading, the running round of a locomotive and for it to be clear inside the siding, or a longer train if the freight operator requires it.
- The two tracks are also required in case one train is unable to leave on schedule.
- The two siding tracks allow incoming trains to split should this be necessary. In this case, it is assumed that the operating crane can reach over the nearest track (and train/wagon) to reach material in a wagon on the farthest track. This arrangement was chosen as it allows the crane to track freely between the trains/wagons and the materials handling area.

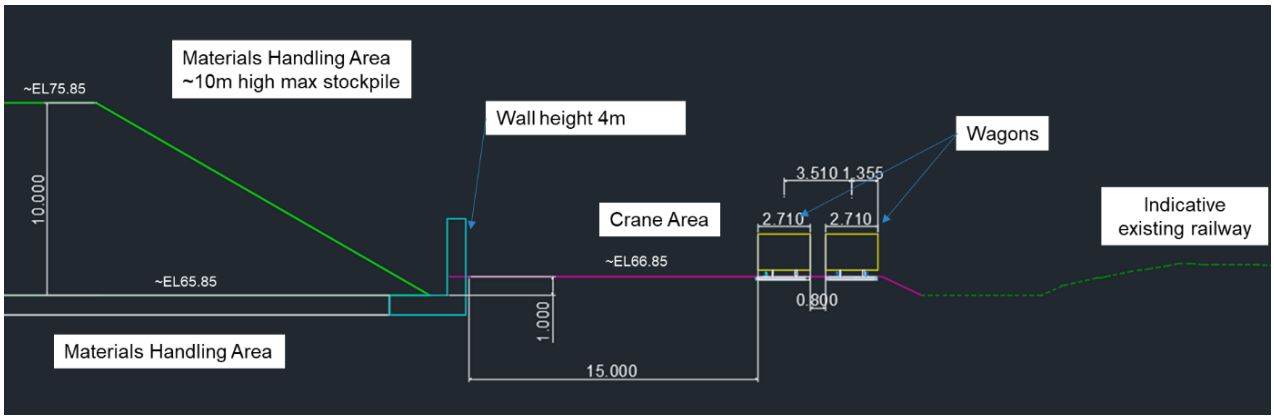
- The two siding tracks are spaced so that there is 800mm clear distance between two adjacent standard freight wagons, to allow personnel to walk between them for inspection if necessary.
- There are no trap points included as part of the options design for the sidings i.e., means to prevent trains from entering or obstructing the mainline when they are not permitted. It was recognised that the location of the siding, as well as track layout and gradient would warrant a particular form of trap point, for example additional rail, buffer stops or a sand drag. As such, it was assumed that trapping should be included as part of design development/refinement once a preferred option was selected.

Materials Handling Area Assumptions

4.1.9 For the materials handling area, options for appraisal are based on the following assumptions:

- The assumed concept is that freight trains will arrive from the direction of Avonmouth (or other suitable construction material sources to the west) and stop inside the siding area.
- The materials handling area would be located adjacent to the rail sidings and include a flat hardstanding platform to allow a mechanical grab with a clamshell bucket, to track up and down the length of the train. The grab would unload the wagons and place materials including sand, gravels and rip-rap (with a diameter up to approximately 550mm) into one of five designated concrete container areas for stockpiling specific materials, see Figure 4.1. The plan dimensions of the concrete areas vary with the capacity of the stockpile areas (i.e., 220,000m^3 or 370,000m^3 for delivery of materials when needed or one year's storage volume respectively) and the local constraints.
- Within the materials handling area, plant would be required to help manoeuvre materials deposited by the crane into stockpiles, as well as into dumper trucks which would then be used to transport materials to the required location on site via the internal haul roads. To allow these vehicles to manoeuvre, the materials handling areas include haul road access around the bays.
- Internal haul roads are included to provide a one-way system allowing vehicles to load up, take material for placement and then return to load up again.
- An external haul road is included, which links the RSMH to the site construction haul roads that follow the perimeter of the reservoir footprint. This is to allow transportation of material via dumper trucks to the desired location on site for placement.
- As shown in Figure 4.1, a wall is included to separate the crane handling platform from the stockpiling areas, to help reduce the risk of material rolling back onto the crane area.

Figure 4.1: Cross Section showing typical layout of the existing railway and the proposed sidings, crane area and materials handling area.



Source: Thames Water Internal, 2024

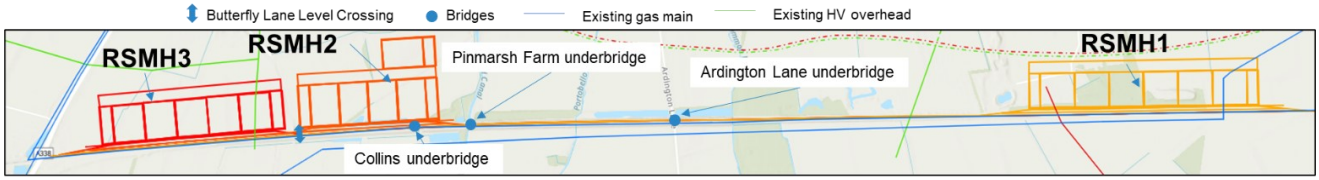
4.2 Initial Review of Rail Siding and Material Handling Area Options

4.2.1 This options appraisal study builds on preliminary work undertaken in Gate 2 for the RSMH requirements for construction of a reservoir.

4.2.2 As indicated in Figure 3.2, two general areas alongside the Great Western Mainline (the east and west areas) were identified for option identification and definition. Within the east and west areas, three RSMH area options were initially proposed as shown in Figure 4.2:

- RSMH 1 in the east area.
- RSMH 2 and RSMH 3 in the west area.

Figure 4.2: RSMH Area Options 1 to 3



Source: Ordnance Survey data © Crown copyright and database right 2023

RSMH 1 in the East Area

4.2.3 After initial review of RSMH 1, it was put forward to undergo appraisal; therefore, RSMH 1 is detailed in Section 4.3 below as an option for assessment.

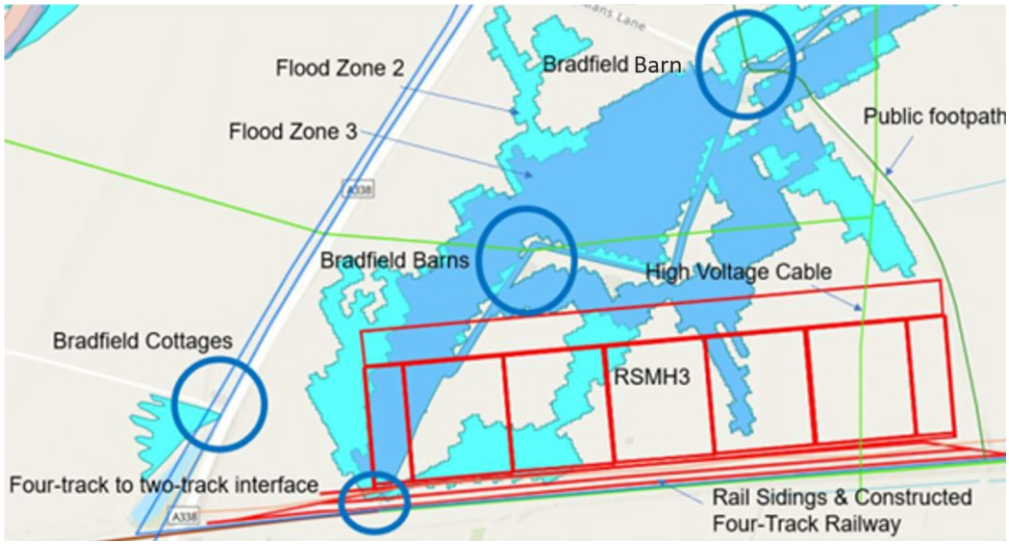
RSMH 2 and 3 in the West Area

4.2.4 Upon initial review of options RSMH 2 and RSMH 3, it was noted both would require the construction of an embankment for new track taking trains coming from the west to the sidings, and additional track to allow trains to get back onto the existing Great Western Mainline.

4.2.5 Within the west area, the railway siding track should connect back onto the existing mainline before the Collins underbridge to enable the continued use of this crossing point. Therefore, excluding options extending to the far east of this area such as RSMH 2. (As outlined in Section it is not necessary to keep the Butterfly Lane crossing operable as part of the appraisal work.)

4.2.6 RSMH 3 is located close to the existing four track Section of the Great Western Mainline, this enables the existing northern relief line to be extended for the railway sidings, possibly making construction and railway operation simpler. However, RSMH 3 is in an existing fluvial flood zone, as well as close to sensitive residential units, as shown in Figure 4.3.

Figure 4.3: RSMH 3 located in flood zones and sensitive residential units.



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RSMH 4 in the West Area

4.2.7 Following the initial review, RSMH 4 was developed. RSMH 4 is located between RSMH 2 and RSMH 3 and is indicated by the green area in Figure 4.4. The option avoids the flood zones, is further from the sensitive residential units and is able to accommodate an embankment for railway in and out of the sidings to the west of the Collins underbridge.

Figure 4.4: RSMH Area Options 1 to 4

Source: Ordnance Survey data © Crown copyright and database right 2023

4.2.8 RSMH 4 was therefore put forward to undergo appraisal along with RSMH 1,

instead of RSMH 2 and 3, neither of which were taken forward. RSMH 4 is detailed in Section 4.4 below as two options for assessment because RSMH 4 was split into RSMH 4a and 4b – this is explained in the Section 4.4.

4.3 Option for Assessment - RSMH 1

Location of RSMH 1

4.3.1 RSMH 1 is located approximately 1.5km west of Steventon and 260m south of the southern edge of the reservoir embankment options. All but one of the options being considered for the Steventon to East Hanney Road Diversion pass through the area between the reservoir embankment and RSMH 1.

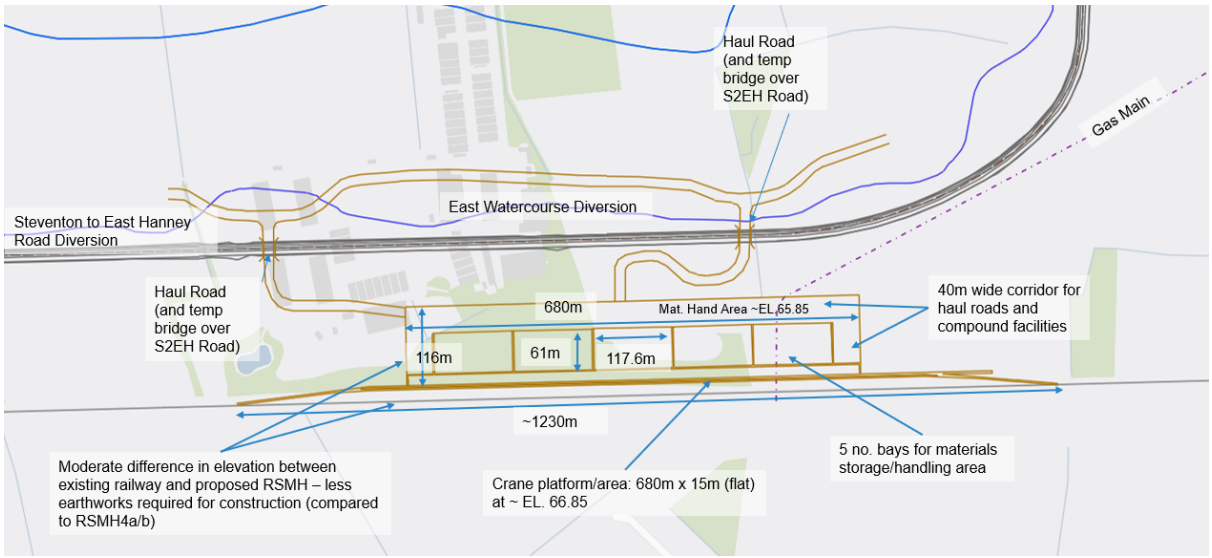
Signalling and Track Modifications for RSMH 1

4.3.2 RSMH 1 would provide the required signalling and track modifications for trains to either exit to the east or the west. For the trains which exit the site towards the east they would return to Avonmouth by looping around via Didcot or Reading. For the trains which exit the site towards the west they would return directly to Avonmouth.

4.3.3 The connections into the existing two track Great Western Mainline for RSMH 1 are approximately 1.2km apart, see Figure 4.5 and Figure 4.6. The possession works will likely need to happen at night, to minimise disruption on the railway line during the day. This interaction will require review and approval with Network Rail, particularly due to the signalling modifications which would be required.

Figure 4.5: RSMH 1 Layout (220,000m^3 stockpile capacity)

Note that this layout is indicative only for the purposes of options appraisal[7].

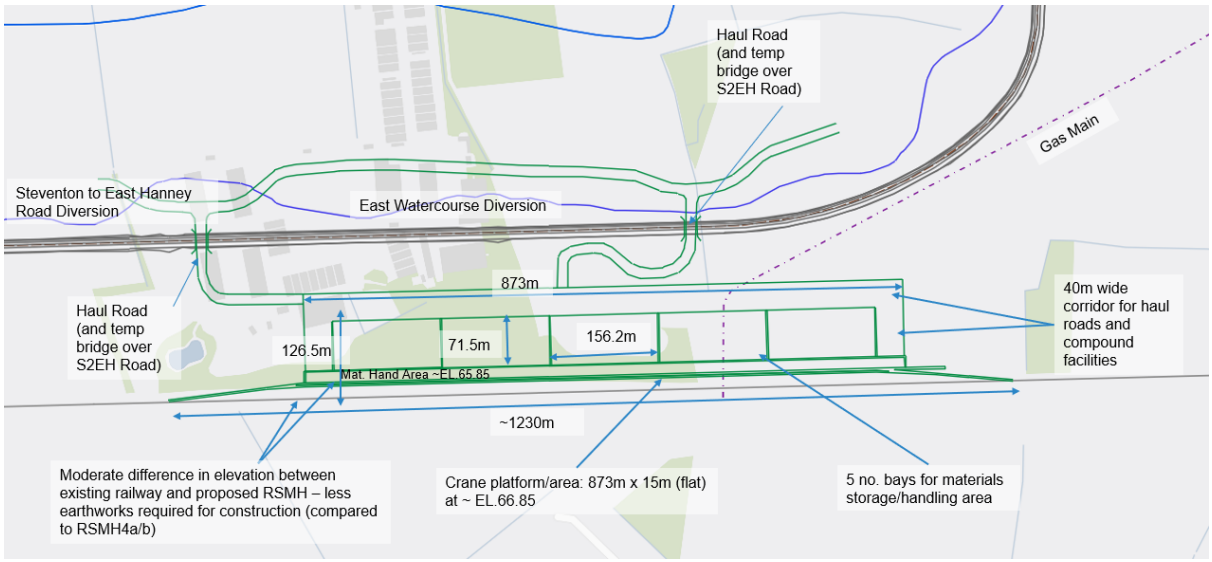


Source: Ordnance Survey data © Crown copyright and database right 2023

[7] Potential noise mitigation is not shown in the figure.

Figure 4.6: RSMH 1 Layout (370,000m^3 stockpile capacity)

Note that this layout is indicative only for the purposes of options appraisal[8].



Source: Ordnance Survey data © Crown copyright and database right 2023 |

Layout of RSMH 1

4.3.4 For the 220,000m^3 stockpile capacity (storage volume required for delivery of materials when needed), the area is 600m (length) x 116m (wide) which covers an area of 69,600m^2. Each of the stockpile material areas are 61m x 118m – the material storage areas are wide compared to the length, due to the constraints to the north, including the proposed diversion road and East watercourse diversion.

4.3.5 For the 370,000m^3 stockpile capacity (the volume needed to store the number of materials for one year), the area is 873m (length) x 128m (wide) which covers an area of 112,181m^2. Each of the stockpile material areas are 71m x 156m. These dimensions enable the rail sidings and materials handling area to be located such that the track going to siding is in the same position for both capacity variations, leaving adequate space for noise mitigation measures to the east[9].

Construction Access for RSMH 1

4.3.6 It was assumed that road access to construct RSMH 1 would need to be via a new access road to the SESRO reservoir and a haul road, so the new access road would need to be constructed prior to construction of RSMH 1. Once established, haul roads would need to be constructed with two temporary bridges over the Steventon to East Hanney Road Diversion to maintain

[8] Potential noise mitigation is not shown in the figure.
[9] Note for the purposes of assessment it has been assumed that a noise bund would be incorporated to the east of the siding to reduce noise levels reaching Steventon. Further work will be undertaken on the preferred option to identify and develop the most appropriate noise mitigation method to be incorporated in the design.

separation of construction traffic, as shown in Figure 4.5 and Figure 4.6. It is recognised from the SESRO Access and Diversion Roads Options Appraisal Report that the Steventon to East Hanney road diversion would need to be built at the start of construction.

Construction of RSMH 1

4.3.7 The relative proximity of RSMH 1 to the Steventon to East Hanney Road Diversion, which must also be used to route several major utility diversions, constrains the space available for construction of this option. There is approximately 80m between RSMH 1 (270,000m^3 stockpile capacity) and the diversion road, and 70m between RSMH 1 (370,000m^3 stockpile capacity) and the diversion road.

4.3.8 Table 4.2 sets out the average elevations of RSMH 1. For the siding and crane area, RSMH 1 requires approximately 0.5m of embankment building up. Some of the material for these embankments may be sourced from that won by excavating into the existing ground level for the materials handling area; however, material availability should be explored further using modelling to undertake a cut/fill balance.

Table 4.1: RSMH 1 - Elevations

Average existing railway embankment elevation (mAOD)	Average existing ground level at location of sidings (mAOD)	Proposed siding and crane area elevation (mAOD)	Proposed materials handling area (mAOD)
67.3	66.3	66.8	65.8

4.3.9 Refer to Appendix A for longitudinal Sections of RSMH 1.

4.3.10 There is an existing 16-inch Southern Gas Network (SGN) intermediate gas main that would require diversion (identified in Figure 4.5 and Figure 4.6) for RSMH 1.

4.4 Options for Assessment - RSMH 4a and RSMH 4b

Location of RSMH 4a and 4b

4.4.1 The two options, as shown in Figure 4.7 and Figure 4.8, are in the same location and have the same dimensions but have different signalling requirements.

4.4.2 RSMH 4a and RSMH 4b are located approximately 1km south of East Hanney, 400m from the proposed Steventon to East Hanney Road Diversion and 1km southwest of the largest footprint reservoir option under consideration.

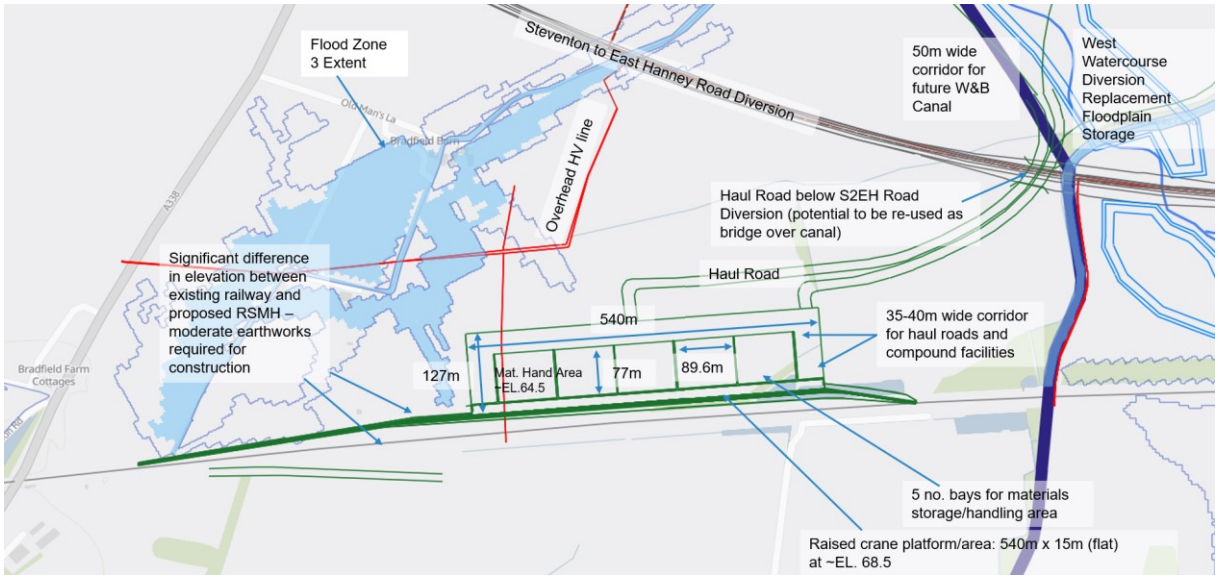
Signalling and Track Modifications for RSMH 4a and 4b

4.4.3 RSMH 4a provides the required signalling and track modifications for trains to exit to either the east or the west, while RSMH 4b would only provide the required signalling and track modifications to allow trains to exit the site to the east. For the trains which exit the site towards the east they would return to Avonmouth by looping around via Didcot or Reading. For the trains which exit the site towards the west they would return directly to Avonmouth.

4.4.4 It is anticipated that the northern line of the existing four track section of the Great Western Mainline would be extended for 1.2km to allow freight trains to enter the siding directly, as shown in Figure 4.7 and Figure 4.8. In comparison to RSMH 1 this would take pressure off the mainline during the connecting process and would also reduce the risk of impact on the running of passenger services during operation.

4.4.5 The possession works would need to happen at night, to minimise disruption on the railway line during the day. The interaction with the existing railway would require review and approval from Network Rail, particularly due to the signalling modifications which would be required.

Figure 4.7: RSMH 4a and RSMH 4b Layout (220,000m^3 stockpile capacity)
Note that this layout is indicative only for the purposes of options appraisal[10].



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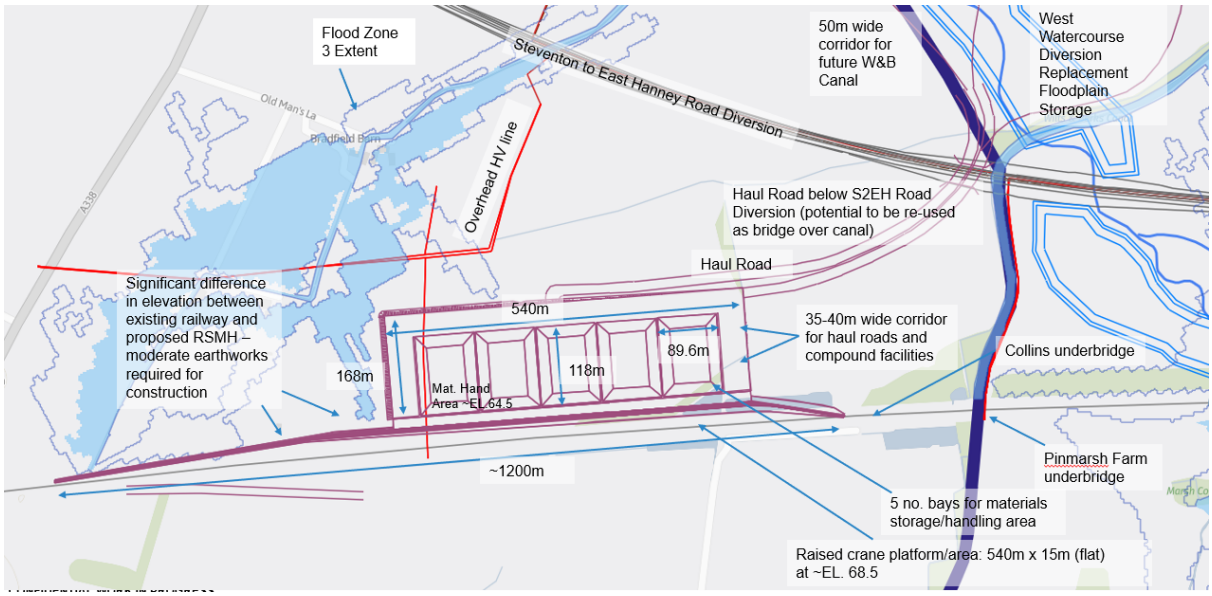
[10] Potential noise mitigation is not shown in the figure.

Figure 4.8: RSMH 4a and RSMH 4b Layout (370,000m^3 stockpile capacity)
Note that this layout is indicative only for the purposes of options appraisal[11].



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Layout of RSMH 4a and 4b

4.4.6 For the 220,000m^3 stockpile capacity (storage volume required for delivery of materials when needed), the area is 540m (length) x 127m (wide) which covers an area of 68,580m^2. Each of the stockpile material storage areas are 77m x 90m – the areas are narrow (compared to RSMH 1) as there are less constraints to the north, so the material areas could be made more square than rectangular.

4.4.7 For the 370,000m^3 stockpile capacity (the volume needed to store the amount of materials for one year), the area is 540m (length) x 168m (wide) which covers an area of 90,720m^2. Each of the stockpile material areas are 118m x 90m. These dimensions enable the rail sidings and materials handling area to be located in the same location for both capacity variations, so that both can be located such that the siding track can connect into the existing Great Western Mainline in the same locations i.e., 1.2 km apart.

Construction Access for RSMH 4a and 4b

4.4.8 It has been assumed that road access to construct RSMH 4a or RSMH 4b would need to be via the new SESRO access road, and a further haul road. This means the SESRO access road would need to be constructed prior to construction of RSMH 4a and 4b. Once established, haul roads would need to be constructed to connect to the reservoir site – there is an opportunity for these to pass under the Steventon to East Hanney bridge that would also be used to maintain the corridor assigned for the future reinstatement of the Wilts &

[11] Potential noise mitigation is not shown in the figure.

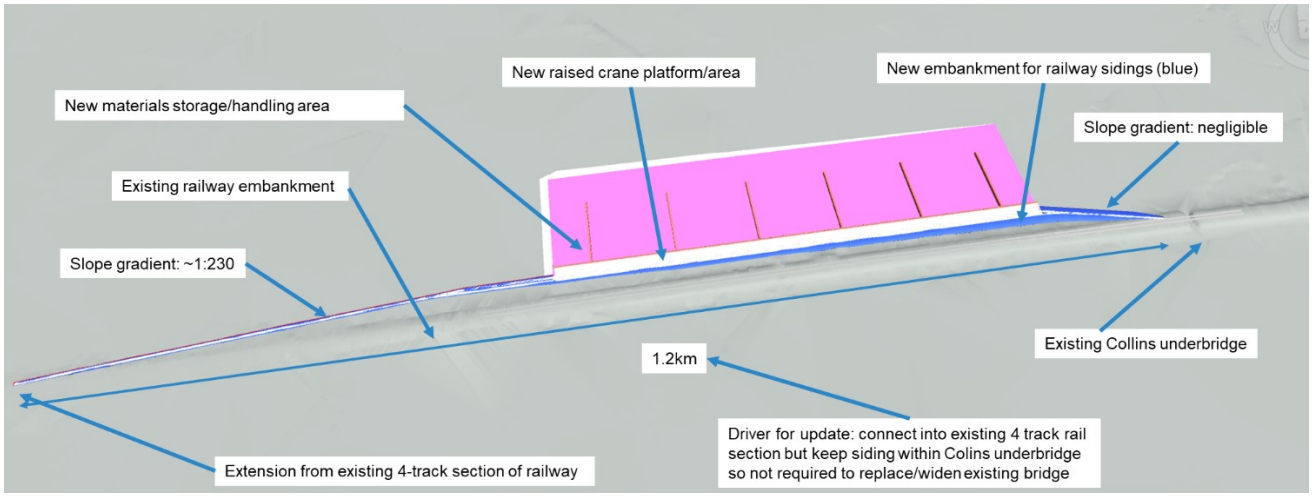
Berks Canal.

Construction of RSMH 4a and 4b

4.4.9 The existing Great Western Mainline in this location is on an embankment, and so RSMH 4a and 4b would need to be routed northwest from the existing railway through the construction of narrow embankments, to create separation from the existing railway embankment to minimise interaction with it. It also means that the sidings and materials handling area doesn't have to be raised as high as the railway embankment but is instead closer to existing ground level.

4.4.10 An Autodesk Civil 3D model was created for RSMH 4a and 4b because of the need for embankment works, see Figure 4.9 which shows the model using Navisworks. The gradient of the narrow embankments connecting the siding tracks to the Great Western Mainline is no steeper than 1 in 230.

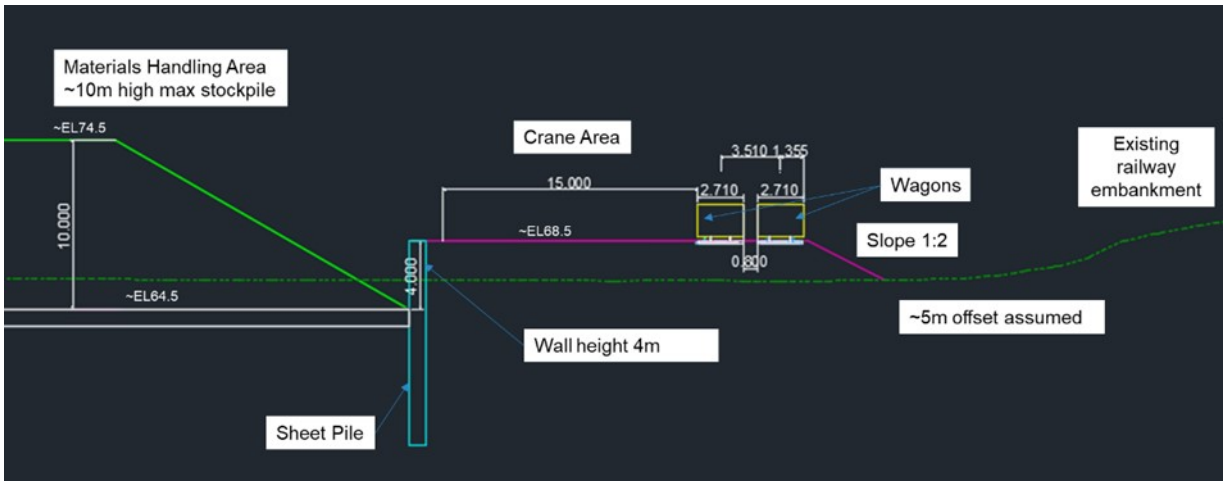
Figure 4.9: RSMH 4a and 4b embankment modelling



Source: Thames Water Internal, 2024

4.4.11 The existing Great Western Mainline adjacent to RSMH 4a and 4b is on an embankment, as such, the options would require a sheet pile retaining wall and earthworks, see Figure 4.10.

Figure 4.10: Cross Section through RSMH 4a and 4b showing the existing railway and the proposed sidings, crane area and materials handling area.



Source: Thames Water Internal, 2024

4.4.12 Table 4.2 sets out the average elevations of RSMH 4a and 4b. For the siding and crane area, RSMH 4a and RSMH 4b require approximately 2.5m of embankment build up. Some of the material for these embankments may be sourced from that won by excavating into the existing ground level for the materials handling area; however, material availability should be explored further using modelling to undertake a cut/fill balance.

Table 4.2: RSMH 4a and 4b - Elevations

Average existing railway embankment elevation (mAOD)	Average existing ground level at location of sidings (mAOD)	Proposed siding and crane area elevation (mAOD)	Proposed materials handling area (mAOD)
69.5	66.0	68.5	64.5

4.4.13 Refer to Appendix B for longitudinal Sections of the RSMH 4a and 4b.

4.4.14 There is an existing Southern and Scottish Energy Network (SSEN) overhead HV line (33kV) which would require diversion.

5 Option Assessments

This section summarises the option assessments undertaken for the RSMH areas, in accordance with step 5 of the appraisal methodology. The section starts by outlining the assumptions taken in the assessments, before individually summarising the performance of each option when assessed. Further details of the option assessment against individual criteria are provided in Appendix C to Appendix G.

5.1 Assessment Assumptions

5.1.1 This section sets out the assumptions used in the assessment of RSMH area options, future changes in assumptions should be reviewed for any potential effect on the outcome of the options appraisal. Section 1.3 earlier in this report outlines the backchecking planned for the options appraisals work.

5.1.2 RSMH 1, 4a and 4b have been taken through to full assessment, while RSMH 2 and 3 were discounted ahead of the assessments in the initial review set out in Section 4.1.

Engineering Assessment Assumptions

5.1.3 The engineering assessment was considered in three themes – design acceptance, constructability and operability. The following assumptions informed the assessment:

- It is assumed that the freight trains delivering materials will be 300m long and will enter the SESRO rail siding at 15mph.
- Based on a preliminary assessment undertaken at Gate 2[12], it is assumed that there is path availability for the freight trains based on the Great Western Mainline (London to Bristol) December 2019 timetable, and it assumed that 6 hours is enough time for the removal of all materials from the train wagons and placement into the materials handling storage areas.
- It is assumed that the existing bridges in the vicinity of the rail siding options can withstand the load of the trains carrying materials for delivery, without the need for reinforcement/modification works.
- It is assumed that the operation of removing materials from train wagons and appropriate placement in the materials handling areas is the same for all options.
- As detailed earlier in this report, the footprints for both stockpile capacities (220,000m^3 and 370,000m^3) are considered during the assessment of options against the appraisal criteria.
- For the RSMH 4a and 4b embankment, it is assumed that the raised embankment areas (if required) can be created from suitable material

[12] SESRO Gate 2 Submission Supporting Document A-1: SESRO Concept Design Report. Available online: https://www.thameswater.co.uk/media-library/home/about-us/regulation/regional-water-resources/south-east-strategic-reservoir/gate-2-reports/A-1---SESRO-Concept-Design-Report.pdf

excavated either from the materials handling area, or the reservoir borrow pit, without impacting the cut/fill balance.

- For the purposes of assessment, it has been assumed for all options, that noise bunds would be incorporated as the principal form of noise mitigation as this presents a worse case in terms of land take. However, further work will be undertaken on the preferred option during design development to identify and develop the most appropriate noise mitigation method to be incorporated, this may include rescheduling of noise creation activities to avoid sensitive times as well as physical mitigation methods. It is assumed that, where the construction of a noise bund may require the creation of an additional construction access route this will be possible.
- An initial assessment was undertaken to explore the feasibility of signalling modifications required for the options and this indicated that it is possible to make the required signalling modifications to facilitate the options.
- Utility diversions have been identified for the rail siding options, including overhead lines and gas mains. For RSHH 1 this includes 16-inch steel intermediate gas main and for RSMH 4a and 4b this includes an 33kV powerline. At this stage, detailed discussion with the utility providers regarding diversion of these utilities for each option has not been undertaken, instead it is assumed that diversion of these utilities can be achieved.

Cost and Carbon Assessment Assumptions

5.1.4 Capital cost and carbon for each option were derived using the approach outlined in the Gate 2 reports. Some aspects of the cost and carbon build-ups needed to be updated or added. Quantities were estimated using information from ArcGIS and Autodesk Civil 3D models to reflect the differences between options. Where available, benchmarked unit cost rates from Gate 2 were used, and where these were not available new rates were developed.

5.1.5 An allowance in the overall capital cost has been made for interaction with Network Rail and associated possession works.

Environmental Assessment Assumptions

5.1.6 The topics for the environmental assessment were considered separately. The following assumptions informed the environmental assessment:

5.1.7 Biodiversity and Nature Conservation

- It was assumed that the Ancient Woodland Inventory and Ancient Tree Inventory was correct and comprehensive at the time of the optioneering process. The latter will need to be confirmed once land access is available and surveys can be carried out to confirm the desktop data.
- The assessment of habitats to be impacted was undertaken using aerial imagery and UK Habitat information collected for Gate 2, the latter of which

was collected using desk study information and aerial imagery and has not been fully ground truthed.

- Existing gaps and access points within landscape features will be used where feasible to minimise vegetation clearance.
- Vegetation clearance within The Cuttings and Hutchin's Copse LWS will be avoided or kept to an absolute minimum where possible.
- Based on analysis of historical maps, the woodland areas within the Cuttings and Hutchin's Copse LWS are not considered to be ancient.

5.1.8 Historic Environment

- The existing publicly available data regarding buried archaeology is not complete and is subject to further desk study and non-intrusive and intrusive surveys to understand the presence, extent and value of buried remains.

5.1.9 Land Quality

- Data provided by third parties, including historical maps to undertake these assessments are accurate.

5.1.10 Landscape and Visual

- Lighting would be required for night-time construction works.
- Lighting would be required for any night-time operation of the rail sidings.
- Vegetation clearance would be required for all options with some mitigation planting carried out, clear of rail lines, in accordance with best practice guidelines and using techniques appropriate to the efficient and safe management of the rail corridor.
- Construction would require the typical use of plant and machinery with haul roads, material storage and other elements of construction infrastructure.
- Noise mitigation and screening mounds would be introduced for the construction and operation of the rail sidings, where required.
- The development of some minor above-ground infrastructure would be required for operation.
- Operation would include the movement of a limited number of trucks and support vehicles and machinery.
- Ultimately, temporary rail infrastructure would be removed, and the land reinstated with an appropriate landscape treatment.

5.1.11 Noise

- Hours of operation of the sidings are assumed to be 06:00 to 11:30 and 12:45 to 18:15, based on work undertaken at Gate 2[13]. It is assumed that there is potential for material handling between 06:00 to 07:00 and train arrivals during nighttime hours so the options were assessed using night-time noise assessment criteria. Construction activities associated with works on the rail line would require occasional night-time working.
- Noise emissions for construction activities (including construction traffic movements and main construction plant / numbers) are based on Gate 2 assumptions, with updates made following a review by the SESRO construction advisor, as required.
- Property counts do not consider the screening of receptors by nearby buildings (i.e., noise screening for the second row of properties is not considered due to the presence of the first row of properties).

5.1.12 Aquatic Environment

- Culverting would be temporary but sufficiently long to span more than one River Basin Management Plan (RBMP) planning cycle (> 6 years).
- Watercourses will be diverted as part of the Early Works programme so they can continue to be connected and flow into the appropriate diversion channel. The diversion channels, once connected, will then be isolated from any other works to allow the riverine habitats to evolve over time without being disturbed by any ongoing construction activities.
- Works should be sequenced appropriately to allow aquatic environmental benefits to be realised.

Community, Planning and Land Assessment Assumptions

5.1.13 The assessment was considered in several themes: 'Community and Planning' and 'Property and Land'. The following assumptions informed the assessment:

- For the socio-economic assessment, it is assumed that the impact of removing the Industrial Park off Hanney Road (Steventon Depot) is incurred by the embankment and not rail option RSMH 1. The embankment's footprint would affect part of the receptor, with RSMH 1 affecting another part of the receptor. In order to avoid double counting, it was assumed that the embankment would incur the negative socio-economic impact of preventing the Industrial Park from functioning.
- The operation of options connecting to the two-track section of the mainline have the potential to impact on passenger services due to freight trains slowing down to enter the rail siding or exiting slowly after using it.
- In planning terms, there is uncertainty in the possible interaction of the rail siding options with potential future plans for re-opening Grove Station. For

[13] SESRO Gate 2 Submission Supporting Document A-1: SESRO Concept Design Report, Section 3.1.2.2 Rail. Available online: https://affinitywater.uk.engagementhq.com/strategic-resource-options

the purpose of the appraisal, these interactions have been noted but it has not been assumed that the SESRO access rail siding options necessarily conflict with passenger rail site safeguarding policy for this in existing and emerging local policy.

5.2 RSMH 1 Assessment

5.2.1 This section summarises the performance of RSMH 1 considering the appraisal themes and subthemes. For full details of the assessment of RSMH 1 against individual criteria refer to Appendix D.

Engineering (Design Acceptance) Performance

5.2.2 RSMH 1 is located approximately halfway along a four-mile two-track section of the Great Western Mainline on which passenger trains travel up to 125mph.

5.2.3 Freight trains delivering to the SESRO site will be travelling on this two-track section at speeds up to 75mph (approximately 33.5m/s) so will need to slow from 75mph to 15mph (approximately 6.7m/s) to enter RSMH 1. Given the size and weight of the freight trains, assumed be 300m long and weighing up to 1500 tonnes, the deceleration from 75mph to 15mph will take several minutes. Network Rail states this section of railway is congested, with high numbers of fast passenger trains, and a number of much slower freight trains operating over the route. The decelerating freight trains will hold up the passenger trains travelling behind because on this two-track section there will be no way for passenger trains to pass around the freight trains decelerating to enter RSMH 1; therefore, passenger trains, which could be travelling up to 125mph, will be slowed to significantly lower speeds behind freight trains decelerating to enter RSMH 1.

5.2.4 The operation of RSMH 1 therefore carries a high risk of disruption to other services and timetabling on the Great Western Mainline from SESRO freight trains running at reduced speeds over the two-track railway section as they decelerate into RSMH 1.

5.2.5 Operating RSMH 1 such that the freight trains exit the site towards the east, returning to Avonmouth by turning around at Didcot or looping round at Reading, would impact the highway users of the Causeway and Stocks Lane MCB-CCTV level crossings. Since RSMH 1 is located close to the level crossings, freight trains leaving RSMH 1 to the east will not have reached maximum speed when travelling through these level crossings, increasing the barrier-down time for trains on the level crossings. This has the potential to significantly impact highway users of the level crossings as they wait an extended period of time at the level crossings.

5.2.6 Given the impact on operation of the Great Western Mainline and the potential impact on highway users of the level crossings, the SESRO project team understand that RSMH 1 is unlikely to be accepted by Network Rail. As outlined in Section 1.2, the Great Western Mainline is important infrastructure and

Network Rail are the key stakeholder in acceptance of any rail siding design.

Engineering (Constructability) Performance

5.2.7 From a health and safety perspective, working close to an operating railway increases risk but it is considered that this risk can be managed such that works for RSMH 1 can be constructed safely with enhanced control measures.

5.2.8 In terms of third-party impacts, impact on the existing rail network during construction of RSMH 1 is inevitable due to the need for possession works.

5.2.9 RSMH 1 does not require extensive earthworks, the installation of sheet piles or extensive signalling modifications, so the programme is shorter with less risk, although there is a need to divert an existing gas line.

5.2.10 Considering logistics, RSMH 1 does not require the import of sheet piles for embankment construction and is close to the reservoir, resulting in short vehicle movements. It also has surrounding space if additional stockpiling is required so there is potential for future expansion if needed.

5.2.11 In terms of construction complexity, RSMH 1 does not require significant embankment works, is located in an area of Gault clay, reducing the likelihood of unexpected ground conditions and does not require extensive signalling modifications. RSMH 1 requires diversion of the existing gas pipeline (shown on Figure 4.5 and Figure 4.6).

Engineering (Operability) Performance

5.2.12 RSMH 1 could be operated safely but will need enhanced control measures during operation due to its proximity to the Steventon to East Hanney road diversion.

5.2.13 In terms of operational complexity, RSMH 1 provides less opportunity for maintenance access to the mainline adjacent to the rail sidings, so there may be more chance of closure periods for maintenance access.

5.2.14 Considering operational resilience, RSMH 1 could potentially be adopted after construction to become a car park.

5.2.15 From a transport planning perspective, the risk of disruption to the busy, strategically important Great Western Mainline during the operation of RSMH 1 is likely to be significant. RSMH 1 has a reliance on the two-track section of existing railway, which has a high risk of disruption to passenger trains by freight trains using the rail siding during operational hours compared with options extending out of the four-track section of existing railway.

Cost and Carbon Performance

5.2.16 Initial high-level cost estimate indicates that the range in costs for rail and

materials handling options represent approximately 4% of total SESRO costs. RSMH 1 has the least capital cost and operational cost, due to limited earthworks and shorter haulage distances.

5.2.17 There was no carbon estimate available for rail options at the time of this options appraisal, however, initial assessment shows correlation between carbon and cost, indicating RSMH 1 is likely to have the lowest carbon cost.

Environmental Performance

5.2.18 RSMH 1 performs well against the air quality criteria, Marcham AQMA is located approximately 4.8km away, and there are no high sensitivity human receptors within 350m of the RSMH boundary; therefore, no significant impacts are expected.

5.2.19 For the aquatic environment, RSMH 1 has no interactions with sensitive source protection zones (SPZ). There are also no risks identified of Water Framework Directive (WFD) deterioration associated with RSMH 1 but there are moderate adverse effects on the aquatic environment predicted due to the impact on headwaters of two WFD waterbodies (mainly the Cow Common Brook and Portobello Ditch WFD water body; and to a lesser extent the Ginge Brook and Mill Brook WFD water body). The requirement for temporary culverting of watercourses creates a low risk of WFD non-compliance given the duration of the works, but this is considered to be localised and not at a waterbody scale. This is a precautionary approach as environmental surveys have not yet been carried out in this area and hence the ecology has not yet been confirmed. If an issue is identified this could be mitigated proactively by creating a watercourse diversion around the RSMH area to replace this watercourse. There is also an opportunity for mitigation and compensation works, which could result in environmental benefits, for the eastern watercourse diversion, provided works are sequenced appropriately and new habitats are better quality than the current baseline.

5.2.20 RSMH 1 performs well against much of the biodiversity and nature conservation criteria as within the boundary of, or in proximity to, RSMH 1 none of the following designated sites were identified: Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site, Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR) and Local Nature Reserve (LNR). However, priority habitats (such as ponds, hedgerows, woodland assumed to be lowland mixed deciduous woodland and arable field margins) are present within RSMH 1. Ancient or veteran trees may be identified during subsequent surveys of the option footprint or in the vicinity as the site partially comprises broadleaved woodland.

5.2.21 Considering biodiversity and nature conservation and landscape, RSMH 1 performs poorly because its construction would require the removal of grassland and a large area of woodland, which is assumed likely to include A or B grade trees. Hedgerows and waterbodies may also require removal. These habitats are likely to support protected and notable species such as badgers,

bats and great crested newts.

5.2.22 RSMH 1 has no predicted impacts on fluvial, pluvial or groundwater flood risk.

5.2.23 RSMH 1 performs well against all the historic environment criteria with no significant impacts expected on scheduled monuments, listed buildings, registered parks and gardens, registered battlefields, world heritage sites, conservation areas, non-designated built heritage, palaeoenvironmental remains or non-designated historic landscapes. However, the site does lie within an area of known high value archaeology.

5.2.24 Considering land quality, RSMH 1 intersects the existing Steventon Depot and lies adjacent to the historical London-Bristol Great Western Mainline, which represent potential sources of contamination. The potential for unexploded ordnance (UXO) disturbance has also been identified within the option area.

5.2.25 From a landscape and visual perspective, the removal of woodland along the Great Western Mainline for RSMH 1 would erode a key characteristic, which contributes positively to the landscape character. The loss of woodland would make Steventon Depot more noticeable in the local landscape (until the depot's proposed removal to facilitate SESRO), and the option, including the associated haul roads, would further erode the rural landscape character and levels of tranquillity. The rail sidings and associated infrastructure for RSMH 1 would be visible in local views from public rights of way (PRoW) and the edge of Steventon, as well as in some panoramic views from The Ridgeway National Trail. Consequently, RSMH 1 would affect the setting of the North Wessex Downs National Landscape, although such effects would be unlikely to be significant. There would also be noticeable changes to visual amenity in Steventon, in part due to lighting during night-time construction works and some operational lighting during the winter months.

5.2.26 RSMH 1 performs poorly against the noise criteria because the closest noise sensitive receptor is between ~600m to 750m from the works site and there is the potential for significant noise effects.

5.2.27 RSMH 1 performs well against the pollution criteria, considering potential impacts associated with discharges during construction and operation, because standard controls would avoid significant effects.

Community, Planning and Land Performance

5.2.28 RSMH 1 performs well against the socio-economic criteria with no significant socio-economic impacts expected.

5.2.29 From the consenting perspective, RSMH 1 is located close to the reservoir footprint, reducing overall land take and potential Order Limits extent, and avoids any potential conflict (but also misses any potential opportunity) with the possibility of a future Grove Station (see Section 3.3 for planning policy). It performs well against the consenting criteria: it is within the area safeguarded

for the reservoir (policies CP14 and CP14a) in the Vale of White Horse Local Plan 2031 and equivalent area in the consultation draft Joint Local Plan 2041 and does not conflict with local policy allocations.

5.2.30 From a transport planning perspective, this option is not assumed to provide a benefit to the local plan proposals for a Grove Station as the four track is not extended and the option location is to the east of the local plan safeguarded station options (see Section 3.3).

5.2.31 The location requires the relocation of an existing 16-inch steel intermediate gas main, introducing an additional interface with Southern Gas Network (SGN). This would require an Undertrack Crossing (UTX) beneath the GWR mainline, which introduces Network Rail as a further stakeholder who would also likely need to accept any diversion proposals, increasing the risk of acceptance. This diversion is likely to take approximately 18 months. In terms of land, a diversion and UTX of the gas main would need to connect into the existing intermediate gas main running parallel south of the GWR mainline. This would require Order Limits to be extended to cover this.

5.2.32 For property and land acquisition, RSMH 1 requires agricultural land Grades 3 and 4. RSMH 1 will require the land used by the storage depot, but this land is required as part of the SESRO project for the reservoir itself.

5.3 RSMH 4a Assessment

5.3.1 This section summarises the performance of RSMH 4a considering the appraisal themes and subthemes. For full details of the assessment of RSMH 4a against individual criteria refer to Appendix E.

Engineering (Design Acceptance) Performance

5.3.2 RSMH 4a extends from the four-track section of the Great Western Mainline, rather than having a reliance on the two-track section of existing railway.

5.3.3 On the four-track section, the freight trains into RSMH 4a will use the up-relief, a track for use by freight trains only with maximum speeds of 40mph allowed. Freight trains delivering materials to RSMH 4a will therefore be travelling at speeds up to 40mph and will need to slow from 40mph to 15mph to enter RSMH 4a. The deceleration from 40mph to 15mph will not take as long as if the freight trains were using the two-track section, on which they would be travelling up to 75mph. The decelerating freight trains using the up-relief will not hold up passenger trains on the railway since with four tracks the freight trains will be using a separate track (the up-relief), meaning that the passenger trains travelling up to 125mph on the line will not be interrupted freight train movements into RSMH 4a.

5.3.4 RSMH4a therefore has a lower risk than RSMH 1 of causing disruption to other services and timetabling of the Great Western Mainline during operation of the rail siding because RSMH 4a relies on services joining and leaving at the end of

the four-track section, not via the middle of the four-mile two-track section of the mainline as per RSMH 1.

5.3.5 Operating RSMH 4a such that the freight trains exit the site towards the east, returning to Avonmouth by looping around via Didcot or Reading, may impact the highway users of the Causeway and Stocks Lane MCB-CCTV level crossings as freight trains pass through these crossing and again pass the crossings from Didcot via Foxhill Junction, heading back to Avonmouth. However, due to the location of RSMH 4a, the speed of the freight trains when passing these crossings is likely to be closer to the maximum permitted freight train speed, and not considered likely to significantly impact the barrier-down time of the level crossings compared to existing barrier-down times.

5.3.6 RSMH 4a therefore carries a much lower risk than RSMH 1 of being rejected by Network Rail.

Engineering (Constructability) Performance

5.3.7 From a health and safety perspective, working close to an operating railway increases risk but it is considered that this risk can be managed such that works for RSMH 4a can be constructed safely with enhanced control measures.

5.3.8 In terms of third-party impacts, impact on the existing rail network during works for RSMH 4a is inevitable due to the need for possession works.

5.3.9 RSMH 4a requires earthworks to suit the existing railway at the proposed option location, which involves the construction of an embankment via imported material from the main site and import of sheet piles for a retaining wall. The option also requires modifications to the existing overhead gantries and significant signalling modifications. These requirements affect programme duration and risk.

5.3.10 Considering logistics, RSMH 4a requires the import of sheet piles for embankment construction and is further from the reservoir, resulting in longer vehicle movements. It also has limited surrounding space if additional stockpiling is required so there is limited potential for future expansion.

5.3.11 In terms of construction complexity, RSMH 4a requires embankment works and is located in an area with the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions. RSMH 4a requires drainage of the area between existing rail embankment and new embankment for rail siding. RSMH 4a requires modifications to overhead gantries and requires significant signalling modifications. However, from an engineering point of view all of these are manageable.

Engineering (Operability) Performance

5.3.12 RSMH 4a can be operated safely but will need enhanced control measures during operation due to its proximity to the diverted PRoW.

5.3.13 In terms of operational complexity, there is an opportunity for the access route to be constructed through the raised embankment for RSMH 4a to improve access to each side of the rail siding, which would be better for maintenance.

5.3.14 Considering operational resilience, RSMH 4a has potential for facilitating a future Grove station; although it is noted that this would require further consideration during SESRO design development.

5.3.15 Due to being further from the reservoir, the operation of RSMH 4a would be more energy intensive.

5.3.16 From a transport planning perspective, the impact on the Great Western Mainline during the operation of RSMH 4a is likely to be limited. RSMH 4a extends from the four-track section of the existing railway, minimising disruption to passenger trains during the operations of the rail siding compared with the option to extend out of the two-track section of existing railway. RSMH 4a also provides the flexibility for freight trains (delivering construction materials to the SESRO site) to exit to either the east or west (depending on the final design).

Cost and Carbon Performance

5.3.17 Initial high-level cost estimate indicates that the range in costs for rail and materials handling options represent approximately 4% of total SESRO costs. Option 4a results in a total project cost of 0.5% more than the lowest cost RSMH option. RSMH 4a has a higher capital cost due to additional earthworks and signalling modifications. However, the difference is not a significant proportion of the overall cost of the project.

5.3.18 There was no carbon estimate available for rail options at the time of this options appraisal however, initial assessment shows correlation between carbon and cost, indicating RSMH 4a is likely to have a higher carbon cost of than RSMH 1.

Environmental Performance

5.3.19 Considering potential impacts on air quality from RSMH 4a, the closest sensitive receptor, Bradfield Barns, is located ~180m northwest. There are also between 1-10 low sensitivity human receptors within 350m of the option works boundary. RSMH 4a is also located within The Cuttings and Hutchin's Copse LWS, which is considered a low sensitivity receptor. Potential effects of construction activities would likely lead to a negligible change in air quality and there are no proposed dust-generating operational activities that could not be managed using normal good practices.

5.3.20 For the aquatic environment, RSMH 4a allows only the minimum environmental benefits to be realised and is only likely to have minor adverse impacts on nearby WFD waterbodies with no risk to attaining WFD objectives. However, RSMH 4a provides no specific space for aquatic improvements and ponds would be lost as a result of the option. The haulage road also potentially reduces flexibility in design of the western watercourse diversion. There is no interaction

with any SPZ.

5.3.21 RSMH 4a performs well against much of the biodiversity and nature conservation criteria as within the boundary of, or in proximity to, RSMH 4a none of the following designated sites were identified: SAC, SPA, Ramsar site, SSSI, NNR and LNS. However, RSMH 4a lies partly within a LWS and priority habitats (such as ponds, hedgerows, woodland assumed to be lowland mixed deciduous woodland and arable field margins) have been identified within the option site boundary. Ancient or veteran trees may be identified during subsequent surveys of the option footprint or in the vicinity as the site partially comprises broadleaved woodland.

5.3.22 Considering biodiversity and nature conservation and landscape, RSMH 4a performs poorly because the construction of this option will require the removal of grassland and a large area of woodland, which is assumed likely to include A or B grade trees. Hedgerows and waterbodies may also require removal. These habitats are likely to support protected and notable species such as badgers, bats and great crested newts.

5.3.23 RSMH 4a has no predicted impacts on fluvial, pluvial or groundwater flood risk. RSMH 4a is close to fluvial flooding area but is currently designed to avoid it.

5.3.24 RSMH 4a performs well against several of the historic environment criteria with no significant impacts expected on scheduled monuments, registered parks and gardens, registered battlefields, world heritage sites, conservation areas, non-designated built heritage, palaeoenvironmental remains or non-designated historic landscapes. However, there is a listed building located ~400m south of RSMH 4a, which may result in setting changes and archaeology is known to be present.

5.3.25 Considering land quality, RSMH 4a lies adjacent to the London-Bristol Great Western Mainline, which is a potential source of contamination. The potential for UXO disturbance has also been identified within the option area.

5.3.26 From a landscape and visual perspective, the removal of vegetation belts and woodland along the Great Western Mainline for RSMH 4a would erode a key characteristic, which contributes positively to the landscape character. The option, including its associated haul roads, would introduce new infrastructure into a part of the landscape generally unaffected by infrastructure so would erode the rural landscape character and levels of tranquillity. The rail sidings and associated infrastructure for RSMH 4a would also be locally visible from some PRoW, a small number of isolated residential properties and the edge of East Hanney, although, if required for noise mitigation, noise bunds (assumed for the purposes of options appraisal) would help to provide partial screening of the material storage. There would also be noticeable changes to the visual amenity of the local community in the vicinity of East Hanney, in part due to lighting during night-construction works and some operational lighting during the winter months for RSMH 4a.

5.3.27 RSMH 4a does not perform well against the noise criteria because the closest noise sensitive receptor is between ~170m to 180m from the works site, so there is the potential for significant noise effects during both construction and operational phases of the siding.

5.3.28 Considering the pollution criteria, the construction of RSMH 4a performs well against the pollution criteria, considering potential impacts associated with discharges during construction and operation, because standard controls would avoid significant effects.

Community, Planning and Land Performance

5.3.29 From a socio-economic perspective, the option requires severance to a local PRoW, but it is assumed this can be redirected during the operation of the RSMH area. The proposed redirection of the Wilts & Berks Canal would be beneficial to improve linkages with the canal and severed PRoW.

5.3.30 From the consenting perspective, RSMH 4a increases overall land take for the SESRO project and the Order Limits extent (compared with the Gate 2 Indicative design), being located away from the reservoir footprint. RSMH 4a is also hypothetically in conflict with (or providing a legacy opportunity for) a future Grove Railway Station and safeguarded areas for the station (policies CP19a) that are included in the Vale of White Horse Local Plan 2031 (see Section 3.3 for further information).

5.3.31 From a transport planning perspective, RSMH 4a would have a positive influence on the proposals for the OCC/VoWH Grove Station options included in local plans (discussed in Section 3.3), and this has been recognised as a potential benefit by Network Rail. It is assumed that extending the northernmost existing track of the Great Western Mainline by 1.2km would provide benefit by having additional track in the vicinity of the safeguarded station option locations.

5.3.32 RSMH 4a lies outside the area safeguarded for the reservoir (policies CP14 and CP14a) in the Vale of White Horse Local Plan 2031 and equivalent area in the consultation draft Joint Local Plan 2041 and lie slightly further away from the area that may be used for Steventon to East Hanney road diversion (depending on option chosen for that). The land required for RSMH 4a or 4b including haul road is therefore likely to require a somewhat greater Order Limits extent, overall, than RSMH1. However, the difference is quite small in the context of the overall land-take and the differences between reservoir footprint options. The differences between rail-siding-specific footprints between the various options are also small in that context.

5.3.33 This location requires the potential removal or diversion of an existing Southern and Scottish Energy Network (SSEN) overhead HV line (33kV). This diversion of the overhead line is likely to take approximately 4 to 6 months, although this may be longer due to the complexities of the line crossing the GWR mainline, and interfacing with Network Rail on the diversion.

5.3.34 For property and land acquisition, RSMH 4a requires agricultural land Grades 3 and 4 and its construction is likely to have a significant impact on residential units.

5.4 RSMH 4b Assessment

5.4.1 This section summarises the performance of RSMH 4b considering the appraisal themes and subthemes. For full details of the assessment of RSMH 4b against individual criteria refer to Appendix F.

Engineering (Design Acceptance) Performance

5.4.2 RSMH 4b extends from the four-track section of the Great Western Mainline, rather than having a reliance on the two-track section of existing railway.

5.4.3 On the four-track section, the freight trains into RSMH 4b will use the up-relief, a track for use by freight trains only with maximum speeds of 40mph allowed. Freight trains delivering to RSMH 4b will therefore be travelling at speeds up to 40mph and will need to slow from 40mph to 15mph to enter RSMH 4b. The deceleration from 40mph to 15mph will not take as long as if the freight trains were using the two-track section, on which they would be travelling up to 75mph. The decelerating freight trains using the up-relief will not hold up passenger trains on the railway since with four tracks the freight trains will be using a separate track (the up-relief), meaning that the passenger trains travelling up to 125mph on the line will not be interrupted freight train movements into RSMH 4b.

5.4.4 RSMH 4b therefore has a lower risk than RSMH 1 of causing disruption to other services and timetabling of the Great Western Mainline during operation of the rail siding because RSMH 1 relies on services joining and leaving via the middle of the four-mile two-track section of the mainline.

5.4.5 Trains exit RSMH 4b to the east. Operating RSMH 4b such that the freight trains exit the site towards the east, returning to Avonmouth by looping around via Didcot or Reading, may impact the highway users of the Causeway and Stocks Lane MCB-CCTV level crossings as freight trains pass through these crossing and again pass the crossings from Didcot via Foxhill Junction, heading back to Avonmouth. However, due to the location of RSMH 4b, the speed of the freight trains when passing these crossings is likely to be closer to the maximum permitted freight train speed, and not considered likely to significantly impact the barrier-down time of the level crossings compared to existing barrier-down times.

5.4.6 RSMH 4b therefore carries a much lower risk than RSMH 1 of being rejected by Network Rail.

Engineering (Constructability) Performance

5.4.7 From a health and safety perspective, working close to an operating railway

increases risk but it is considered that this risk can be managed such that works for RSMH 4b can be constructed safely with enhanced control measures.

5.4.8 In terms of third-party impacts, impact on the existing rail network during works for RSMH 4b is inevitable due to the need for possession works.

5.4.9 RSMH 4b requires earthworks to suit the existing railway at the proposed option location, which involves the construction of an embankment via imported material from the main site and import of sheet piles for a retaining wall. The option also requires modifications to the existing overhead gantries. These requirements affect programme duration and risk.

5.4.10 Considering logistics, RSMH 4b requires the import of sheet piles for embankment construction and is further from the reservoir, resulting in longer vehicle movements. It also has limited surrounding space if additional stockpiling is required, so there is limited potential for future expansion.

5.4.11 In terms of construction complexity, RSMH 4b requires embankment works and is located in an area with the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions. RSMH 4b requires drainage of the area between existing rail embankment and new embankment for rail siding. RSMH 4b requires modifications to overhead gantries. However, from an engineering point of view all of these are manageable.

Engineering (Operability) Performance

5.4.12 RSMH 4b can be operated safely but will have enhanced control measures during operation due to its proximity to the diverted ProW. In terms of access and egress that can be provided, RSMH 4b has an opportunity for an access route to be constructed through the raised embankment to improve access to each side of the rail siding.

5.4.13 In terms of operational complexity, there is an opportunity for the access route to be constructed through the raised embankment for RSMH 4b to improve access to each side of the rail siding, which would be better for maintenance.

5.4.14 Considering operational resilience, RSMH 4b has potential for facilitating a future Wantage and Grove station, although it is noted that this would require further consideration during SESRO design development.

5.4.15 Due to being further from the reservoir, the operation of RSMH 4b would be more energy intensive.

5.4.16 From a transport planning perspective, the disruption to the busy, strategically important Great Western Mainline during the operation of RSMH 4b is likely to be limited. RSMH 4b extends from the four-track section of the existing railway, minimising disruption to passenger trains during the operations of the rail siding compared with the option to extend out of the two-track section of existing railway. RSMH 4b does not, however, allow freight trains (for construction

material deliveries to the SESRO site) to exit to the west of the rail siding.

Cost and Carbon Performance

5.4.17 Initial high-level cost estimate indicates that the range in costs for rail and materials handling options represent approximately 4% of total SESRO costs. RSMH 4b results in a total project cost of 0.41% more than the lowest cost RSMH option. RSMH 4b has a higher capital cost due to additional earthworks and signalling modifications. However, the difference is not a significant proportion of the overall cost of the project.

5.4.18 There was no carbon estimate available for rail options at the time of this options appraisal however, initial assessment shows correlation between carbon and cost, indicating RSMH 4a is likely to have a higher carbon cost of than RSMH 1.

Environmental Performance

5.4.19 Considering the potential impacts on air quality, the closest sensitive receptor, Bradfield Barns, is located ~180m north west of RSMH 4b. There are also between 1-10 low sensitivity human receptors within 350m of the option works boundary. RSMH 4b is also located within The Cuttings and Hutchin's Copse LWS, which is considered a low sensitivity receptor. Potential effects of construction activities would likely lead to a negligible change in air quality and there are no proposed dust-generating operational activities that could not be managed using normal good practices.

5.4.20 For the aquatic environment, RSMH 4b has no interactions with sensitive SPZ. It is only likely to have minor adverse impacts on nearby WFD waterbodies with no risk to attaining WFD objectives. However, RSMH 4b allows only the minimum environmental benefits to be realised because it provides no specific space for aquatic improvements and ponds would be lost as a result of the option. The haulage road also potentially reduces flexibility in design of the western watercourse diversion.

5.4.21 RSMH 4b performs well against much of the biodiversity and nature conservation criteria as within the boundary of, or in proximity to, RSMH 4b none of the following designated sites were identified: SAC, SPA, Ramsar site, SSSI, NNR and LNS. However, RSMH 4b lies partly within a LWS and priority habitats (such as ponds, hedgerows, woodland assumed to be lowland mixed deciduous woodland and arable field margins) have been identified within the option site boundary. Ancient or veteran trees may be identified during subsequent surveys of the option footprint or in the vicinity as the site partially comprises broadleaved woodland.

5.4.22 Considering biodiversity and nature conservation and landscape, RSMH 4b performs poorly because the construction of this option will require the removal of grassland and a large area of woodland, which is assumed likely to include A or B grade trees. Hedgerows and waterbodies may also require removal. These habitats are likely to support protected and notable species, such as badgers,

bats and great crested newts.

5.4.23 RSMH 4b has no predicted impacts on fluvial, pluvial or groundwater flood risk. RSMH 4b is close to fluvial flooding area but is currently designed to avoid it.

5.4.24 RSMH 4b performs well against several of the historic environment criteria with no significant impacts expected on scheduled monuments, registered parks and gardens, registered battlefields, world heritage sites, conservation areas, non-designated built heritage, palaeoenvironmental remains or non-designated historic landscapes. However, the closest listed building to RSMH 4b is located ~400m south of the option, which may result in setting changes and archaeology is known to be present.

5.4.25 Considering land quality, RSMH 4b lies adjacent to the London-Bristol Great Western Mainline, which is a potential source of contamination. The potential for UXO disturbance has also been identified within the option area.

5.4.26 From a landscape and visual perspective, the removal of vegetation belts and woodland along the Great Western Mainline for RSMH 4b would erode a key characteristic, which contributes positively to the landscape character. The option, including its associated haul roads, would introduce new infrastructure into a part of the landscape generally unaffected by infrastructure so would erode the rural landscape character and levels of tranquillity. The rail sidings and associated infrastructure for RSMH 4b would also be locally visible from some PRoW, a smaller number of isolated residential properties and the edge of East Hanney, although if required for noise mitigation, noise bunds (assumed for the purposes of options appraisal) would help to provide partial screening of the material storage. There would also be noticeable changes to the visual amenity of local the community in the vicinity of East Hanney, in part due to lighting during night-construction works and some operational lighting during the winter months for RSMH 4b.

5.4.27 RSMH 4b does not perform well against the noise criteria because the closest noise sensitive receptor is between ~170m to 180m from the works site, so there is the potential for significant noise effects during both the construction and operation phases.

5.4.28 Considering the pollution criteria, the construction of RSMH 4b performs well against the pollution criteria, considering potential impacts associated with discharges during construction and operation, because standard controls would avoid significant effects.

Community, Planning and Land Performance

5.4.29 From a socio-economic perspective, RSMH 4b requires severance to a local ProW but it is assumed this can be redirected during the operation of the RSMH area. The proposed redirection of the Wilts & Berks Canal would be beneficial to improve linkages with the canal and severed PRoW.

5.4.30 From the consenting perspective, RSMH 4b increases overall land take for the SESRO project and the Order Limits extent (compared with the Gate 2 Indicative Design), being located away from the reservoir footprint. RSMH 4b is also hypothetically in conflict with (or providing a legacy opportunity for) a future Grove Station and safeguarded areas for the station (policy CP19a) that are included in the Vale of White Horse Local Plan 2031 (see Section 3.3 for further information).

5.4.31 From a transport planning perspective, RSMH 4b would have a positive influence on the proposals for the OCC/VoWH Grove Station options included in local plans (discussed in Section 3.3), and this has been recognised as a potential benefit by Network Rail. It is assumed that extending the northernmost existing track of the Great Western Mainline by 1.2km would provide benefit by having additional track in the vicinity of the safeguarded station option locations.

5.4.32 RSMH 4b lies outside the area safeguarded for the reservoir (policies CP14 and CP14a) in the Vale of White Horse Local Plan 2031 and equivalent area in the consultation draft Joint Local Plan 2041 and lie slightly further away from the area that may be used for Steventon to East Hanney road diversion (depending on option chosen for that). The land required for RSMH4b or 4a including haul road is therefore likely to require a somewhat greater Order Limits extent, overall, than RSMH1. However, the difference is quite small in the context of the overall land-take and the differences between reservoir footprint options. The differences between rail-siding-specific footprints between the various options are also small in that context.

5.4.33 This location requires the potential removal or diversion of an existing Southern and Scottish Energy Network (SSEN) overhead HV line (33kV). This diversion of the overhead line is likely to take approximately 4 to 6 months, although this may be longer due to the complexities of the line crossing the GWR mainline, and interfacing with Network Rail on the diversion.

5.4.34 For property and land acquisition, RSMH 4b requires the take of Grade 3 and 4 agricultural land and will likely impact the two properties to the west and north.

6 Preferred Option

This section summarises step 6 of the appraisal methodology and draws on the assessments of RSMH 1, RSMH 4a and RSMH 4b with the aim to identify a preferred option for master planning and consultation. It is noted that RSMH 4a and RSMH 4b are two variations of RSMH 4, allowing for two variations in approach to railway signalling.

6.1 Comparison of RSMH 1, 4a and 4b

Comparison of Engineering Performance

6.1.1 For the engineering themes of design acceptability, constructability and operability, the tables below present a comparison of the performance of RSMH 1, RSMH 4a and RSMH 4b, after their assessment against the appraisal criteria (reported in Section 5) and workshop discussion.

Table 6.1: Design Acceptance Subtheme Narratives for Comparison of RSMH 1, RSMH 4a and RSMH 4b

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Network Rail	RSMH 1 is located approximately halfway along a four-mile two-track section of the Great Western Mainline. On the two-track section, freight trains will need to arrive and depart from this siding via the mainline and there is no way for passenger trains to pass around the freight trains, which will run at significantly reduced speeds for approach to and departure from RSMH 1. There is therefore a high risk of disruption to other services and timetabling on the Great Western Mainline from the operation of RSMH 1 with other services held up by the decelerating/accelerating freight trains into RSMH 1 on the two-track section. Given this impact, the SESRO project team understand that RSMH 1 is unlikely to be accepted by Network Rail. RSMH 4a and 4b extends from the four-track section of the mainline, rather than having a reliance on the two-track section. This will allow freight trains to arrive into RSMH 4a and 4b via the separate track for freight trains only (the up-relief), which is on the four-track section. The risk of disruption to passenger services is		✓

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
	therefore reduced as passenger trains will not be held behind freight trains decelerating into RSMH 4a or 4b. RSMH 1 therefore carries a much higher risk of being rejected by Network Rail than RSMH 4a and 4b due to its high risk of impacting the Great Western Mainline (a busy, strategically important national rail route). Network Rail acceptance of a proposed rail siding design is critical because without it, a siding (if constructed) could not be connected to the existing network and used for its intended purpose.		

Table 6.2: Constructability Subtheme Narratives for Comparison of RSMH 1, RSMH 4a and RSMH 4b

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Health and Safety	All options require working close to an operating railway, which increases risk, but it is considered that this can be managed to construct all options safely and therefore the health and safety subtheme is not a material differentiator between RSMH 1, 4a and 4b.		
Third Party Impact	For all options, impact on the existing railway during construction of the rail siding is inevitable due to the need for possession works. Despite a greater number of hours estimated for possession works for RSMH 4a, all options are considered to score similarly against this subtheme and therefore it is not considered a material differentiator between RSMH 1, 4a and 4b in this appraisal.		
Logistics	RSMH 4a and 4b are further from the reservoir than RSMH 1, resulting in an increased distance for vehicle movements. RSMH 4a and 4b also require the import of sheet piles for embankment construction which is not needed for RSMH 1.	✓	

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
	RSMH 1 is the preferred option for logistics, as it has more surrounding space if additional stockpiling is required, it is also closer to the reservoir.		
Programme	RSMH 4a and 4b require extensive earthworks and the installation of sheet piles. RSMH 1 does not require these things, so its duration and risk are lower, as such RSMH 1 is the preferred option for programme.	✓	
Construction Complexity	RSMH 4a and 4b require drainage of the area between the existing rail embankment and the new embankment for the rail siding, as well as modifications to the existing overhead gantries. RSMH 4a and 4b require embankment works and are located in an area over the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions. RSMH 1 is the preferred option because it does not require significant earthworks and is located in an area of Gault clay, reducing the likelihood of unexpected ground conditions.	✓	

Table 6.3: Operability Subtheme Narratives for Comparison of RSMH 1, RSMH 4a and RSMH 4b

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Health and Safety	All options will have enhanced control measures during operation, for works occurring in close proximity to a live railway. For RSMH 1, additional enhanced control measures shall be required due to the proximity to the proposed Steventon to East Hanney Diversion Road and RSMH 4a and 4b due to their proximity to the diverted Public Right of Way (PRoW). RSMH 4a and 4b have an opportunity for the access route to be constructed through the raised embankment to improve access to each side of the rail siding and, as such, are preferred over RSMH 1.		✓

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Operational Complexity	RSMH 1 provides less opportunity for maintenance access under the rail sidings which may result in increased closure periods for maintenance. RSMH 4a and 4b present an opportunity for an access route to be constructed through the raised embankment to improve access to each side of the rail siding, so they are preferred over RSMH 1.		✓
Operational Resilience	All options have the potential for reuse by other schemes, RSMH 4a and 4b have potential for facilitating a future Grove Station, car park or platform (see Section 3.3 for planning policy), pending further consideration during SESRO design development. However, due to being closer to the reservoir, the operation of RSMH 1 would be less energy intensive and so is the preferred option.	✓	
Transport Planning	RSMH 1 relies on the two-track section of the mainline, so is likely to be more disruptive to passenger trains during the operation of the rail siding than RSMH 4a and 4b, which extend from the four-track section.		✓

6.1.2 The comparisons for the three engineering themes are summarised below:

- **Design Acceptance:** RSMH 1 carries a much higher risk of being rejected by Network Rail than RSMH 4a and 4b.
- **Constructability:** RSMH 1 is less complex and logistically it is easier to construct than RSMH 4a and 4b because it does not require the import of sheet piles, the construction of an embankment or significant earthworks and it also has potentially better ground conditions than RSMH 4a and 4b. For these reasons, the programme for RSMH 1 is also shorter with less risk compared to RSMH 4a and 4b. While RSMH 4a and 4b perform less well than RSMH 1 under some constructability subthemes, constructing RSMH 4a and 4b is considered feasible.
- **Operability:** RSMH 1 is located closer to the reservoir resulting in shorter haulage distances for the large number of vehicle movements required during the construction of the reservoir / operation of the rail siding; however, RSMH 4a and 4b present an opportunity to construct an access road through the raised embankment and provide better access for maintenance. Considering third-party impact during its operation, RSMH 1 is also likely to result in a high risk to disruption to passenger services on the Great Western

Mainline (compared to RSMH 4a and 4b) since it relies on the two-track section of the mainline rather than the four-track section.

6.1.3 On balance of the engineering themes and subthemes, it is considered from an engineering standpoint that RSMH 1 should not be progressed further through the options appraisal given its high risk of rejection by Network Rail compared to RSMH 4a and 4b. The risk that Network Rail will reject a rail siding design is a critical consideration since without their acceptance, a rail siding could not be constructed.

Comparison of Cost and Carbon Performances

6.1.4 For the cost and carbon theme, the table below presents a comparison of RSMH 1, RSMH 4a and 4b, after their assessment against the appraisal criteria (reported in Section 5) and workshop discussion.

Table 6.4: Cost & Carbon Subtheme Narratives for Comparison of RSMH 1, RSMH 4a and RSMH 4b

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Cost	RSMH 1 has the least capital cost and operational cost, due to limited earthworks and shorter haulage distances. However, the initial high level estimates of CAPEX costs for the options are a small proportion of the overall cost of the SESRO project. None of the costs are therefore considered to be disproportionate or so great in comparison with the other options that one option is an unreasonable preference if it performs well in the other subthemes. Cost is therefore not seen as a material differentiator between options when identifying a preferred option.		
Carbon	There is no carbon estimate available for rail options at this time, however, initial assessment shows correlation between carbon and cost, indicating RSMH 1 is likely to have the lowest carbon cost. However, for the same reasoning as with cost, carbon cost is not considered to be a material differentiator between options at this stage.		

6.1.5 Overall, RSMH 4a has the largest cost and RSMH 1 has the lowest cost. Neither capital cost nor carbon cost are, however, considered as material differentiators between options, when identifying a preferred option, because among the indicative high-level cost estimates none are disproportionately large in comparison with the other options such that one option is an unreasonable

preference if it performs well in the other subthemes.

Comparison of Environmental Performances

6.1.6 For the environmental performance theme, the table below presents a comparison of RSMH 1, RSMH 4a and RSMH 4b, after their assessment against the appraisal criteria (reported in Section 5) and workshop discussion.

Table 6.5: Environmental Subtheme Narratives for Comparison of RSMH 1, RSMH 4a and RSMH 4b

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Air Quality	From an air quality perspective, RSMH 1 is the preferred option as Marcham AQMA is located approximately 4.8km away, and there are no high sensitivity human receptors within 350m of the RSMH boundary; therefore, no significant impacts are expected. RSMH 4a and 4b are similarly located (170-180m) from high sensitivity human receptors, and both are located within the LWS. Nevertheless, the construction of RSMH 4a and 4b would likely lead to a negligible change in air quality.	✓	
Aquatic Environment	From an aquatic environment perspective, RSMH 1 is the preferred option as risk is mitigable and could provide environmental benefit, whereas RSMH 4a and 4b only allow the minimum environmental benefits to be realised.	✓	
Biodiversity and Nature Conservation	All options contain priority habitats such as ponds, hedgerows, woodland assumed to be lowland mixed deciduous woodland, and arable field margins within the option site boundary. Desk study indicates that no ancient woodland would be affected by any of the options. Desk study indicates that no ancient or veteran trees would be affected by any of the options, but surveys may potentially indicate trees that could be classified as ancient or veteran tree. RSMH 4a and 4b are the least preferred options as they lie partly within a LWS.	✓	
Biodiversity and Nature Conservation	All options will require the removal of a large area of woodland which is assumed likely to include A or B grade trees. There are also grassland, hedgerow,	✓	

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
and Landscape	and waterbody habitats in all option footprints which are likely to support protected and notable species such as badgers, bats and great crested newts. RSMH 4a and 4b are the least preferred options as they would require some land take from the LWS which is an area of high conservation value due to the presence of priority woodland habitat. The waterbodies present within the LWS also provide habitat for a population of great crested newts.		
Flood Risk	All options have no impact on fluvial, pluvial or groundwater flood risk, so the flood risk subtheme is not considered a material differentiator between options in this appraisal.		
Historic Environment	RSMH 1 is the least preferred option due to the presence of high value archaeology. RSMH 4a and 4b are equal as they are both located within approximately 400m of a listed building and have known archaeology present.		✓
Land Quality	All options lie adjacent to the historical London-Bristol Great Western Rail Mainline, which is a potential source of contamination, and there is the potential for UXO in the area. RSMH 1 also crosses Steventon Depot, which is a potential source of contamination. Therefore, options RSMH 4a and 4b are preferred from a Land Quality perspective as these options will not disturb the potential source of contamination at Steventon Depot.		✓
Landscape and Visual	All options require the removal of vegetation belts and woodland along the GWR train line which would erode a key characteristic. The loss of woodland for the RSMH 1 option would also make Steventon Depot more noticeable in the local landscape (until the depot's proposed removal to facilitate SESRO). All options, including their associated haul roads, would introduce new infrastructure and erode the rural landscape and levels of tranquillity. The rail sidings and associated infrastructure would also be		

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
	visible in local views from some Public Rights of Way (PRoW). RSMH 1 will also be visible from the edge of Steventon, along with some of the panoramic views from The Ridgeway National Trail, and consequently would affect the setting of the North Wessex Downs National Landscape. RSMH 4a and 4b would be visible from some isolated residential properties and the edge of East Hanney, although noise bunds (assumed only for the purposes of options appraisal) would help to provide partial screening of the material storage. Landscape and visual is not a material differentiator between RSMH 1, 4a and 4b.		
Noise	RSMH 1 is marginally the preferred option during construction given the increased separation distance to the closest noise sensitive receptors; however, all options have the potential to result in significant adverse noise impacts. There is no material differentiator in relation to the operational noise impacts, with all options potentially resulting in significant adverse effects for many sensitive receptors. Further work is required for all options to determine further noise mitigation options. Such potential impacts predominantly arise from the material handling works at the sidings.	✓	
Pollution	No potential significant effects are likely for any option because emissions to land and water can be controlled through standard good practice construction methods and mitigation, therefore, the pollution subtheme is not considered a material differentiator between the options in this appraisal.		

6.1.7 Overall, RSMH 1 is the preferred option from a terrestrial and aquatic environment standpoint as it does not encroach upon the Cuttings and Hutchin's Copse LWS. However, it is acknowledged that RSMH 1 is the least preferred option from a land quality perspective as this option crosses the Steventon Depot, which is a possible source of contamination, and from the

heritage perspective due to the presence of high-quality archaeology. RSMH 4a and 4b are the least preferred options for most environmental subthemes due to land take and potential impacts upon the LWS and local receptors.

Comparison of Community, Planning and Land Performances

6.1.8 For the community, planning and land theme, the table below presents a comparison of the performance of RSMH 1, RSMH 4a and RSMH 4b, after their assessment against the appraisal criteria (reported in Section 5) and workshop discussion.

Table 6.6: Community, Planning and Land Subtheme Narratives for Comparison of RSMH 1, RSMH 4a and RSMH 4b

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
Socio-Economic	RSMH 1 is the preferred option as no significant impacts are expected from a socio-economic point of view. RSMH 4a and 4b are the least preferred options because they will sever a PRoW during construction, which is expected to be reinstated during operation of the reservoir. The proposed redirection of the Wilts & Berks Canal would be beneficial to improve linkages with the canal and severed PRoW. RSMH 4a and 4b negatively impact this reinstatement and detract from its benefits.	✓	
Consenting	From the consenting perspective, there are no very strong differentiators between RSMH1, 4a and 4b. RSMH4a and 4b are slightly less favoured from the point of view of being located further from the reservoir footprint (increasing overall land take and being outside the area safeguarded for SESRO in local policy) and hypothetically being in conflict with (or providing a legacy opportunity for) the possibility of a future Grove Station.	✓	
Transport Planning	RSMH 4a and 4b would have a positive influence on the proposals for the OCC/VoWH Grove Station options included in local plans (discussed in Section 3.3), and this has been recognised as a potential benefit by Network Rail. It is assumed that extending the northernmost existing track of the Great Western Mainline by 1.2km would provide this benefit by having		✓

Subtheme	Narrative	RSMH 1	RSMH 4a/4b
	additional track in the vicinity of the safeguarded station option locations. RSMH 1 would not provide this benefit.		
Property and Land Acquisition	All options require agricultural land, Grades 3 and 4. The construction of RSMH 4a and RSMH 4b is likely to have a significant impact on residential units. RSMH 1 will require the land used by the storage depot but, for the purposes of this options analysis, this has been ignored because the land is required for the reservoir itself.		

6.1.9 The comparisons for the subthemes in Table 6.6 are summarised below:

- Socio-economic: RSMH 1 is the preferred option while RSMH 4a and 4b are the least preferred options.
- Consenting: There are no very strong differentiators between RSMH 1, 4a and 4b, although RSMH4a and 4b are slightly less favoured.
- Transport Planning: RSMH 4a and 4b are more likely to help in facilitating a future Grove Station compared to RSMH 1.
- Property and Land Acquisition: There is little difference between RSMH 4a and RSMH 4b, with both likely to impact the two properties to the north and west. However, RSMH 1 only has an impact on the storage depot that will be removed for the reservoir itself.

6.1.10 Overall for Community, Planning and Land, RSMH 4a and 4b are located further from the reservoir increasing land take than RSMH 1, and closer to nearby residential units with related adverse impact.

Comparison Outcomes

6.1.11 In this options appraisal, RSMH 1 was discounted as the preferred option due to the much higher risk of being rejected by Network Rail than RSMH 4a and 4b due to its high risk of impacting the Great Western Mainline (a busy, strategically important national rail route).

6.1.12 The risk that Network Rail would not accept RSMH 1 is a critical consideration such that RSMH 1 cannot be taken forward, despite its preferable performance over RSMH 4a and 4b in other subthemes. Without agreement from Network Rail the option could not be constructed off the mainline. There is a much lower risk that Network Rail will not accept RSMH 4a and 4b.

6.1.13 It was, however, acknowledged that RSMH 1 performs better than both RSMH 4a and 4b for most of the environmental subthemes due to the land take and

potential impacts upon the LWS and local receptors from RSMH 4a and 4b. Further work was therefore undertaken to investigate alternative layouts that avoid encroaching onto the LWS with the aim to improve the environmental performance and minimise impact on the LWS, while keeping the risk of rejection from Network Rail much lower than RSMH 1.

6.1.14 RSMH 4a and 4b are in the same location and performed very similarly in assessment, the difference between the two options being the signalling arrangements – while RSMH 4a has the flexibility for freight trains to enter and exit to the east and west, freight trains could only exit RSMH 4b to the east. For the purposes of this options appraisal only, RSMH 4b was taken forwards for the investigation of alternative layouts; however, options could be investigated in the future with a signalling arrangement to allow freight trains to enter and exit to the east and west.

6.1.15 RSMH 4b was taken forwards for the purposes of options appraisal over RSMH 4a for the following reasons:

- Engineering – RSMH 4b requires less complex signalling modifications than RSMH 4a. Although this means freight trains will only be able to exit to the east, an acceptable alternative in terms of timetabling and operation is that they will be able to return west to Avonmouth by looping around via Didcot or Reading.
- Cost and Carbon – Although not considered a material differentiator between options, RSMH 4b has a lower capital cost and carbon associated with it than RSMH 4a. This is due to the fewer signalling modifications required, which means a shorter programme, but it also means less possession works, which incur costs to Network Rail.

6.1.16 On this basis, alternative layouts of RSMH 4b were investigated, as outlined in the section below.

6.2 Development of Additional Option RSMH 5

6.2.1 Alternative layouts were investigated to reduce the potential environmental impact of RSMH 4b by avoiding the Cuttings and Hutchin's Copse LWS. In so doing, an additional option, RSMH 5, was developed and defined for assessment.

Location of RSMH 5

6.2.2 RSMH 5 is approximately 1km south of East Hanney, 400m from the proposed Steventon to East Hanney Road Diversion and 900m southwest of the reservoir. A main consideration for the location of RSMH 5 is the need to avoid the Cuttings and Hutchin's Copse LWS.

Signalling and Track Modifications for RSMH 5

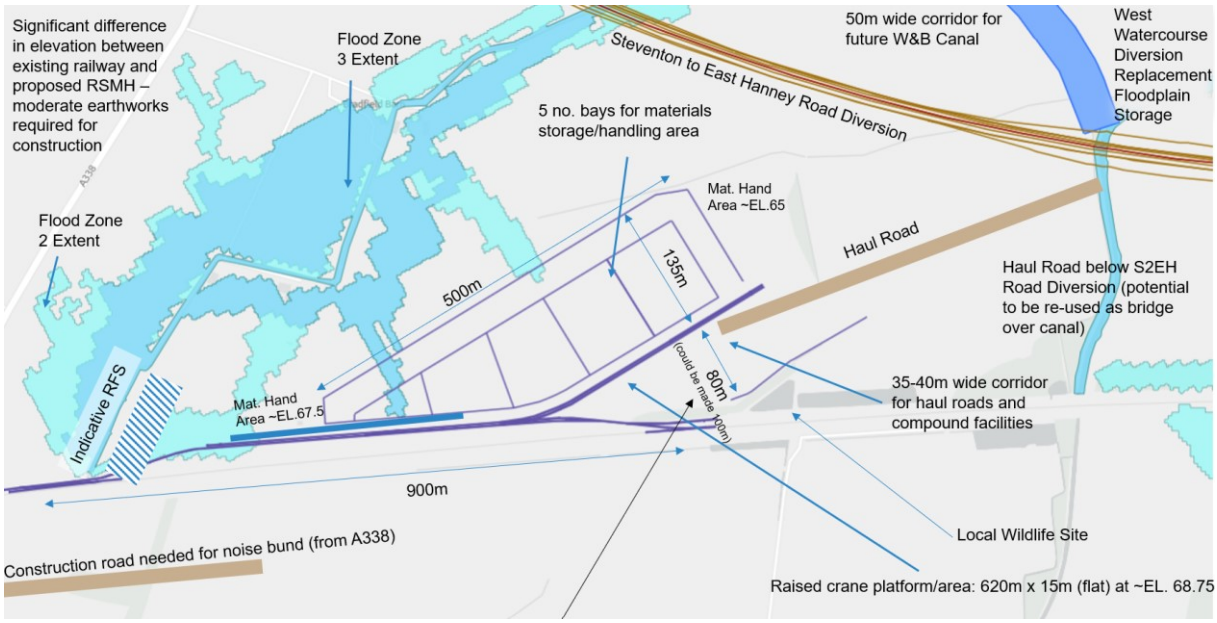
6.2.3 Compared to RSMH 4b, RSMH 5 has been developed as follows: The gradients down from and up to the GWR line have been made steeper (but within operable limits), the take-off point moved further west, and an additional siding rail spur added. These adjustments help to move RSMH 5 away from the LWS.

6.2.4 As with RSMH 4b, RSMH 5 would only provide the required signalling and track modifications to allow the trains to exit the site to the east, requiring trains exiting RSMH 5 to return to Avonmouth by looping around via Didcot or Reading.

6.2.5 It is anticipated that the northern line of the existing 4 track section of the Great Western Mainline would be extended for ~900m to allow freight trains to enter the siding directly. The siding connections into the existing Great Western Mainline would be ~900m apart. This interaction would require review and approval with Network Rail, particularly due to the signalling modifications which would be required. The possession works would likely need to happen at night, to minimise disruption on the railway line during the day.

Figure 6.1: Layout of RSMH 5 (370,000m^3 capacity)

Note that this layout is indicative only for the purposes of options appraisal[14].



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Layout of RSMH 5

6.2.6 Options that would turn the railway siding into the SESRO site for trains to stop perpendicular to the existing railway were initially considered and ruled out because they would either need to be in a flood zone or their length would

[14] Potential noise mitigation is not shown in the figure.

impinge on the footprint of the reservoir embankment, resulting in potential elongation of the construction programme as all material would need to be imported and the rail siding demolished before the affected embankment section could be constructed. As such, all rail siding options considered during the initial assessments are parallel to the existing railway[15]. RSMH 5 explores an alternative option, with the rail siding at an angle to the existing railway, allowing a reduction in the total east-west length of the siding whilst also avoiding impacts on the flood zone and the footprint of the reservoir embankment.

6.2.7 For RSMH 5, the area for materials handling is not rectangular, as it is in the other options, in order to limit impact on the floodplain shown in Figure 6.1. The area required has been based on the area for the other options for the 370,000m^3 stockpile capacity (the volume needed to store the materials for one year). The area for materials handling adjacent to the rail siding would be separated into bays for storing different material types, shown indicatively on Figure 6.1.

6.2.8 To achieve connection back into the Great Western Mainline to the west of the LWS, whilst also aiming to avoid flood plain as well as providing the same area of materials handling, there is an additional spur of ~315m off the main rail siding as shown on Figure 6.1. The spur is currently 80m from the Cuttings and Hutchin's Copse LWS (on Figure 6.1), but this could be adjusted and refined with further design work, particularly if the stockpile capacity of the materials handling area is reduced as this would give scope to adjust the layout of the materials handling area.

Construction Access for RSMH 5

6.2.9 It has been assumed that road access to construct the rail siding would need to be via a new road - the SESRO main access road and a haul road. This means, as per other RSMH options, it is assumed that SESRO main access road would need to be constructed prior to construction of RSMH 5. Once established, haul roads would need to be constructed, which may pass under the Steventon to East Hanney bridge that would also be used for the Wilts and Berks Canal corridor.

Construction of RSMH 5

6.2.10 The existing Great Western Mainline in this location is on an embankment, and so RSMH 5 would need to be routed slightly north from the existing railway, to create separation from the existing railway embankment and so that the sidings and materials handling area is closer to existing ground level.

6.2.11 The existing Great Western Mainline adjacent to RSMH 5 is on an embankment, as such, the RSMH 5 option would require a sheet pile retaining wall and earthworks. The site crosses an area of flood zone, shown in Figure 6.1, which

[15] It is noted that, whilst a rail siding at an angle to the existing railway may have been possible for RSMH 2, this would not have changed the acceptability of the option.

would require some replacement floodplain storage.

6.2.12 An existing unmanned level crossing passes through the site, however Network Rail have developed separate plans to remove this and relocate the footpath.

6.2.13 This location requires the potential removal or diversion of an existing Southern and Scottish Energy Network (SSEN) overhead HV line (33kV). This diversion of the overhead line is likely to take approximately 4 to 6 months, although this may be longer due to the complexities of the line crossing the GWR mainline, and interfacing with Network Rail on the diversion.

6.3 Comparison of RSMH 4b and 5

6.3.1 RSMH 5 was assessed against the same criteria as the other three options (RSMH 1, RSMH 4a and RSMH4b), in accordance with appraisal step 5. For full details of the assessment of RSMH 5 against individual criteria refer to Appendix H.

6.3.2 A workshop was held to discuss the comparison of RSMH 5 and RSMH 4b with the aim to identify a preferred option between RSMH 4b and RSMH 5.

6.3.3 The table below provides a comparison (by subtheme) of the performance of RSMH 4b and RSMH 5, after the development of RSMH 5 from RSMH 4b, the assessment of RSMH 5 against the appraisal criteria and RSMH 5 workshop.

Comparison of Engineering Performance

6.3.4 For the engineering themes of design acceptability, constructability and operability, the tables below present a comparison of the performance of RSMH 4b and RSMH 5, after their assessment against the appraisal criteria and workshop discussion.

Table 6.7: Design Acceptance Subtheme Narratives for Comparison of RSMH 4b and RSMH 5

Subtheme	Narrative
Network Rail	RSMH 5 has similar key characteristics in its interaction with the Great Western Mainline as RSMH 4b with both RSMH 4b and 5 extending out of the four-track section of the mainline rather than having a reliance on the two-track section. At this stage of design development, there is therefore considered no greater risk of Network Rail rejecting RSMH 5 compared with RSMH 4b. RSMH 5 therefore carries a much lower risk than RSMH 1of being rejected by Network Rail.

Table 6.8: Constructability Subtheme Narratives for Comparison of RSMH 4b and RSMH 5

Subtheme	Narrative
Health and Safety	RSMH 4b and 5 both require working close to an operating railway which increases risk, but this can be managed. This subtheme is therefore not considered a material differentiator between the two options.
Third Party Impact	Impact on rail is inevitable due to need for possession works, however RSMH 4b and 5 are considered to score similarly against this subtheme. Both options require potential access to land south of the GWR mainline for removing/diverting the existing overhead 33kV power line.
Logistics	RSMH 4b and 5 are similar in that both have limited space for expanding the stockpile area if required. Both options are further from the reservoir (compared with RSMH 1), resulting in longer vehicle movements and both options require the import of sheet piles for embankment construction. Both options require noise mitigation to the south with a worst case (assessed) option of the requirement for a noise mitigation south of the railway[16].
Programme	RSMH 5 requires slightly more rail track to be laid and earthworks due to the rail 'spur', however this is not a material differentiator with respect to programme.
Construction Complexity	RSMH 4b and 5 are similar in that they require drainage of the area between existing rail embankment and new embankment for the rail siding, as well as modifications to the existing overhead gantries. The signalling modifications are the same for both options. RSMH 4b and 5 require embankment works and are located in an area over the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions. RSMH 5 requires more embankment to be created and track to be laid but overall, there are no material differentiators between the two options.

Table 6.9: Operability Subtheme Narratives for Comparison of RSMH 4b and RSMH 5

Subtheme	Narrative

[16] For the purposes of assessment, it has been assumed for all options, that noise bunds would be incorporated as the principal form of noise mitigation as this presents a worse case in terms of land take. However, further work will be undertaken on the preferred option to identify and develop the most appropriate noise mitigation method to be incorporated.

Health and Safety	All options will have enhanced control measures during operation, for works occurring in close proximity to a live railway. There will need to be enhanced control measures for RSMH 4b and 5 due to their proximity to the diverted Public Right of Way (PRoW). RSMH 4b and 5 have an opportunity for the access route to be constructed through the raised embankment to improve access to each side of the rail siding. The health and safety subtheme is therefore not considered a material differentiator between the two options.
Operational Complexity	There is an equal opportunity for RSMH 4b and 5 to provide an access route to be constructed through the raised embankment which could improve access to each side of the rail siding.
Operational Resilience	RSMH 4b and 5 both have potential for facilitating a future Grove station, pending further consideration during SESRO design development. The operational resilience subtheme is therefore not considered a material differentiator between the two options.
Transport Planning	Both RSMH 4b and RSMH 5 extend from the four-track section and operate with the same signalling requirements, resulting in a lower likelihood of disruption to passenger trains during operation of the rail siding (in comparison to RSMH 1). There are therefore no strong differentiators between RSMH 4b and 5 from a transport planning perspective.

6.3.5 The comparisons for the three engineering themes are summarised below:

- **Design Acceptance:** At this stage of design development, there is considered to be no greater risk of Network Rail rejecting RSMH 5 compared with RSMH 4b.
- **Constructability:** RSMH 5 requires slightly more rail track to be laid and earthworks due to the rail 'spur', however this is not a material differentiator with respect to programme. In other constructability subthemes the options perform similarly.
- **Operability:** In all operability subthemes RSMH 5 performs similarly to RSMH 4.

6.3.6 On balance options RSMH 4b and 5 perform similarly over all of the engineering themes and subthemes.

Comparison of Cost and Carbon Performances

6.3.7 For the cost and carbon theme, the table below presents a comparison of RSMH 4b and RSMH 5, after their assessment against the appraisal criteria and workshop discussion.

Table 6.10: Cost and Carbon Narratives for Comparison of RSMH 4b and RSMH 5

Subtheme	Narrative
Cost	RSMH 5 has a higher capital cost due to additional earthworks and signalling requirements than Option 4b. However, the difference is not a significant proportion of the overall cost of the project.
Carbon	There is no carbon estimate available for rail options at this time, but initial assessment shows correlation between carbon and cost. This would indicate that RSMH 4b is likely to have a lower carbon cost than RSMH 5; however, for the same reasoning as with cost, carbon cost is not considered to be a material differentiator between options at this stage.

6.3.8 Neither capital cost nor carbon cost are currently considered as material differentiators between options, when identifying a preferred option, because among the indicative high-level cost estimates none are disproportionately large in comparison with the other options such that one option is an unreasonable preference if it performs well in the other subthemes.

Comparison of Environmental Performances

6.3.9 For the environmental performance theme, the table below presents a comparison of RSMH 4b and RSMH 5, after their assessment against the appraisal criteria and workshop discussion.

Table 6.11: Environmental Subtheme Narratives for Comparison of RSMH 4b and RSMH 5

Subtheme	Narrative
Air Quality	From an air quality perspective, both RSMH 4b and RSMH 5 are similarly located (170-180m) from high sensitivity human receptors; however, RSMH 4b is located within The Cuttings and Hutchin's Copse LWS and RSMH 5 is located 80-100m to the west of this LWS, which is considered a low sensitivity receptor. The construction of RSMH 4b and 5 would likely lead to a negligible change in air quality and there are no proposed dust-generating operational activities for either RSMH 4b or RSMH 5 that could not be managed using normal good practices.
Aquatic Environment	The footprint of both RSMH 4b and RSMH 5 are within the headwaters of two main WFD waterbodies: the Cow Common Brook and Portobello Ditch (GB106039023360) and Childrey Brook and Norbrook at Common Barn (GB106039023380). Both RSMH 4b and RSMH 5 result in approximately 450m of watercourse lost within the

	Cow Common Brook and Norbrook at Common Barn WFD waterbody as a result of the screening bund south of the railway[17]. RSMH 4b would result in an additional approximately 50 m of ditch lost within the Cow Common Brook and Portobello Ditch WFD water body north of the RSMH footprint. Whilst these losses would not affect WFD compliance and the 50m is no significant differentiator between the two options, it does affect the overall amount of mitigation required by the project. Both options will require dewatering. It has been assumed that the most likely route taken will be to direct water west or north into the East Hanney Ditch catchment (part of the Childrey Brook and Nor Brook at Common Barn WFD water body). Both options require a haulage road which goes east and crosses at least one watercourse i.e., an unnamed tributary of the Cow Common Brook (Cow Common Brook & Portobello Ditch WFD water body). Whilst the exact layout / location of the site dewatering is not a material differentiator between these two options for the aquatic environment, successful implementation of best practice pollution prevention measures is critical for any RSMH option to attain WFD compliance for the Cow Common Brook waterbody and the Childrey Brook WFD waterbody; as any downstream pollution e.g. sediments could compromise WFD compliance of the western watercourse system as a whole by affecting the water quality or ecology. It is noted that the haulage road's crossings extending east for both options will, at some point, need to cross the western watercourse diversion. These should use a bridge rather than a culvert and have sediment mitigation measures to prevent impacts on the aquatic environment.
Biodiversity and Nature Conservation	Both RSMH 4b and 5 contain priority habitats such as ponds, hedgerows, woodland assumed to be lowland mixed deciduous woodland and arable field margins within their site boundaries. Desk study indicates that no ancient woodland would be affected by any of the options. Desk study indicates that no ancient or veteran trees would be affected by any of the options, but surveys may potentially indicate trees that could be classified as ancient or veteran tree.

[17] Screen bunds assumed for appraisal purpose, alternative screening options to be investigated during design development.

	RSMH 4b is the least preferred option, however, because it lies partly within The Cuttings and Hutchin's Copse LWS while RSMH 5 is located 80-100m from this LWS.
Biodiversity and Nature Conservation and Landscape	RSMH 5 is the preferred option because, although the construction of RSMH 5 will require the removal of some vegetation along the Great Western Mainline and tree belts along Old Man's Lane, it is not located within the LWS. Hedgerows and waterbodies may also require removal. These habitats are likely to support protected and notable species such as badgers, bats, and great crested newts. RSMH 4b is the least preferred option as it would require some land take from the LWS, which is an area of high conservation value due to the presence of priority woodland habitat.
Flood Risk	No impact on fluvial, pluvial or groundwater flood risk for both RSMH 4b and 5. RSMH 5 is slightly within a fluvial flooding area but includes mitigation using a local replacement flood storage area, so flood risk is not considered a material differentiator between the options.
Historic Environment	Option 5 is preferred due to the lack of known archaeology.
Land Quality	Both options lie adjacent to the London-Bristol Great Western Mainline, which is a potential source of contamination. RSMH 4b is the least preferred, however, because the potential for UXO disturbance has been identified within the option area, whereas RSMH 5 is of relatively low risk from UXO.
Landscape and Visual	Both options require the removal of vegetation belts and woodland along the Great Western Mainline, which would erode a key characteristic. Both options, including their associated haul roads, would introduce new infrastructure and erode the rural landscape and levels of tranquillity. The rail sidings and associated infrastructure would also be visible in local views from some Public Rights of Way (PRoW). Both options would be visible from some isolated residential properties and the edge of East Hanney, although the noise bunds (assumed only for the purposes of options appraisal) would help to provide partial screening of the material storage. Landscape and visual is, therefore, not considered a material differentiator between RSMH 4b and 5.
Noise	Noise is not a material differentiator in relation to the operational noise impacts, with all options potentially resulting in significant adverse

	effects for multiple sensitive receptors. Further work is required for all options to determine further noise mitigation options.
Pollution	No potential significant effects are likely for any option because emissions to land and water can be controlled through standard good practice construction methods and mitigation, therefore, the pollution subtheme is not considered a material differentiator between the options in this appraisal.

6.3.10 Overall, RSMH 5 is the preferred option from an environmental standpoint because it does not encroach on The Cuttings and Hutchin's Copse LWS, has lack of known archaeology and has a low risk from UXO, although it is acknowledged that many subthemes are not considered differentiators between the two options.

Comparison of Community, Planning and Land Performances

6.3.11 For the community, planning and land theme, the table below presents a comparison of the performance of RSMH 4b and RSMH 5, after their assessment against the appraisal criteria and workshop discussion.

Table 6.12: Community, Planning and Land Subtheme Narratives for Comparison of RSMH 4b and RSMH 5

Subtheme	Narrative
Socio-Economic	Both RSMH 4b and 5 sever a PRoW during construction, which is expected to be reinstated during operation of the reservoir. The proposed redirection of the Wilts & Berks Canal would be beneficial to improve linkages with the canal and severed PRoW. However, RSMH 5 encroaches further onto land that appears to have equestrian uses so is not the preferred option from a socio-economic perspective.
Consenting	From the consenting perspective, both RSMH 4b and 5 are located outside the area safeguarded for SESRO in local policy and require a greater Order Limits extent than would be required for other RSMH options, but RSMH 5 would require the acquisition of additional land that appears to have equestrian uses. Both RSMH 4b and 5 could in theory either conflict with or help deliver a possible future Grove Station, as sought by local policy. From the consenting criteria there are otherwise no strong differentiators between RSMH 4b and 5.
Transport Planning	RSMH 4b and 5 have a potential to influence the proposals for the OCC/VoWH proposed Grove station. From a transport planning perspective there are no strong differentiators between RSMH4b and RSMH5.

Property and Land Acquisition	The differences between RSMH 4b and RSMH 5 relate to RSMH 5 being further west. This places it closer to two residential properties, both of which are moderately substantial and have amenity land around them and appear to have equestrian uses. This will increase the impact on the more southerly property. There is also a higher probability of property having to be acquired as a result of RSMH 5.

6.3.12 The comparisons in Table 6.12 are summarised below:

- **Socio-economic:** From a socio-economic perspective, RSMH 4b is the preferred option over RSMH 5 as the latter encroaches further onto land that appears to have equestrian uses.
- **Consenting:** From a consenting perspective, RSMH 4b is preferred over RSMH 5 as it would require the acquisition of additional land that appears to have equestrian uses.
- **Transport Planning:** From a transport planning perspective there are no strong differentiators between RSMH4b and RSMH5.
- **Property and Land Acquisition:** RSMH 5 is further west which places it closer to two residential properties, increasing the potential impact on both.

Comparison Outcomes

6.3.13 As set out in its option definition (Section 6.2), RSMH 5 uses an additional siding rail spur off the main rail siding to move RSMH 5 away from the Cuttings and Hutchin's Copse LWS. In comparison, RSMH 5 is therefore preferred under several environmental subthemes, such as Biodiversity and Nature Conservation, reflecting the increased distance from and reduced potential to impact the LWS compared to RSMH 4b, which encroaches on the LWS.

6.3.14 The assessment of RSMH 5 identified, however, that the option encroaches to a greater extent on land associated with residential properties in this area which also appear to have equestrian uses. This affects the performance of RSMH 5 under the socio-economic, consenting, and property and land acquisition subthemes compared with RSMH 4b.

6.3.15 On balance, RSMH 5 is provisionally preferred over RSMH 4b, acknowledging that further work will be needed to understand and minimise the potential impact of RSMH 5 on properties and land. This may involve small adjustments to the layout of RSMH 5 but the key elements defining this option (such as the concept of providing an additional rail spur to enable the alignment of the siding at an angle to the main track) will remain.

6.4 Identification of the Preferred Option

6.4.1 Figure 6.2 summarises the development of options for assessment and the comparisons undertaken between options to identify the preferred option for

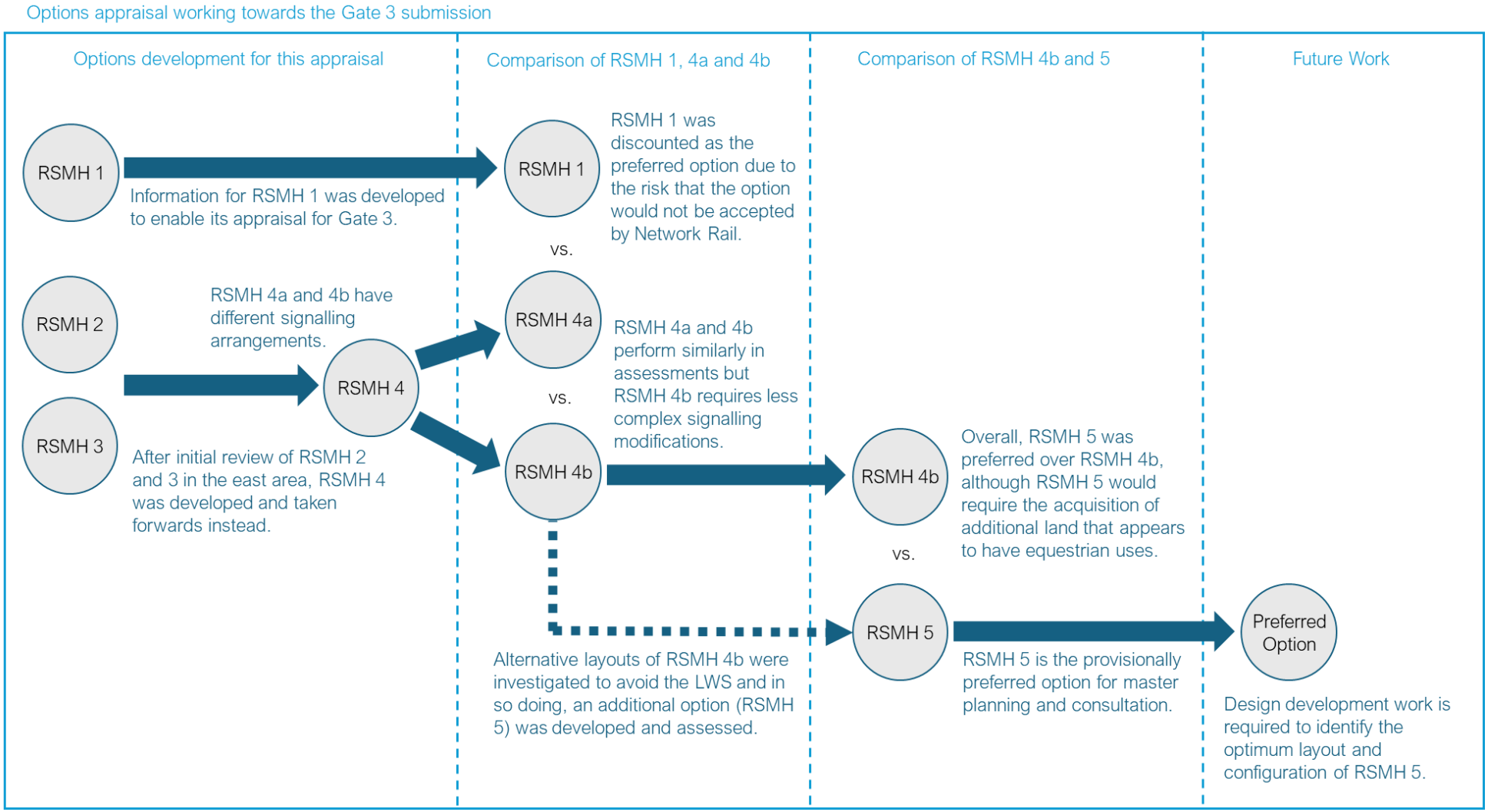
master planning and consultation.

6.4.2 RSMH 5 was identified as the provisionally preferred option over RSMH 1, RSMH 4a and RSMH 4b because:

- RSMH 1 was discounted as the preferred option due to the high risk that Network Rail would not accept RSMH 1.
- RSMH 4b was provisionally preferred over RSMH 4a for the development of RSMH 5, as it requires less complex signalling modifications. However, RSMH 4a and 4b perform similarly and an option could be developed in the location of RSMH 5 that uses the signalling principles of either RSMH 4a or 4b. This will be discussed further with Network Rail during the design development stages.
- RSMH 5 was preferred over RSMH 4b under several environmental themes and the concept of having an additional spur off the main rail siding (compared to the parallel track) gives greater flexibility to refine the design going forwards. However, this is subject to further work being undertaken to understand and minimise the potential impact of RSMH 5 on the properties and land to the west.

6.4.3 Design development will be required to identify the optimum configuration of the RSMH 5 design, balancing operational requirements for the RSMH area with impact on the operational railway, local wildlife / habitat, and local properties (including the land that appears to have equestrian uses).

Figure 6.2: Identification of the Preferred Option for the RSMH Area



Source: Thames Water Internal, 2024

7 Conclusions and Next Steps

This section provides conclusions from this option appraisal report and recommendations for future work.

7.1 Conclusions

7.1.1 An assessment methodology was established as outlined in Section 2 and detailed fully in the SESRO Option Appraisal Context and Methodology Report. The process followed for identifying the preferred option is summarised below:

- Appraisal step 1: The purpose of this appraisal study was to identify a preferred location and indicative layout for the RSMH area to facilitate the delivery of construction materials to the SESRO site by rail. The preferred option is for master planning and consultation.
- Appraisal step 2: Constraints on the definition of options for the RSMH area were identified, as outlined in Section 3. Two areas within the general extents of the SESRO location (the area defined by A roads and the railway) were identified within which location options for the RSMH area were developed in step 4.
- Appraisal step 3: The SESRO Criteria Table was developed for all the options appraisals of associated infrastructure for the reservoir and is included in the SESRO Option Appraisal Context and Methodology Report.
  - Four specific criteria, detailed in Section 2.4, were developed for the assessment of the RSMH area options only, relating to topics such as design acceptability (to Network Rail), construction complexity, logistics and 3rd party impact.
- Appraisal step 4: Options were defined and developed to a sufficient level of detail for them to be assessed, as presented in Section 4 and summarised below:
  - RSMH 1 was developed in the eastern area and two options (RSMH 2 and 3) were initially developed for the western area.
  - Initial screening of the options determined that RSMH 2 and 3 should be amalgamated for assessment into RSMH 4. Two variants to RSMH 4 (a and b) were then developed that are at the same location but that have different signalling arrangements, meaning freight trains for RSMH 4a can exit both east and west but can only exit east for RSMH 4b.
  - Three options (RSMH 1, 4a and 4b) were therefore developed for assessment against the appraisal criteria.
- Appraisal step 5: Technical specialists assessed the options against developed criteria, based on their expertise and the assessment methodology. The performance of individual options against the assessment criteria are summarised in Section 5 for RSMH 1, 4a and 4b.
- Appraisal step 6: Following the individual option assessments, a workshop was held to bring together specialists to discuss the performance of options

RSMH 1, RSMH 4a and RSMH 4b in assessment, including key differentiators between options. Figure 6.2 summarises the process, including the development of options and comparisons between options, to identify a preferred option for master planning and consultation. The assessment and comparisons focussed on determining the preferred location for the RSMH area. Section 6 presents the appraisal narratives, comparing the performance of options and identifying the key differentiators between options, as well as presenting the definition of RSMH 5, which was an option developed following the comparison of RSMH 1, 4a and 4b. The outcome of the options appraisal is summarised below.

- Appraisal steps 7 and 8: Appraisal steps 7 and 8 will be undertaken as part of the next steps set out below in Section 7.2.

RSMH Area - Appraisal Outcome

7.1.2 Although RSMH 1 performs better in assessment than both RSMH 4a and 4b in many subthemes, there is a high risk that Network Rail would not accept RSMH 1 due to its potential for impact on the operation of the existing railway, such that RSMH 1 was discounted as the preferred option and not taken forwards in the options appraisal as shown in Figure 6.2.

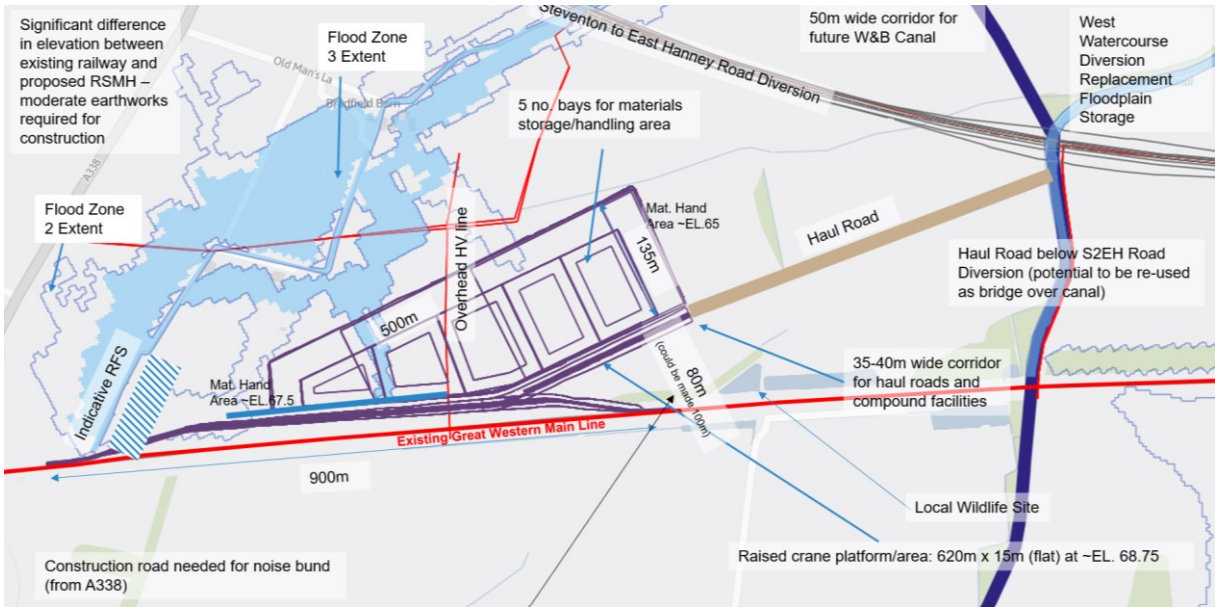
7.1.3 Since there were environmental concerns for RSMH 4a and 4b, centred around the impacts from the options impinging on the LWS, RSMH 5 was developed from RSMH 4b to avoid impinging on the LWS. RSMH 5 was then individually assessed against the appraisal criteria and its performance in assessment was compared with RSMH 4b to identify a preference between the two options.

7.1.4 The comparison of RSMH 5 and RSMH 4b identified that while having the additional spur that avoids the LWS delivers environmental benefits for RSMH 5 compared with RSMH 4b, RSMH 5 encroaches to a greater extent on land to the west that appears to have equestrian uses. However, RSMH 5 was identified as the provisionally preferred option over RSMH 4b because it is preferred under several environmental themes and the concept of having an additional spur off the main rail siding gives greater flexibility to refine the design. Further work will be undertaken to understand and minimise the potential impact of RSMH 5 on the properties and land to the west.

Preferred Option for the RSMH Area

7.1.5 RSMH 5 (detailed in Figure 7.1 below) is identified as the provisionally preferred option for master planning and consultation, acknowledging that further work will be needed to refine the design.

Figure 7.1: RSMH Area Provisionally Preferred Option for Master Planning and Consultation



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7.2 Next Steps

7.2.1 As set out in the SESRO Design Development Process in Figure 1.1, the next stage on from the option appraisal of associated infrastructure is to develop the Gate 3 Interim Landscape and Environmental Master Plan and material for the non-statutory public consultation in 2024. For this master plan, the outcomes of this appraisal should be reviewed against the other appraisals, as outlined in Section 2.8 of this report. As the rail siding is not a permanent feature of the project, it is not directly incorporated into the masterplan; however, the preferred option will be considered within the development of the masterplan as it will influence the route of the watercourse diversions in this area.

7.2.2 Further study, engineering feasibility and design development will be undertaken to refine the design of a RSMH facility in the west area based on the configuration of the RSMH 5. This will include a more detailed study of the constraints in the west location area (identified in Figure 3.2), consideration of feedback from the summer 2024 consultation and design development to optimise the design (layout, size and shape) of the RSMH (including further consideration of the materials handling requirements / stockpile capacity). This study will seek to optimise the size and shape of the option footprint and will inform the design for consultation in 2025.

7.2.3 Further study and design development referenced in the above paragraph will be undertaken in tandem with further liaison with Network Rail to ensure the acceptability of the design in terms of connections to the Great Western Mainline and signalling arrangements.

7.2.4 Steps for further study and design development include but are not limited to the following.

- A study of the area within and surrounding RSMH 4a, 4b and 5 will be undertaken to map the constraints and better understand the area, including further investigation into existing utilities and confirmation of existing land uses, to inform engineering feasibility and design development of RSMH 5.
- The design of RSMH 5 will be developed to identify the optimum configuration, balancing operational requirements for the RSMH area (including materials handling / stockpiling requirements) with impact on the operational railway, local wildlife / habitat, and local properties and land uses.
- The preliminary assessment undertaken at Gate 2 to estimate the capacity available for two freight train deliveries a day within the timetable for the Great Western Mainline will be reviewed and updated.
- For the purpose of this options appraisal, nominal noise mitigation has been included in all options; however, all options perform poorly in terms of noise impact. Further work will be undertaken to identify the most suitable noise mitigation to be incorporated. This may include restrictions on working hours as well as physical noise barriers.
- Further work following on from the initial assessment, which explored the feasibility of signalling modifications required for the options, will be undertaken, including progressing with the design development of RSMH 5 to resolve any concerns regarding the potential impact on passenger services.
- Further discussion with Network Rail including:
  - Confirmation of the assessment of the options and the identification of the preferred option as outlined in this report.
  - Confirmation of Network Rail requirements for the preferred option to be incorporated into the design development stage.
  - Ongoing liaison throughout the design development stage.
- RSMH 5 will be taken forwards for formal sign off by Network Rail at project milestone ES2, which is defined as ‘constraints identified and project feasibility confirmed’. This is part of the ‘Strategic Development & Project Selection’ phase of Network Rail's project management process PACE (Project Acceleration in a Controlled Environment). After ES2, the design will be developed/refined under the same National Rail framework, using National Rail feedback, to get their sign off at project milestones ES3 (‘Single option identified and endorsed’) and ES4 (‘Approval in Principal’), before RAPID Gate 4 in Q1 2026.
- Many of the assessments under the environment and community, planning and land themes in this options appraisal are based on desktop studies. For the preferred option, these will be validated (particularly in relation to environmental issues) with field surveys and contact with relevant stakeholders. As shown in Figure 1.1, environmental appraisal / impact

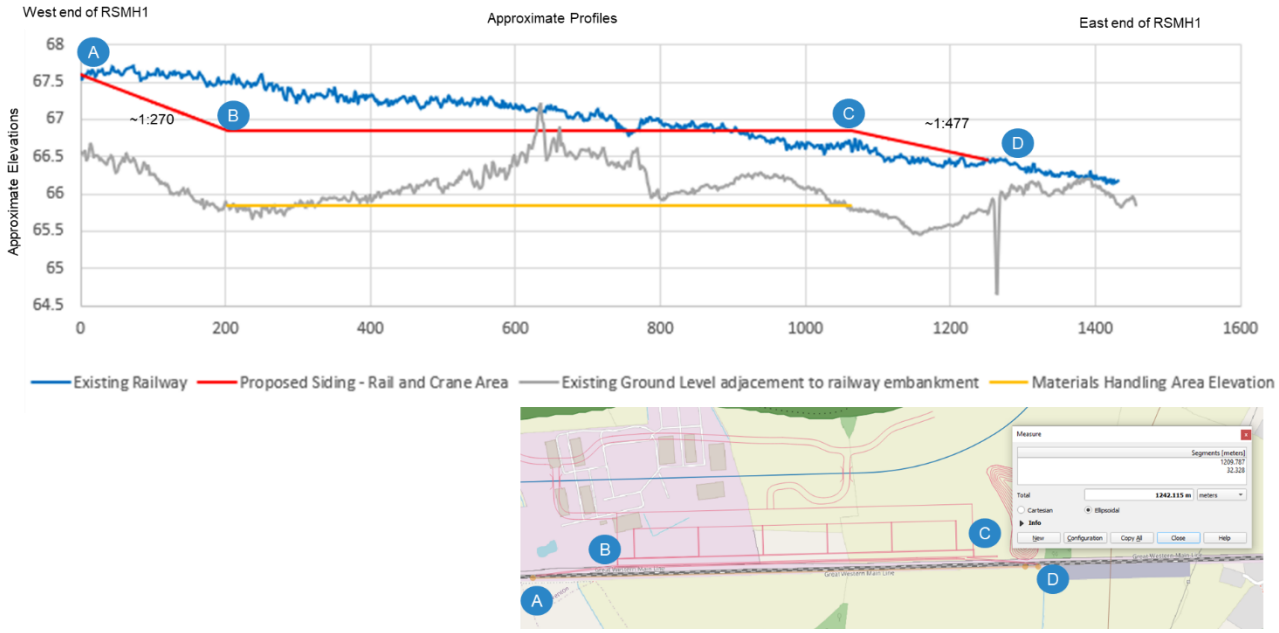
assessment will be undertaken as part of the upcoming stage 5 (design development) in the SESRO Design Development Process.

7.2.5 As more information is identified and designs are developed it is likely that information and options definition will diverge from the information used for this appraisal. In this instance, further backchecking of this options appraisal will be required as outlined in Section 1.3.

Appendix A RSMH 1 Indicative Longitudinal Section

7.2.6 Figure 7.2 shows that the crane platform for RSMH 1 is 1m higher than the materials handling area. It also shows that the track off the Great Western Mainline slopes down to the level (flat) siding area and the track which connects back onto the railway slopes down again. A suitable trapping arrangement will be required to ensure that in the event of brake failure, trains would be prevented from rolling onto the mainline. If this option is selected, further details of trapping arrangement will be developed during the design development stage.

Figure 7.2: RSMH 1 Indicative Longitudinal Section

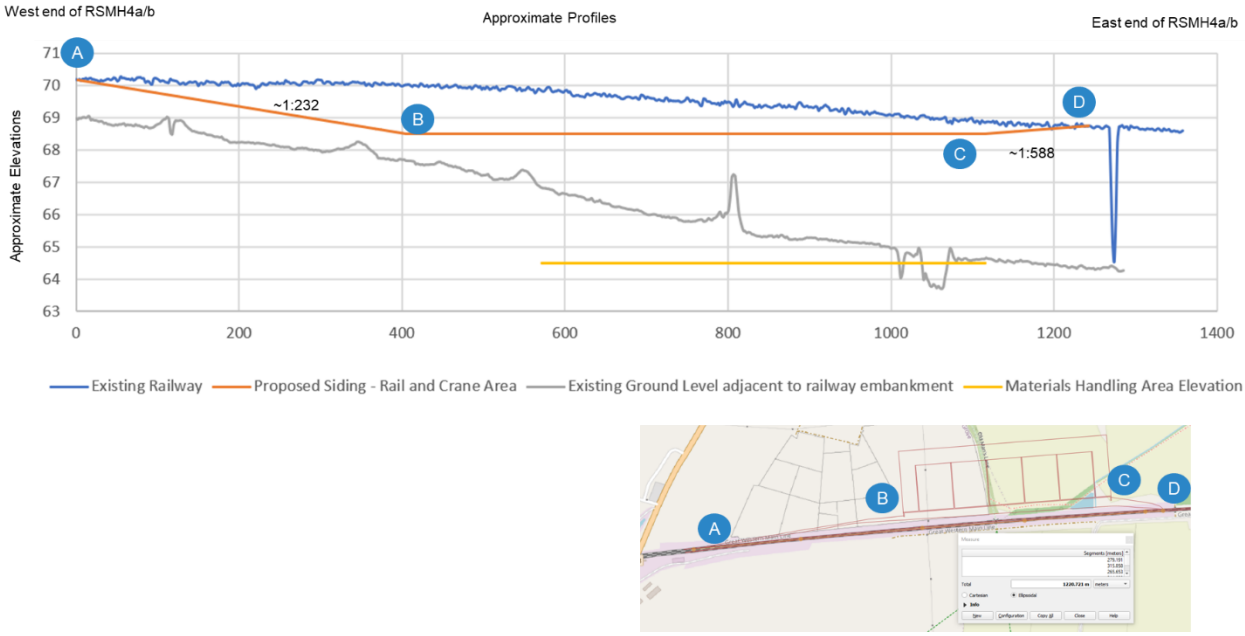


Source: Thames Water Internal, 2024

Appendix B RSMH 4a and RSMH 4b Indicative Longitudinal Section

7.2.7 Figure 7.3 shows that the crane platform for RSMH 4a and 4b are 4m higher than the materials handling area. It also shows that the track off the Great Western Mainline slopes down to the level (flat) siding area and the track slopes up to connect back onto the railway.

Figure 7.3: RSMH 4a and 4b Longitudinal Section

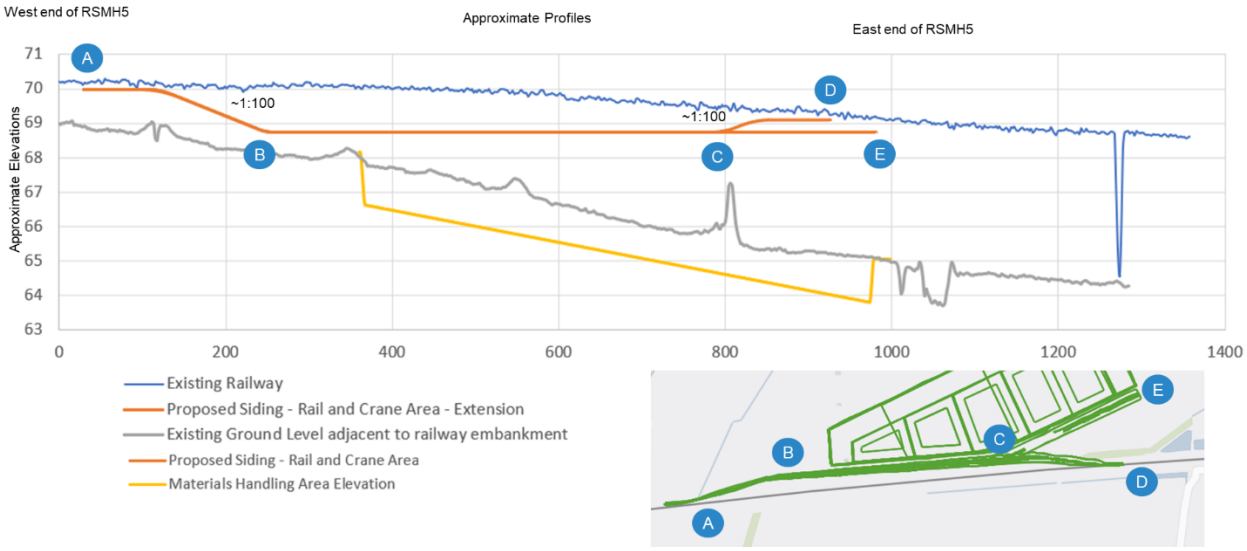


Source: Thames Water Internal, 2024

Appendix C RSMH 5 Indicative Longitudinal Section

7.2.8 Figure 7.3 shows a crane platform for RSMH 5 ranging from 2 - 5m higher than the sloped materials handling area. It also shows that the track off the Great Western Mainline slopes down to the level (flat) siding area and the track slopes up to connect back onto the railway.

Figure 7.4: RSMH 5 Indicative Longitudinal Section



Source: Thames Water Internal, 2024

Appendix D RSMH 1 Criteria Workbook

RSMH 1

Criteria code	Criteria Description	Method of Assessment	RAG	Description of RAG	Narrative	Sub-Theme
Design Acceptance						
ENG1	Network Rail - Risk that Network Rail would not accept the option	Expert judgement	R	High risk that Network Rail would not accept the option	The SESRO project team understand that RSMH 1 is unlikely to be accepted by Network Rail given the impact on operation of the Great Western Mainline and the potential impact on highway users of the level crossings. The operation of RSMH 1 carries a high risk of disruption to other services and timetabling on the Great Western Mainline from SESRO freight trains running at reduced speeds over the two-track railway section as they decelerate into RSMH 1. Since RSMH 1 is located close to the level crossings, freight trains leaving to the east will not have reached maximum speed when travelling through the Causeway and Stocks Lane MCB-CCTW level crossings, increasing the barrier-down time for trains on the level crossings.	Design Acceptance
Constructability						
CON1	Safety - Risk of endangering construction workers or members of the public during construction e.g. water, ground, height, rail, road and utilities	Look at programme and list types of construction involved. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be constructed safely but enhanced control measures required	Working next to the railway increases risk, while the option is considered to be deliverable, it would requires extra control measures. Option 1 doesn't have a raised embankment.	Health and Safety
CON2A	Programme - Duration, longest /shortest, but also consider whether the longer duration has an impact on the overall scheme programme	Compare differences in the programmes which would materialise from different options. Consider earthworks seasons.	G	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.	Option 1 does not necessitate significant earthworks, which has a positive impact on the construction programme duration. Additionally, this option does not require the construction of a raised embankment or retaining walls	Programme
CON2B	Programme - Opportunities for construction programme acceleration through efficiencies	Compare differences in the programmes which would materialise from different options.	A	The option has limited potential to introduce programme efficiencies and reduce the construction programme	There is a potential opportunity for the acceleration of the construction programme for Option 1 if construction access off the existing Steventon to East Hanney Road is allowable.	Programme
CON2C	Programme - Dependencies i.e. proximity or physical relationships between elements of scope that introduce programme dependencies	Is the options on the critical path? Will it impact other critical activities?	A	Several major dependencies/ multiple minor dependencies	Option 1 requires a Gas diversion which would probably require 18 months minimum which would need approval from SGN and Network Rail for a undertrack crossing (UTX). A415 to SESRO Access Road / perimeter haul roads must be constructed to gain access to the rail siding; and Steventon to East Hanney Road diversion interconnecting haul roads must pass over or under (with temporary bridges). In addition, Option 1 has a close proximity to the reservoir embankment and watercourse diversion. Contaminated land remediation on the MOD / industrial area. Connection to the existing Network Rail infrastructure at either end of the siding requires possessions. Further Network Rail possessions will be required for the online OLE, signalling and S&C installation.	Programme
CON2D	Programme - Risk	Are there items in the construction which have a significant programme risk	G	Minor programme risk	Option 1 does not have significant earthworks. No items anticipated to introduce programme risk.	Programme
CON2E	Programme - Use of existing assets to reduce the amount of construction required	Identify if any existing assets can be used	G	Option makes use of existing assets	Option 1 is likely to be able to make use of the made ground at the industrial units. However, could have contaminated land impacts.	Programme
CON3A	Logistics - Space available for construction and materials storage	Determine space constraints using GIS and options layouts from option definition.	G	Adequate space	Option 1 has adequate space for the estimated amount of material delivery required. While the Steventon to East Hanney Road diversion is likely to need to be constructed in the area between the siding and the reservoir embankment, there is more scope for extending the length of the siding to the east to create more space than to the north.	Logistics
CON3B	Logistics - Suitable and efficient access for construction workers, deliveries and waste removal including minimisation of lengths of new roads for access during construction	Determine method of access using GIS and options layouts from option definition.	G	Adequate access is available with no or minimal additional road length required for construction of the option.	Option 1 includes 40m width around the materials handling areas for haul roads / welfare facilities. The location of the option lends itself well to a one-way system for material placement.	Logistics
CON3C	Logistics - Import of materials or resources during construction	Use quantity estimates to assess different options.	G	No (or minimal) import of materials required.	Option 1 requires the import of materials for concrete wall, however does not require import of sheet piles.	Logistics
CON3D	Logistics - Haulage distance required for construction materials arrival on site to the placement location	Determine length using GIS and options layouts from option definition.	G	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.	The haulage distance from the materials handling area to the outer perimeter haulage road is approximately 200m. This is regardless of the reservoir footprint option selected.	Logistics
CON3E	Logistics - Vehicle movements	Use vehicle movement estimates to assess different options.	G	Construction unlikely to add vehicle movements.	Option 1 does not require earthworks / sheet piles, which is unlikely to add vehicle movements required for construction.	Logistics
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	Determine space using GIS and options layouts from option definition.	A	Sufficient capacity for required storage, but there is limited additional capacity, and the double handling of material cannot be entirely minimised	Option 1 has been developed to store up to ~1 year of imported material. For Option 1, there is scope for extending the length of the siding to the east to create space than to the north, which could be restricted by the Steventon to East Hanney Road and utility diversions.	Logistics
CON4A	Construction Complexity - Temporary conditions/works requirements e.g. embankment slope stability and moisture outside of placement seasons.	Expert Judgement	G	Temporary Works requirements minimal and can be used in the permanent state and no extension to the programme	Due to no earthworks requirement it is considered that Option 1 has low temporary works complexity. There will be temporary bridges over the Steventon to East Hanney Road Diversion - but not major. It is very likely that the option will require diversion of the existing intermediate pressure gas main, including an undertrack crossing (UTX).	Construction complexity
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	Determine using GIS and options layouts from option definition.	A	Option requires a moderately complex (mitigation likely) and/or moderate number of additional structures and/or modification to existing structures.	Some risk of modifications required for level crossings in Steventon for Option 1. Option 1 will require 2 bridges over the Steventon to East Hanney diversion road.	Construction complexity
CON4D	Construction Complexity - Volume and / or complexity of rail signalling interventions required	Review technical study to determine RAG assessment	A	Moderate modifications and additional infrastructure required	Cost estimate for signalling modifications associated with this option amount to £4.65m.	Construction complexity
CON5B	3rd Party Impact - Potential to disrupt existing rail network during enabling works and construction	Expert judgement	A	Disruption likely to be moderate	Based on Costain estimate would require ~268hr possession. Gas main diversion would refer a UTX and so discussions with Network Rail.	3rd Party Impact
CON7A	Ground - Terrain of site, and implications for the need for earthworks and engineered slopes	Use of lidar and civil 3D models to assess amount/location of earthworks required	G	Terrain is favourable to the design of assets and therefore reduces the amount of earthworks required	RSMH1 is at the same elevation as the railway - reducing the amount of earthworks required.	Construction complexity
CON7B	Ground - Risk of unexpected conditions	Use of expert judgement based on comparable areas	G	Low exposure to risk of unexpected ground conditions.	Likely to be within Gault Clay	Construction complexity

CON7C	Ground - Impact of ground conditions on the complexity of design and construction	Use of expert judgement	G	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	Part of Option 1 site is likely to be made ground	Construction complexity
CON7D	Ground - Risk of ground settlement above line of tunnel affecting other structures/houses	Use of expert judgement	G	No risk of ground settlement affecting other structures	Risk of settlement of the existing railway line caused by the rail siding and materials handling area would be possible to prevent through design.	Construction complexity
Operability						
OPS1A	Safety - Risk of endangering operational staff, visitors or members of the public during operation	Look at operational activities and public access. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be operated safely but enhanced control measures required	This option will have enhanced control measures during operation. Option 1 would have a close proximity to the Steventon to East Hanney Road Diversion (with temporary access bridges above).	Health and Safety
OPS1B	Safety - Access and egress for operational staff, visitors, deliveries and waste removal during normal operations and emergencies	Expert judgement	A	Access/egress can be provided, however it is challenging / restricted	Access / egress would be controlled for all options. Option 1 provides less opportunity for access route to be constructed underneath the rail sidings.	Health and Safety
OPS2A	Maintenance - Ease of maintenance	Expert judgement	A	Majority of maintenance activities could be undertaken during moderate closure periods and / or with moderate disruption	Option 1 provides less opportunity for maintenance access under the rail sidings. Therefore, may be more chance of closure periods for maintenance access.	Operational Complexity
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)	Review GIS supported by expert judgement	G	Option is outside the flood zone	Option 1 is outside the flood zone 2/3.	Operational Resilience
OPS7A	Sustainability - Reuse of assets or temporary works for permanent items, e.g. materials storage slab, haulage roads, compound car park	Expert judgement	A	Some potential for reuse of assets/temporary works	Could re-build the storage units. May be an opportunity for Option 1 to be partially converted to car parking (depending final transport strategy). May also be an opportunity for Option 1 to become the location for the T2ST water treatment works (if it is determined that this cannot be at the same location as the potential SWOX / SWA treatment works) The additional track that would be laid as part of Option 1 could be utilised in a future scheme to extend the 4-track from Wantage towards Steventon.	Operational Resilience
OPS7B	Operability - Power required for operational energy use	Calculated power requirement for the option	G	Option requires limited amount of energy to operate	Due to the shorter haulage distances for Option 1 it is likely to be less energy intensive to operate the rail siding.	Operational Resilience
OPS8B	3rd Party Impact - Potential to disrupt existing rail network during operation	Expert judgement	R	Disruption likely to be significant	As Option 1 relies on the 2-track section - there is likely to be disruption to passenger trains during operation of the rail siding.	Transport Planning
Relative Costs						
COS1	Capex cost of the option	Cost estimate calculation for each option.	G	CAPEX estimated to result in an increase of <1% of the CAPEX for the overall SESRO project compared to the lowest cost option	Initial high-level cost estimate indicates that the range in costs for rail and materials handling options represent c 4% of total SESRO costs. Option 1 has the least capital cost and operational cost, due to limited earthworks and shorter haulage distances.	Cost
COS3	Opportunity for cost-sharing with other SROs, NSIPs and local non-SRO schemes/plans, e.g. STT, T2ST, SWOX/Farmoor, Abingdon flood storage	Cost estimate calculation for each option.	A	Limited opportunities identified for cost saving.	Unlikely for cost sharing with other rail infrastructure activities at Option 1. However, may be a potential for the site to be used by the T2ST water treatment works and / or industrial units could be rebuilt	Cost
Carbon Costs						
CAR1	Carbon costs associated to the Capex of the option	Carbon estimate calculation for each option.	G	No carbon estimate available for rail options at this time, assume correlate to CAPEX	No carbon estimate available for rail options at this time, however initial assessment shows correlation between carbon and cost, indicating option 1 is likely to have the lowest carbon cost.	Carbon
CAR3	Opportunity for mitigation e.g. smaller earthworks may lead to less carbon	Carbon estimate calculation for each option.	G	High likelihood and magnitude of mitigation opportunity.	Option 1 has the lowest fill requirement.	Carbon
Environmental Performance						
ENV1A	Minimise impacts on Special Area of Conservation	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SAC's or potential SAC's within the boundary of the proposed RSMH 1 site. The closest SAC to the rail siding is 11.5Km to the east (Little Wittenham SAC).	Biodiversity and Nature Conservation
ENV1B	Minimise impacts on Special Protection Area	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SPA's or potential SPA's within the boundary of the proposed RSMH 1 site. The closest SPA to the rail siding is Thames Basin Heaths SPA located 41Km to the south-east.	Biodiversity and Nature Conservation
ENV1C	Minimise impacts on Ramsar	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no Ramsar sites or potential Ramsar sites within the boundary of the proposed RSMH 1 site. The closest Ramsar to the rail siding is South-west London Waterbodies located 57Km to the south-east.	Biodiversity and Nature Conservation
ENV1D	Minimise impacts on Site of Special Scientific Interest	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SSSI's within the boundary of the proposed RSMH 1 site. The site is also not located within the Impact Risk Zone (IRZ) of any SSSI. The closest SSSI to the rail siding is Barrow Farm Fen SSSI located 6Km to the north.	Biodiversity and Nature Conservation
ENV1E	Minimise impacts on National Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no NNR within the boundary of the proposed RSMH 1 site. The closest NNR to the rail siding is located 8Km to the north. Cothill NNR.	Biodiversity and Nature Conservation
ENV1F	Minimise impacts on Local Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no LNR within the boundary of the proposed RSMH 1 site. The closest LNR to the rail siding is located 7.5Km to the south-east of the site. The site is called Mowbray Fields and is located near East Hagbourne.	Biodiversity and Nature Conservation
ENV2A	Minimise impacts on Ancient Woodland	Natural England Ancient Woodland Maps and Professional Judgement.	G	No ancient woodland impacted	Historic mapping indicates that there is no ancient woodland present on-site	Biodiversity and Nature Conservation
ENV2B	Minimise impacts on Ancient and Veteran Trees	Woodland Trust Ancient Tree Inventory map search and professional judgement	A	Development in close proximity with potential indirect impact to ancient or veteran trees	There are no known ancient or veteran trees present in the vicinity except an Ancient Yew in Steventon several hundred metres to the SE on the other side of the rail line. However, survey may identify trees that could be classified as ancient or veteran. Amber score given on a precautionary basis pending survey as the site partially comprises broadleaved woodland.	Biodiversity and Nature Conservation
ENV2C	Minimise impacts on Protected Trees	Check against published TPO dataset.	G	No protected trees impacted	No protected trees would be impacted.	Landscape & Visual
ENV2D	Minimise impacts on vegetation (including trees, woodland, hedges and shrubs)	Check against baseline resources and based upon high level knowledge of site from previous site visits. Professional judgement.	R	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.	Construction of the RSMH 1 rail siding will require the removal of a large area of woodland and grassland habitat. Woodland is assumed to be likely to include A or B grade trees. Hedgerows and other habitat types including waterbodies may also require removal. These habitats likely support protected and notable species including badgers, bats and great crested newts.	Biodiversity and Nature Conservation and Landscape
ENV3	Minimise impacts on Local Wildlife Sites (LWS)	Professional Judgement and LWS Citation provided by TVERC.	G	No impacts to LWS	There are no LWS within the boundary of the proposed RSMH 1 site. The closest LWS to the rail siding is located 340m to the west - The Cuttings and Hutchin's Copse LWS.	Biodiversity and Nature Conservation
ENV4A	Minimise impacts on Scheduled monuments or activities which could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	This option would not physically affect any scheduled monuments or change their setting. The nearest such designation is 3.1km to the north-east of the option	Historic Environment

ENV4B	Minimise impacts on listed buildings or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	This option would not physically affect any listed buildings and would likely result in minimal changes to the listed buildings clustered together in Steventon, with the nearest to the option being 570m to the south east	Historic Environment
ENV4C	Minimise impacts on Registered Parks and Garden or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	This option would not affect any Registered Parks and Gardens either physically or in terms of changes to their setting. The nearest RP&G is 4.8km to the north-east	Historic Environment
ENV4D	Minimise impacts on Registered Battlefields or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no Registered Battlefields in the vicinity (with the nearest lying 20km to the east) so no impacts would occur from this option	Historic Environment
ENV4E	Avoid impacts on World Heritage Sites or activities that could lead to a loss of significance, including setting	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no World Heritage Sites in the vicinity so no impacts would occur from this option. The nearest to the option is Blenheim Palace 23km to the north	Historic Environment
ENV4F	Minimise impacts on conservation areas which could result in loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	Steventon Conservation Area lies approximately 570m south east of this option, which has potential to change the setting of the asset, though visual intrusion is likely to be minimal given the local topography	Historic Environment
ENV5A	Minimise loss to non-designated built heritage	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no known non-designated assets within the option footprint so no direct physical impacts would occur	Historic Environment
ENV5B	Minimise loss to paleoenvironmental remains	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	Resource currently unknown and would require investigation to establish presence, extent and significance	Historic Environment
ENV5C	Minimise loss to non-designated historic landscapes	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	No known non-designated designed landscapes present within the option	Historic Environment
ENV5D	Minimise loss of non-designated archaeological remains	Professional judgement, incorporating the use of the IEMA's Principles of Cultural Heritage Assessment in the UK and the Chartered Institute for Archaeologists standard and guidance document for desk based assessment	R	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	Direct impacts on two known clusters of high value archaeological remains as detected from aerial interpretation and mapping studies, with an emphasis on the cluster within the eastern half of the option location.	Historic Environment
ENV6A	Minimise loss of fluvial flood storage within Flood Zone 2 or 3	Measure using GIS	G	Site is outside flood zone 2 and 3	RSMH 1 is not in any flood zone	Flood Risk
ENV6B	Minimise impacts of pluvial flood risk.	Expert judgement	G	No predicted impacts on pluvial flood risk	RSMH1 is not located in an rea with existing pluvial flooding. Although the materials handling area shall be hardstanding, assuming the drainage is designed correctly it is not expected to have an adverse impact on pluvial flooding.	Flood Risk
ENV6C	Minimise impacts of groundwater flood risk.	Checking existing national and local records	G	No predicted impacts on groundwater flood risk	Option is not considered to have a significant impact on groundwater flood risk. The options are considered to score similarly against this criteria.	Flood Risk
ENV7A	Minimise disturbance of potentially contaminated land	Checking existing national and local records	A	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	This option intersects Steventon Depot, a historical military depot, as well as being adjacent to the London – Bristol Great Western Rail trainline which represent potential sources of contamination.	Land
ENV7B	Minimise disturbance of potentially contaminated land specifically in relation to authorised and historic landfills	Checking existing national and local records	G	Not within authorised and historic landfills or previous industrial sites or within 250m of authorised and historic landfills or previous industrial sites	There is no authorised or historical landfill within 250m of this option	Land
ENV8	Minimise disturbance of land with known potential for Unexploded Ordnance (UXO)	Checking existing national and local records	A	Disturbance of a low quantity of UXO which can be easily managed / remediated. Unlikely to have significant cost or program implications	A pre-desk study assessment from Zetica acquired for Gate 2 identified various potential UXO risks across the SESRO area and recommended a detailed UXO survey .	Land
ENV9A	Minimise loss of terrestrial priority habitats (use narrative to describe type and quantum)	Use of aerial imagery, MAGIC maps and Professional Judgement	R	Priority habitat directly impacted	Habitats within the site of the RSMH1 include those which are classified as priority habitats under the NERC Act (2006). Priority habitats likely to be present include ponds, hedgerows, lowland mixed deciduous woodland and arable field margins.	Biodiversity and Nature Conservation
ENV9B	Minimise loss of aquatic priority habitats (use narrative to describe type and quantum)	Professional judgement based on knowledge of Water Framework Directive.	A	Priority habitat directly impacted but mitigation feasible	The headwaters of two watercourses will be directly impacted by the proposed works. There is the opportunity for mitigation and compensation works, for example by diverting some of the watercourses ahead of the works as part of the WWD and EWD Early Works programme so these watercourses can continue to be connected and flow into the EWD. These are small scale channels and thus mitigation should be possible.	Aquatic Environment

ENV10A	Reduce effects on North Wessex Downs National Landscape and its setting	Professional judgement.	A	National Landscape and its setting likely to be affected. Effect is unlikely to be significant.	Removal of woodland along the GWR Main Line would erode a key characteristic which currently contributes positively to the local landscape character and setting of the North Wessex Downs National Landscape. Loss of woodland would open up intervisibility between National Landscape and rail sidings/material storage and associated haul roads and noise bund, as well as the Steventon Depot. However, due to the distance and presence of solar farms locally within this part of the National Landscape setting, the effect on the landscape character and tranquillity of the National Landscape and its setting would be unlikely to be significant.	Landscape & Visual
ENV10B	Reduce effects on local landscape character	Professional judgement.	R	Effect on local landscape character is likely to be significant.	Removal of woodland along the GWR Main Line would erode a key characteristic which currently contributes positively to the local landscape character. Loss of woodland would make the Steventon Depot more noticeable in the local landscape. The rail sidings/material storage and associated haul roads and noise bund would increase the presence of existing infrastructure and further erode the generally rural landscape character and levels of tranquillity which would also be affected by noise. Effect on local landscape character potentially significant.	Landscape & Visual
ENV11A	Reduce effects on panoramic views from national trail, open access land and important viewpoints in the National Landscape	Professional judgement.	A	Effect on panoramic views from national trail, open access land and important viewpoints in National Landscape unlikely to be significant.	Material storage, noise bund, infrastructure at rail sidings and haulage traffic would be visible within some panoramic views from The Ridgeway National Trail. This would add to the presence of existing infrastructure in the panoramic views, such as solar farms, and views towards the Steventon Depot would also be opened up due to vegetation loss. However, the effect on panoramic views from the National Landscape is unlikely to be significant due to the distance and small proportion of the wider views which would be affected.	Landscape & Visual
ENV11B	Reduce effects on sensitive local visual receptors	Professional judgement.	A	Effect on local views of sensitive visual receptors unlikely to be significant.	Material storage, noise bund, infrastructure at rail sidings and haulage traffic would be visible in local views from public rights of way (PRoWs), including the Vale Way Long Distance Path, and the edge of Steventon. However, existing vegetation would filter many views (including those from the long distance path) and the more open views are already affected by the presence of infrastructure such as pylons and overhead lines, a large solar farm and the GWR Main Line. As such, the effect on these views is unlikely to be significant.	Landscape & Visual
ENV12	Minimise disturbance/encroachment into Air Quality Management Area (AQMA)	Based on an understanding of the scale and nature of activities, air quality management areas (AQMAs) were identified in close proximity to the proposed works.	G	Site is located further than 1km from AQMA OR no construction traffic must go through an AQMA	Marcham AQMA is the closest AQMA to RSMH1 and is approximately 4.8 km north of the works boundary. The anticipated construction and operational activities would likely lead to a negligible change in air quality.	Air Quality
ENV13	Minimise disturbance/encroachment into Groundwater Source Protection Zone (SPZ)	Magic maps	G	Site is within Zone 3 or not within a SPZ	The nearest SPZ is south of the town of Wantage, approximately south west of the scheme - approx. 7.5 km away from RSMH1.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	RSMH1 is located within the headwaters of this WFD waterbody. The works would result in temporary culverting of a short section of headwater tributaries that flow into the Cow Common Brook and Mere Dyke system. The culverting would be sufficiently long time to cover more than one RBMP cycles and thus it would be hard to argue that this is a temporary deterioration of quality. There is no easy mitigation for this effect and thus a low risk of WFD non-compliance related to this particular activity. However, this is considered to be localised and therefore not at a waterbody scale. That said, there is the opportunity for compensation works, for example by diverting some of the watercourses ahead of the works as part of the WWD and EWD Early Works programme so these watercourses can continue to be connected and flow into the EWD. These are small scale channels and thus mitigation should be possible.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH1 does not interact directly or indirectly with this WFD waterbody.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH1 does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH1 does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH1 does not interact directly or indirectly with this WFD waterbody	Aquatic Environment

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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Moderate adverse impacts likely; low risk to ability to attain Water Framework Directive objectives for this waterbody	RSMH1 is located within the headwaters of this WFD waterbody. The works would result in temporary culverting of a short section of headwater tributaries that flow into the Ginge Brook and Mill Brook system. The culverting would be sufficient duration to span more than one RBMP cycle and thus it would be hard to argue that this is a temporary deterioration of quality. There is no easy mitigation for this effect and thus a risk of WFD non-compliance related to this particular activity. However, this is considered to be localised and therefore not at a waterbody scale. That said, there is the opportunity for compensation works, for example by diverting some of the watercourses ahead of the works as part of the WWD and EWD Early Works programme so these watercourses can continue to be connected and flow into the EWD. These are small scale channels and thus mitigation should be possible.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH1 does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
ENV15A	Maximise potential for future environmental benefits (terrestrial), e.g. increase tree planting	Professional Judgement	A	Site allows some additional environmental benefits to be realised	No specific space for environmental benefits and removes woodland but there may be potential for environmental benefits	Biodiversity and nature conservation
ENV15B	Maximise potential for future environmental benefits (aquatic), e.g. increase wetlands area	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Site allows some additional environmental benefits to be realised	See comment on ENV14A. Wider environmental benefits may be realised for the EWD provided the works are sequenced appropriately and new habitats are better quality than the current baseline.	Aquatic Environment
ENV16	Maximise flexibility in routing diverted watercourses so their habitats can be of sufficiently high quality to contribute to catchment Water Framework Directive objectives	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Site allows some flexibility in routing watercourses / Good quality habitat options are available	See comment on ENV14A. Benefits may be realised for the EWD provided the works are sequenced appropriately and new habitats are better quality than the current baseline..	Aquatic Environment
ENV17	Minimise disturbance/encroachment into Local Geological Sites (LGS)	Checking existing national and local records	G	Site is located more than 250m from LGS	No LGS present	Biodiversity and nature conservation
ENV18A	Minimise impacts associated with Noise and Vibration as a consequence of the construction of the option	Based on information available at Gate 2, worst-case construction impacts from the rail sidings were predicted to be associated with material handling (see ENV18B). Impacts arising during other construction works are predicted to be no greater than those presented for ENV18B (AB Mar24)	A	Potential for significant effects but likely to be mitigated if they occur	Noise and vibration impacts would be predicted to be no greater than those presented for ENV18B. However, construction would be anticipated to be during normal hours of construction (e.g. not at night), with the exception of occasional possession works on the railway, and the nearest property is ~600m from the scheme. As such, an AMBER rating is considered appropriate for both stockpile capacity options.	Noise
ENV18B	Minimise impacts associated with Noise and Vibration as a consequence of the operation of the option	Indicative assessment with noise sensitive properties within RAG bands identified based on predicted construction noise levels during Gate 2 assessment (inc. bunding around sidings). Red band is from works site to the SOAEL+5dB distance, and Amber is from SOAEL+5dB distance to the SOAEL. Rail Sidings: Red 675m, Amber 676-1209m, Green 1210m. This is based on worst-case activity, Material Handling, which includes potential for works between 06:00 to 07:00 and was assessed using night-time noise assessment criteria at Gate 2 as a precautionary approach. The noise emission for the activity is based on G2 assumptions, with update made following review by Costain (JB 05Jun). Professional judgement used in assigning a single RAG rating for each option under review, which includes a review of the number of properties in each band and how close they are located to the RAG boundaries. Property counts do not consider screening of receptors by nearby buildings, screening at second row of properties by first row of properties. This will result in a precautionary assessment of noise impacts. NOTES: buildings to be demolished are excluded from assessment, RAG bands based on assessment approach for residential properties but all NV sensitive receptors identified at Gate 2 are included in analysis. (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Closest noise sensitive receptor to the 220,000m3 stockpile option is approximately 750m from the works site, while the closest receptor to the 370,000m3 stockpile option is approx. 600m away. At these distances, and with provision of screening bunds (to completely block line of sight), there is the potential for significant noise effects. Total property counts: Option 220,000m3 Red=0, Amber=350+; Option 370,000m3 Red=7, Amber=500+. An AMBER rating is considered appropriate for the smaller stockpile capacity option, while RED rating is considered appropriate for the larger stockpile capacity option.	Noise
ENV19A	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the construction of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	G	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.	There are 0 high sensitivity human receptors (i.e. dwellings) and between 1 - 10 low sensitivity human receptors (e.g. public footpaths) within 350 m of the RSMH1 works boundary. Its assumed the adjacent Steventon storage facility will be demolished prior to works commencing. No human receptors are evident within 50 m of proposed haulage route. There are no statutory designated sites in the vicinity of RSM1. Construction activities include the material storage bays, sidings and screening mound. Less earthworks are required for RSMH1 as it will be at the same elevation as the existing railway. At this stage, a raised crane area is not anticipated. It is considered that there are no proposed dust-generating construction activities that could not be managed using normal good practices (see IAQM construction dust guidance, 2016) to prevent significant effects at any off-site receptor. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of construction traffic required (whether accessing the site via the SESRO access road or via East Hanney / Steventon), the potential effects would likely lead to a negligible change in air quality. The appraisal score assigned is also applicable to decommissioning (demolition).	Air Quality

ENV19B	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the operation of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	G	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.	The material storage capability for RSMH1 is anticipated to be 220,000 m3 (small handling area) and 370,000 m3 (large handling area). Based on the number and sensitivity of nearby receptors, it is considered that there are no proposed dust-generating operational activities that could not be managed using normal good practices (IAQM construction dust guidance, 2016) to prevent significant effects at any off-site receptor. Operation related vehicles include one crane, dumper trucks and support vehicles. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of operational traffic required, the potential effects would likely lead to a negligible change in air quality. **Note emissions from the anticipated 2 trains per day not considered as it would likely lead to a negligible change in air quality.	Air Quality
ENV20A	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the construction of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of Steventon, in part due to lighting during night-time construction works.	Landscape & Visual
ENV20B	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the operation of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of Steventon, in part due to presence of some lighting during winter months. The material storage, noise bund and cranes would be taller and therefore more noticeable than the adjacent low-level buildings and infrastructure at Steventon Depot, which is relatively well screened by woodland in views from Steventon.	Landscape & Visual
ENV21A	Minimise impacts associated with solid discharge during construction, e.g. aggregate spills during transport from rail to site, sediment runoff from soil erosion due to excavation of borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from construction likely to be readily controlled using standard construction mitigation	Pollution
ENV21B	Minimise impacts associated with solid discharge during operation, e.g. release of sediment into surrounding environment for the reservoir maintenance such as dredging, debris removal	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from operation likely to be readily controlled using standard construction mitigation	Pollution
ENV22A	Minimise impacts associated with liquid discharge during construction, e.g. discharge of groundwater to during the excavation of the borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard construction mitigation	Pollution
ENV22B	Minimise impacts associated with liquid discharge during operation, e.g. the extent and severity of altered terrestrial and aquatic habitats in affected areas due to emergency release of water	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard mitigation	Pollution
Community and Planning Considerations						
CPC1	Distance to the nearest property that will stay during construction (metres)	GIS	G	501m plus from the nearest property	Closest property to the 220,000m3 stockpile option is approximately 750m from the works site, while the closest property to the 370,000m3 stockpile option is approx. 600m away.	Socio-Economic
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	GIS analysis of footprint, community assets, and links with residences.	G	Community access/use of community assets is not disrupted during construction	Site does not directly affect any community assets or community access. Only buildings affected are businesses at a business/storage park (to be demolished) but these are not considered assets or residential.	Socio-Economic
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	GIS analysis of footprint, community assets, and links with residences.	G	Community access/use of community assets is not disrupted during operation	Site does not directly affect any community assets or community access. Only buildings affected are businesses at a business/storage park (to be demolished) but these are not considered assets or residential.	Socio-Economic
CPC4A	Are public rights of way disrupted or adversely affected?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	G	No recreational resource / right of way are disrupted or affected. Sites with no recreational activities	Site does not directly affect recreational resource or PRoW.	Socio-Economic
CPC4B	Are there opportunities to create or improve linkages of Public Rights of Way (PRoW) and recreational routes?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	G	Links to a recreational resource / right of way of national or regional importance can be enhanced	Focus of the intervention (rail sidings) is to provide transport infrastructure for freight. Although this option minimises negative impacts on recreational resources and PRoW, it does not specifically improve these either. There is a possibility that footpaths in close proximity to the south of the trainline could be improved along with their connectivity with the reservoir, therefore creating a positive effect. This option avoids severance with the Wiltshire and Berkshire Canal that Option 4 creates and requires redirection of PRoW. Therefore, option 1 creates/improves linkages of PRoW with recreational routes.	Socio-Economic
CPC5	Maximise potential opportunity for recreational benefits	GIS analysis of PRoW, open spaces, cycle routes, canals, other forms of regional/nationally important receptors (e.g. National Cycle Routes), and community assets.	G	Option allows significant additional recreational benefits to be realised	Focus of the intervention (rail sidings) is to provide transport infrastructure for freight. Although this option minimises negative impacts on recreational resources and PRoW, it does not specifically improve these either. There is a possibility that footpaths in close proximity to the south of the trainline could be improved along with their connectivity with the reservoir , therefore creating a positive effect. This option avoids severance with the Wiltshire and Berkshire Canal that Option 4 creates and requires redirection of PRoW.	Socio-Economic
CPC6	Support the realisation of socio-economic incentives on SESRO, including employment, skills, tourism, sustainable travel, connecting people with nature and environmental education	GIS analysis of footprint, community assets, private residents, and businesses. Also awareness of overall project objectives is needed to conclude if the designs align with these.	G	Site supports the social-economic incentives of the overall scheme	Focus of the intervention (rail sidings) is to provide transport infrastructure for freight. This option minimises negative impacts on recreational resources and PRoW, therefore supporting socio-economic incentives of SESRO (tourism, sustainable travel, connecting people with nature). However, the site directly impacts businesses located just off Hanney Road, on the site of the proposed sidings which will be demolished anyway as part under the reservoir and access lost.	Socio-Economic

CPC7	Minimise overall SESRO Order Limits extent and land acquisition, without compromising SESRO needs and project benefits	Spatial comparison of land that would likely be included in the DCO Order Limits, including construction working areas, access and highways or PRoW interactions.	G	Requires minimum Order Limits extent	RSMH1 is at the closest location to the likely reservoir footprint and embankment construction works area and lies within the area currently safeguarded in the VoWH Local Plan. The potential Steventon to East Hanney road diversion route (depending on option chosen for that) and works area to construct that would be closely adjacent. RSMH1 is likely to require the least overall Order Limits extent relative to the other rail siding options.	Consenting
CPC8	Aim for consistency with published and (insofar as possible) emerging Local Plan land use allocations	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in existing and any emerging Local Plan documents and any Supplementary Planning Documents.	G	Low or no impact	No land use allocation conflicts with VoWHDC Local Plan. Lies within the SESRO safeguarded area in policies CP14 and CP14a. No land use conflicts with the consultation draft Joint Local Plan 2041. No land use allocation conflicts with the Oxfordshire County Council Minerals and Waste Local Plans. Not within the area of the South Oxfordshire District Council Local Plan.	Consenting
CPC9	Aim for consistency with any adopted Neighbourhood Plan policy applicable to the land area affected	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in any made Neighbourhood Plan.	G	Low or no impact	RSMH1 is within the area of the draft Steventon Neighbourhood Plan. The plan is still being drafted and consulted upon, and has not been submitted for examination or made.	Consenting
CPC10	Avoid development of infrastructure within specifically designated areas or their setting, as applicable (e.g. Green Belt, AONB, Common Land, Open Space)	Spatial comparison with designated sites, their settings, and the nature of development works expected.	A	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)	Not located within a specifically designated area, such as Green Belt, AONB, Common Land or Open Space. However, an adverse effect on the AONB setting is expected (see ENV10).	Consenting
CPC11	Avoid encroachment on any safeguarded land in minerals and waste policy, unless the minerals can be beneficially utilised as a result	Spatial comparison of allocated sites and review of policy wording in existing and any emerging Waste and Minerals Local Plan documents.	G	Low or no impact	Not located in minerals safeguarding area or on a site allocated for minerals or waste uses.	Consenting
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)	Review of NSIP projects on PINS's register; review of Network Rail and National Highways investment plans; spatial review of statutory undertakers' assets.	G	Low or no interaction with existing infrastructure or proposed Nationally Significant Infrastructure Project (NSIP)	No NSIPs currently registered. No known proposals from Network Rail – the East West Rail proposal does not affect the site. No known proposals from National Highways yet – RIS3 Investment Plan will be published in 2024 which will detail the A34 improvements project. Existing gas main and high-voltage line require diversion. However, these are not part of the national gas or electricity grid backbones. Telecoms line follows same path as Great Western Main Line, likely to be similarly affected (if any effect) by all rail siding options.	Consenting
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	Review of the nature of expected development works against the list of other consents and licenses developed at Gateway 2.	A	One or more additional consent/license required	Basic Asset Protection Agreement required with Network Rail. Not likely to add to extent or complexity of FRAP. Possible Notice of Demolition to the LPA for storage park buildings. Likelihood of at least one protected species relocation licence (reptiles).	Consenting
CPC14	Avoid or minimise the need for any consequential development consenting (i.e. displacement or alteration of other development)	Review of existing development within the likely land-take, its nature and scale.	A	Other existing development requires planning permission to relocate or alter	Located partly on the existing freight yard and light industrial 'Steventon Storage' site. However, this site would also be affected by the likely reservoir footprint and embankment construction area. Existing gas pipeline and HV mains would need to be diverted as pass through RSMH1. However, this can form part of the DCO associated development or potentially be delivered through statutory undertaker permitted development.	Consenting
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)	Review GIS layers for services against the options. Expert Judgement.	R	Multiple complex interfaces with others may complicate or delay progress	The location of RSMH 1 is likely to be unpreferred by Network Rail as it is on section of 2 track railway and may cause interruption to passenger trains as freight trains slow down to enter the siding. The location also requires the relocation of an existing gas main - introducing an additional interface with National Grid	Consenting
CPC16	Potential for contribution to long-term infrastructure aims	Expert judgement	A	Small contribution	Network Rail have expressed the need to update the track in this area to be 4 track. The sidings at the location of RSMH1 would partly contribute to this, but not significantly.	Consenting
CPC18	Influence the location and layout of development to maximise the use and value of existing and planned sustainable transport investment	Expert judgement	A	Option partially supports existing and planned public transport infrastructure between key destinations	RSMH 1 would have a smaller influence than RSMH4a/b on the proposals for the OCC/VoWH proposed Wantage and Grove station. After construction, the area could be turned into a car park or bus stop area for visitors wishing to access the site.	Transport Planning
Property & Land Acquisition						
PRP1	Minimise loss of sensitive properties, i.e. residential, commercial, green belt, common land, historical or community assets due to project delivery	Review Land allocation mapping on ArcGIS.	A	Moderate or temporary loss of sensitive properties	Employment land will be affected, however, asset would have to be removed as part of the overall scheme.	Property & Land Acquisition
PRP2	Minimise loss of land allocated within the Local Plan for alternative higher value / social / cultural value uses, i.e. residential, historical or community assets due project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of allocated land for higher value / social value properties	No allocations / planning applications listed.	Property & Land Acquisition
PRP3	Minimise permanent loss of best and most versatile agricultural land (grades 1, 2 and 3)	Review of agricultural grading layer on ArcGIS, based on 2019 Provisional Agricultural Land Classification	A	Results in loss of any Grade 2 agricultural land or >50% Grade 3 agricultural land	Land is allocated as grade 3	Property & Land Acquisition
PRP4	Assessment of Land and Property asset costs and associated compensation due under the Compensation Code	Review of land use / designation on ArcGIS	A	Land acquisition costs likely to be moderate. Local or regional business or other facilities affected in addition to agricultural land	Commercial land values can range from £250,000 - £500,000 in the area. Additionally, a business extinguishment claim is likely which could be in excess of the land value.	Property & Land Acquisition
PRP5	Assessment of special land considerations, including Special Category Land (SCL) including utility infrastructure, national asset protection agencies and Crown bodies	Review of affected landowners	A	Nature and number of SCL is medium / low and may represent delivery risks	Church Commissioners identified. Additional sensitive parties may also include the Hillesden Trust and Oxford University	Property & Land Acquisition
PRP6	Minimise disruptions of landowners access to their land required for temporary works	Review location in conjunction with existing road network	A	Landowners unable to access their land during construction and operation phases, but access can be provided using reasonable mitigation measures	Immediate access to the A34 from the east of the site would enable high impact on sensitive land uses during construction phase. Further detail required on access across site and construction methodology.	Property & Land Acquisition

Appendix E RSMH 4a Criteria Workbook

RSMH 4a

Criteria code	Criteria Description	Method of Assessment	RAG	Description of RAG	Narrative	Sub-Theme
Design Acceptance						
ENG1	Network Rail - Risk that Network Rail would not accept the option	Expert judgement	A	Low to Medium risk that Network Rail would not accept the option	RSMH 4a extends from the four-track section of the mainline. The decelerating freight trains on the four-track section of railway will use the up-relief, so passenger trains on the line will not be interrupted by movements into RSMH 4a. Due to the location of RSMH 4a, the speed of the freight trains (if exiting to the east) when passing the level crossings is not likely to significantly impact the barrier-down time of the level crossings compared to existing barrier-down time. RSMH 4a therefore carries a lower risk of being rejected by Network Rail.	Design Acceptance
Constructability						
CON1	Safety - Risk of endangering construction workers or members of the public during construction e.g. water, ground, height, rail, road and utilities	Look at programme and list types of construction involved. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be constructed safely but enhanced control measures required	Working alongside the railway increases risk. Although this option is feasible, it necessitates additional control measures. Construction of a raised embankment alongside the requirement for multiple signal changes introduces further safety requirements.	Health and Safety
CON2A	Programme - Duration, longest /shortest, but also consider whether the longer duration has an impact on the overall scheme programme	Compare differences in the programmes which would materialise from different options. Consider earthworks seasons.	A	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.	Option 4a necessitates the construction of a retaining wall alongside significant earthworks, which negatively impacts the construction program duration. Additionally, Option 4a involves extensive signalling requirements to facilitate trains exiting the sidings in both directions, further increasing the potential for delays in the construction programme.	Programme
CON2B	Programme - Opportunities for construction programme acceleration through efficiencies	Compare differences in the programmes which would materialise from different options.	A	The option has limited potential to introduce programme efficiencies and reduce the construction programme	There is a potential opportunity for the acceleration of the construction programme for Option 4a if construction access off the existing Steventon to East Hanney Road (or Old Mans Lane) is allowable. Noise bund would need a separate access to the south side of the railway.	Programme
CON2C	Programme - Dependencies i.e. proximity or physical relationships between elements of scope that introduce programme dependencies	Is the options on the critical path? Will it impact other critical activities?	A	Several major dependencies/ multiple minor dependencies	Option 4a requires a HV diversion which crosses over a railway line, likely to require 4-6 months minimum. A415 to SESRO Access Road / perimeter haul roads must be constructed to gain access to the rail siding; and Steventon to East Hanney Road diversion interconnecting haul roads must pass over or under (with temporary bridges). Connection to the existing Network Rail infrastructure at either end of the siding requires possessions. Further Network Rail possessions will be required for the online OLE, signalling and S&C installation.	Programme
CON2D	Programme - Risk	Are there items in the construction which have a significant programme risk	A	Moderate programme risk	Option 4a necessitates significant earthworks, multiple noise mitigation features, and a separate construction road (with access off the public road). Furthermore, additional signalling works are required at this location, introducing additional programme risk.	Programme
CON2E	Programme - Use of existing assets to reduce the amount of construction required	Identify if any existing assets can be used	A	Option does not make use of existing assets	Option 4a or 4b is within a green field site.	Programme
CON3A	Logistics - Space available for construction and materials storage	Determine space constraints using GIS and options layouts from option definition.	A	Limited / restricted space	Option 4a or 4b provide the required amount of space which is estimated for materials delivery. However, there would be limited additional space if volumes were to increase. The site is limited to the west by an area of floodplain, and to the east by access bridges.	Logistics
CON3B	Logistics - Suitable and efficient access for construction workers, deliveries and waste removal including minimisation of lengths of new roads for access during construction	Determine method of access using GIS and options layouts from option definition.	A	Due to restricted access, an additional length of road is likely required for construction of the option.	Option 4a includes a 40m width around the materials handling areas for haul roads and welfare facilities. The location of the main construction compound in the north-east corridor of the SESRO, along with Option 4a situated in the south-west of the site, necessitates a construction/haul road that spans the entire site, encircling the reservoir. Unless the SESRO site were to expand beyond the G2 boundary, or the construction compound were to relocate, this option would require the maximum possible length of construction road for deliveries and access to the main construction compound. It should be noted that the majority of this access road is not "new" as a construction road is likely to span the full perimeter of the reservoir.	Logistics
CON3C	Logistics - Import of materials or resources during construction	Use quantity estimates to assess different options.	R	Large amount of import materials required and/or one or several logistical challenges identified for the import of material.	Option 4a requires the import of materials for the sheet pile retaining wall. This would need to be imported to the site by road. The fill required to form the embankment will need to be extracted from the main construction site and transported to the rail siding location.	Logistics
CON3D	Logistics - Haulage distance required for construction materials arrival on site to the placement location	Determine length using GIS and options layouts from option definition.	A	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.	The haulage distance from the materials handling area to the outer perimeter haulage road is approximately 800m for the largest footprint option, up to 1600m for the smallest footprint option.	Logistics
CON3E	Logistics - Vehicle movements	Use vehicle movement estimates to assess different options.	A	Construction likely to add vehicle movements.	Option 4a or 4b require earthworks / sheet piles, which increases the number of vehicle movements required for construction.	Logistics
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	Determine space using GIS and options layouts from option definition.	A	Sufficient capacity for required storage, but there is limited additional capacity, and the double handling of material cannot be entirely minimised	Option 1 and 4a/b have been developed to store up to ~1 year of imported material. For Option 4a/b, there is limited scope for expanding the area due to flood zone to the west and north and railway bridge to the east.	Logistics
CON4A	Construction Complexity - Temporary conditions/works requirements e.g. embankment slope stability and moisture outside of placement seasons.	Expert Judgement	G	Temporary Works requirements minimal and can be used in the permanent state and no extension to the programme	As there are more earthworks requirements for Option 4 a/b the temporary works would be more complicated than Option 1 - but not significantly enough to score differently. It is very likely that the option will require diversion of the existing overhead 33kV powerline which crosses the GWR mainline.	Construction complexity
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	Determine using GIS and options layouts from option definition.	R	Option requires a complex and/or high number of additional structures and/or modifications to existing structures.	Some risk of a need for adjustments to existing bridges to the east of the site to facilitate Option 4a/b. Due to additional embankment would require culvert / drainage underneath. There may be a need for adjustments to existing gantry towers for Option 4a/b.	Construction complexity
CON4D	Construction Complexity - Volume and / or complexity of rail signalling interventions required	Review technical study to determine RAG assessment	R	Significant modifications and additional infrastructure required	Option 4a involves extensive signalling requirements to facilitate trains exiting the sidings in both directions. Cost estimate for signalling modifications associated with this option amount to £5.47m.	Construction complexity
CON5B	3rd Party Impact - Potential to disrupt existing rail network during enabling works and construction	Expert judgement	A	Disruption likely to be moderate	Based on Costain estimate would require ~322hr possession.	3rd Party Impact
CON7A	Ground - Terrain of site, and implications for the need for earthworks and engineered slopes	Use of lidar and civil 3D models to assess amount/location of earthworks required	A	Terrain is unfavourable to the design of assets and therefore increases the amount of earthworks required	Option 4a or 4b require embankment works to build the rail siding up to an appropriate elevation (due to the railway being on an embankment at this location). They may also require drainage of the area between existing rail embankment and new embankment for rail siding.	Construction complexity
CON7B	Ground - Risk of unexpected conditions	Use of expert judgement based on comparable areas	R	High exposure to risk of unexpected ground conditions.	Option 4a/b overlaps in the materials handling area with the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions.	Construction complexity

CON7C	Ground - Impact of ground conditions on the complexity of design and construction	Use of expert judgement	G	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	Option 4a/b requires filling in of a pond.	Construction complexity
CON7D	Ground - Risk of ground settlement above line of tunnel affecting other structures/houses	Use of expert judgement	G	No risk of ground settlement affecting other structures	Risk of settlement of the existing railway line caused by the rail siding and materials handling area is similar for all options and would be possible to prevent through design.	Construction complexity
Operability						
OPS1A	Safety - Risk of endangering operational staff, visitors or members of the public during operation	Look at operational activities and public access. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be operated safely but enhanced control measures required	Enhanced control measures during operation required. Option 4a is closer in proximity to diversion of the public right of way (Old Mans Lane), however it may be possible for the haul road to pass under a permanent bridge for the Steventon to East Hanney Road Diversion, rather than have temporary bridges.	Health and Safety
OPS1B	Safety - Access and egress for operational staff, visitors, deliveries and waste removal during normal operations and emergencies	Expert judgement	G	Access/egress can be provided	Access / egress would be controlled for all options. Opportunity for access route to be constructed through the raised embankment for Option 4a/b to improve access to each side of the rail siding	Health and Safety
OPS2A	Maintenance - Ease of maintenance	Expert judgement	G	Majority of maintenance activities could be undertaken during limited closure periods and / or with limited disruption	Opportunity for access route to be constructed through the raised embankment for Option 4a/b to improve access to each side of the rail siding	Operational Complexity
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)	Review GIS supported by expert judgement	G	Option is outside the flood zone	With relatively minor adjustments to the shape / location of the noise bund, Option 4a/b would be outside the flood zone 2/3.	Operational Resilience
OPS7A	Sustainability - Reuse of assets or temporary works for permanent items, e.g. materials storage slab, haulage roads, compound car park	Expert judgement	A	Some potential for reuse of assets/temporary works	Due to the location of Option 4a, this option could be used to support or facilitate the construction of a future Wantage and Grove Station. Network Rail may wish to keep the rail sidings should they see benefit to their operations in leaving them in after construction.	Operational Resilience
OPS7B	Operability - Power required for operational energy use	Calculated power requirement for the option	A	Option requires moderate amount of energy to operate	Due to the longer haulage distances for Option 4a/b it is likely to be more energy intensive to operate the rail siding.	Operational Resilience
OPS8B	3rd Party Impact - Potential to disrupt existing rail network during operation	Expert judgement	A	Disruption likely to be limited	Option 4a extends from the 4-track section, minimising disruption to passenger trains during operation of the rail siding. Option 4a also provides flexibility for trains to arrive or exit to both the east and west, reducing impact on the operating railway. There may be some disruption caused to users of the PRoW.	Transport Planning
Relative Costs						
COS1	Capex cost of the option	Cost estimate calculation for each option.	G	CAPEX estimated to result in an increase of <1% of the CAPEX for the overall SESRO project compared to the lowest cost option	Initial high-level cost estimate indicates that the range in costs for rail and materials handling options represent c 4% of total SESRO costs. Option 4a results in a total project cost of 0.5% more than the lowest cost RSMH option. Option 4a/b have a higher capital cost due to additional earthworks and signalling modifications. However, the difference is not a significant proportion of the overall cost of the scheme.	Cost
COS3	Opportunity for cost-sharing with other SROs, NSIPs and local non-SRO schemes/plans, e.g. STT, T2ST, SWOX/Farmoor, Abingdon flood storage	Cost estimate calculation for each option.	A	Limited opportunities identified for cost saving.	Increased chance of cost sharing with other rail infrastructure activities for Option 4a/b.	Cost
Carbon Costs						
CAR1	Carbon costs associated to the Capex of the option	Carbon estimate calculation for each option.	G	No carbon estimate available for rail options at this time, assume correlate to CAPEX	No carbon estimate available for rail options at this time, however initial assessment shows correlation between carbon and cost, indicating option 4a is likely to have the highest carbon cost.	Carbon
CAR3	Opportunity for mitigation e.g. smaller earthworks may lead to less carbon	Carbon estimate calculation for each option.	A	Limited likelihood and magnitude of mitigation opportunity.	Options 4a/b have a higher fill requirement.	Carbon
Environmental Performance						
ENV1A	Minimise impacts on Special Area of Conservation	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SAC's or potential SAC's within the boundary of the proposed RSMH 4a site. The closest SAC to the rail siding is 8.5Km to the north (Cothill Fen SAC).	Biodiversity and Nature Conservation
ENV1B	Minimise impacts on Special Protection Area	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SPA's or potential SPA's within the boundary of the proposed RSMH 4a site. The closest SPA to the rail siding is Thames Basin Heaths SPA located 43Km to the south-east.	Biodiversity and Nature Conservation
ENV1C	Minimise impacts on Ramsar	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no Ramsar sites or potential Ramsar sites within the boundary of the proposed RSMH 4a site. The closest Ramsar to the rail siding is South-west London Waterbodies located 60Km to the south-east.	Biodiversity and Nature Conservation
ENV1D	Minimise impacts on Site of Special Scientific Interest	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SSSI's within the boundary of the proposed RSMH 4a site. The site is also not located within the Impact Risk Zone (IRZ) of any SSSI. The closest SSSI to the rail siding is Frilford Heath ponds and Fens SSSI located 5.6Km to the north.	Biodiversity and Nature Conservation
ENV1E	Minimise impacts on National Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no NNR within the boundary of the proposed RSMH 4a site. The closest NNR to the rail siding is located 8.1Km to the north. Cothill NNR.	Biodiversity and Nature Conservation
ENV1F	Minimise impacts on Local Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no LNR within the boundary of the proposed RSMH 4a site. The closest LNR to the rail siding is located 8.5Km to the south-east of the site. The site is called Mowbray Fields and is located near East Hagbourne.	Biodiversity and Nature Conservation
ENV2A	Minimise impacts on Ancient Woodland	Natural England Ancient Woodland Maps and Professional Judgement.	G	No ancient woodland impacted	Historic mapping indicates that there is no ancient woodland present on-site	Biodiversity and Nature Conservation
ENV2B	Minimise impacts on Ancient and Veteran Trees	Woodland Trust Ancient Tree Inventory map search and professional judgement	A	Development in close proximity with potential indirect impact to ancient or veteran trees	There are no ancient or veteran trees recorded by the Woodland Trusts Ancient Tree Inventory on or close to this option. However, survey may identify trees that could be classified as ancient or veteran. As such, this option scores amber on a precautionary basis pending survey.	Biodiversity and Nature Conservation
ENV2C	Minimise impacts on Protected Trees	Check against published TPO dataset.	G	No protected trees impacted	No protected trees would be impacted.	Landscape & Visual
ENV2D	Minimise impacts on vegetation (including trees, woodland, hedges and shrubs)	Check against baseline resources and based upon high level knowledge of site from previous site visits. Professional judgement.	R	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.	Construction of the RSMH 4a rail siding and associated noise bunding will require the removal of a large area of woodland with some grassland and agricultural land lost too. Woodland is assumed to be likely to include A or B grade trees. Hedgerows and other habitat types including waterbodies may also require removal. These habitats likely support protected and notable species including badgers, bats and great crested newts.	Biodiversity and Nature Conservation and Landscape
ENV3	Minimise impacts on Local Wildlife Sites (LWS)	Professional Judgement and LWS Citation provided by TVERC.	R	LWS impacted and mitigation not feasible	RSMH 4a is located within The Cuttings and Hutchin's Copse LWS. The site is designated for the presence of ponds and wet woodland with ancient woodland indicator species. Initial inspection confirmed woodland indicator species and ponds suitable for GCN.	Biodiversity and Nature Conservation
ENV4A	Minimise impacts on Scheduled monuments or activities which could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No scheduled monuments present or in immediate vicinity, with the nearest lying 4.6km to the north-east of the option	Historic Environment
ENV4B	Minimise impacts on listed buildings or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	A	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	No listed buildings lie within the option footprint or adjacent to it so no direct physical impacts would occur. Nearest listed building lies approximately 350m south of the option and setting changes might occur	Historic Environment

ENV4C	Minimise impacts on Registered Parks and Garden or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No Registered Parks and Gardens present within the option or in the immediate vicinity, with the nearest RP&G 7.7km to the north-east	Historic Environment
ENV4D	Minimise impacts on Registered Battlefields or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No Registered Battlefields present within the option or in the immediate vicinity, with the nearest being 22.4km to the east	Historic Environment
ENV4E	Avoid impacts on World Heritage Sites or activities that could lead to a loss of significance, including setting	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No World Heritage Sites present, with the nearest being Blenheim Palace 23km to the north	Historic Environment
ENV4F	Minimise impacts on conservation areas which could result in loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No Conservation Areas present within the option but the East Hanney Conservation Area lies approximately 1km to the north-west. The option is unlikely to result in setting changes to the designation given the local topography and distance between the two	Historic Environment
ENV5A	Minimise loss to non-designated built heritage	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No known non-designated built heritage within the option footprint or immediately adjacent to it but this would have to be borne out with detailed assessment	Historic Environment
ENV5B	Minimise loss to paleoenvironmental remains	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	Resource presently unknown and would require investigation to establish presence, extent and significance	Historic Environment
ENV5C	Minimise loss to non-designated historic landscapes	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	No known designed landscapes within the option footprint	Historic Environment
ENV5D	Minimise loss of non-designated archaeological remains	Professional judgement, incorporating the use of the IEMA's Principles of Cultural Heritage Assessment in the UK and the Chartered Institute for Archaeologists standard and guidance document for desk based assessment	A	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	No known archaeological remains at the location of the main option area, but connecting rail routes cross through two high value clusters of non-designated archaeological remains, leading to partial loss.	Historic Environment
ENV6A	Minimise loss of fluvial flood storage within Flood Zone 2 or 3	Measure using GIS	G	Site is outside flood zone 2 and 3	RSMH 4a/b is not in any flood zone	Flood Risk
ENV6B	Minimise impacts of pluvial flood risk.	Expert judgement	G	No predicted impacts on pluvial flood risk	RSMH 4a/b is not located in an area with existing pluvial flooding. Although the materials handling area shall be hardstanding, assuming the drainage is designed correctly it is not expected to have an adverse impact on pluvial flooding.	Flood Risk
ENV6C	Minimise impacts of groundwater flood risk.	Checking existing national and local records	G	No predicted impacts on groundwater flood risk	Option is not considered to have a significant impact on groundwater flood risk. The options are considered to score similarly against this criteria.	Flood Risk
ENV7A	Minimise disturbance of potentially contaminated land	Checking existing national and local records	A	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	This site is adjacent to the London – Bristol Great Western Rail trainline which presents a potential source of contamination.	Land
ENV7B	Minimise disturbance of potentially contaminated land specifically in relation to authorised and historic landfills	Checking existing national and local records	G	Not within authorised and historic landfills or previous industrial sites or within 250m of authorised and historic landfills or previous industrial sites	There is no authorised or historical landfill within 250m of this option	Land
ENV8	Minimise disturbance of land with known potential for Unexploded Ordnance (UXO)	Checking existing national and local records	A	Disturbance of a low quantity of UXO which can be easily managed / remediated. Unlikely to have significant cost or program implications	A pre-desk study assessment from Zetica acquired for gate 2 identified various potential UXO risks across the SESRO area and recommended a detailed UXO survey of the area.	Land
ENV9A	Minimise loss of terrestrial priority habitats (use narrative to describe type and quantum)	Use of aerial imagery, MAGIC maps and Professional Judgement	R	Priority habitat directly impacted	Habitats within the site of the RSMH 4a include those which are classified as priority habitats under the NERC Act (2006). Priority habitats likely to be present include ponds, hedgerows, lowland mixed deciduous woodland and arable field margins.	Biodiversity and Nature Conservation
ENV9B	Minimise loss of aquatic priority habitats (use narrative to describe type and quantum)	Professional judgement based on knowledge of Water Framework Directive.	G	No priority habitat directly impacted by proposed option footprint	RSMH4b is located relatively close to the headwaters of this WFD waterbody (within 500 m). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning that would be no loss of aquatic habitats / watercourse.	Aquatic Environment
ENV10A	Reduce effects on North Wessex Downs National Landscape and its setting	Professional judgement.	G	National Landscape and its setting would not be affected.	Removal of vegetation belts along field boundaries and woodland along the GWR Main Line would erode a key characteristic which currently contributes positively to the setting of the North Wessex Downs National Landscape. However, other intervening woodland and urban areas in the landscape would limit the intervisibility between the National Landscape and the rail sidings/material storage and associated haul road and noise bunds. As such, the landscape character and tranquillity of the of the National Landscape and its setting would be unlikely to be affected.	Landscape & Visual
ENV10B	Reduce effects on local landscape character	Professional judgement.	R	Effect on local landscape character is likely to be significant.	Removal of vegetation belts along field boundaries and woodland along the GWR Main Line would erode a key characteristic which currently contributes positively to the local landscape character. The rail sidings/material storage and associated haul road and noise bunds would introduce new infrastructure into a part of the landscape which is generally unaffected by infrastructure. This would erode the generally rural landscape character and levels of tranquillity which would also be affected by noise. Effect on local landscape character potentially significant.	Landscape & Visual

ENV11A	Reduce effects on panoramic views from national trail, open access land and important viewpoints in the National Landscape	Professional judgement.	G	Panoramic views from national trail, open access land and important viewpoints in the National Landscape unlikely to be affected or the proposal is likely to be barely discernible in views.	The proposals would either not be visible or barely discernible in panoramic views from the National Landscape due to the topography, intervening woodland and urban areas.	Landscape & Visual
ENV11B	Reduce effects on sensitive local visual receptors	Professional judgement.	R	Effect on local views of sensitive visual receptors likely to be significant.	Material storage, noise bund, infrastructure at rail sidings and haulage traffic would be locally visible in views from PRoWs, a smaller number of isolated residential properties and the edge of East Hanney. However, the noise bunds would help to provide partial screening of the material storage. The effect would likely be significant for the most affected views.	Landscape & Visual
ENV12	Minimise disturbance/encroachment into Air Quality Management Area (AQMA)	Based on an understanding of the scale and nature of activities, air quality management areas (AQMAs) were identified in close proximity to the proposed works.	G	Site is located further than 1km from AQMA OR no construction traffic must go through an AQMA	Marcham AQMA is the closest AQMA to RSMH4a and is approximately 5.1 km north-northeast of the works boundary. The anticipated construction and operational activities would likely lead to a negligible change in air quality.	Air Quality
ENV13	Minimise disturbance/encroachment into Groundwater Source Protection Zone (SPZ)	Magic maps	G	Site is within Zone 3 or not within a SPZ	The nearest SPZ is south of the town of Wantage, approximately south west of the scheme - approx. 5 km away from RSMH4a.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	RSMH4a is located relatively close to the headwaters of this WFD waterbody (within 500 m). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning that would be no loss of aquatic habitats / watercourse. There may be a requirement for site water management which would likely require a discharge into a nearby watercourse. Best Practice pollution prevention measures e.g. settlement lagoons would likely reduce potential pollution risks. It is assumed that the haulage road does not have additional crossings over the WWD.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4a does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4a does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4a does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	RSMH4a is located relatively close to the headwaters of this WFD waterbody (within 500 m). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning that would be no loss of aquatic habitats / watercourse. There may be a requirement for site water management which would likely require a discharge into a nearby watercourse. Best Practice pollution prevention measures e.g. settlement lagoons would likely reduce potential pollution risks.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4a does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4a does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
ENV15A	Maximise potential for future environmental benefits (terrestrial), e.g. increase tree planting	Professional Judgement	R	Site allows only the minimum environmental benefits to be realised	No specific space for environmental benefits and removes part of existing pond and wet woodland LWS.	Biodiversity and nature conservation
ENV15B	Maximise potential for future environmental benefits (aquatic), e.g. increase wetlands area	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	R	Site allows only the minimum environmental benefits to be realised	No specific space for aquatic improvements identified. Some ponds lost.	Aquatic Environment
ENV16	Maximise flexibility in routing diverted watercourses so their habitats can be of sufficiently high quality to contribute to catchment Water Framework Directive objectives	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Site allows some flexibility in routing watercourses / Good quality habitat options are available	Haulage road quite close to WWD and will run to the western edge of new proposed WWD corridor, potentially reducing flexibility in design (if needed).	Aquatic Environment
ENV17	Minimise disturbance/encroachment into Local Geological Sites (LGS)	Checking existing national and local records	G	Site is located more than 250m from LGS	No LGS present	Biodiversity and nature conservation

ENV18A	Minimise impacts associated with Noise and Vibration as a consequence of the construction of the option	Based on information available at Gate 2, worst-case construction impacts from the rail sidings were predicted to be associated with material handling (see ENV18B). Impacts arising during other construction works are predicted to be no greater than those presented for ENV18B (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Noise and vibration impacts would be predicted to be no greater than those presented for ENV18B	Noise
ENV18B	Minimise impacts associated with Noise and Vibration as a consequence of the operation of the option	Indicative assessment with noise sensitive properties within RAG bands identified based on predicted construction noise levels during Gate 2 assessment (inc. bunding around sidings). Red band is from works site to the SOAEL+5dB distance, and Amber is from SOAEL+5dB distance to the SOAEL. Rail Sidings: Red 675m, Amber 676-1209m, Green 1210m. This is based on worst-case activity, Material Handling, which includes potential for works between 06:00 to 07:00 and was assessed using night-time noise assessment criteria at Gate 2 as a precautionary approach. The noise emission for the activity is based on G2 assumptions, with update made following review by Costain (JB 05Jun). Professional judgement used in assigning a single RAG rating for each option under review, which includes a review of the number of properties in each band and how close they are located to the RAG boundaries. Property counts do not consider screening of receptors by nearby buildings, screening at second row of properties by first row of properties. This will result in a precautionary assessment of noise impacts. NOTES: buildings to be demolished are excluded from assessment, RAG bands based on assessment approach for residential properties but all NV sensitive receptors identified at Gate 2 are included in analysis. (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Closest noise sensitive receptor to the 220,000m3 stockpile option is approximately 170m from the works site, while the closest receptor to the 370,000m3 stockpile option is approx. 180m away. At these distances, and with provision of screening bunds (to completely block line of sight), there is the potential for significant noise effects Total property counts: Option 220,000m3 Red=9, Amber=200+; Option 370,000m3 Red=9, Amber=180+. A RED rating is considered appropriate for both stockpile capacity options.	Noise
ENV19A	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the construction of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	A	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.	There are three high sensitivity human receptors (i.e. dwellings) within 350 m of the RSMH4a works boundary with the closest (Bradfield Barns) <180 m NW from the works boundary. There are between 1 - 10 medium sensitivity human receptors (barns and outbuildings) and between 1 - 10 low sensitivity human receptors within 350 m of RSMH4a works boundary. Furthermore, RSMH 4a is located within The Cuttings and Hutchin's Copse LWS, which is considered a low sensitivity receptor. The haulage route is potentially off Old Mans Lane or via the SESRO access. Construction activities include the material storage bays, a crane platform area, sidings and screening mounds. The platform will be constructed using sheet piles / retaining wall to provide greater visibility to the crane driver. It is considered that there are no proposed dust-generating construction activities that could not be managed using normal good practices (IAQM construction dust guidance, 2016) to prevent significant effects at any off-site receptor. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of construction traffic required (whether accessing the site via the SESRO access road or via East Hanney), the potential effects would likely lead to a negligible change in air quality. Although residual effects are unlikely, the close proximity of the human receptors means this Option is assigned an Amber score. The appraisal score assigned is also applicable to Decommissioning (demolition).	Air Quality
ENV19B	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the operation of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	A	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.	The material storage capability for RSMH4a will be 220,000 m3 (small handling area) and 370,000 m3 (large handling area). Based on the number and sensitivity of nearby receptors, it is considered that there are no proposed dust-generating operational activities that could not be managed using normal good practices (IAQM construction dust guidance, 2016) to prevent significant effects at any off-site receptor. Operation related vehicles include one crane, dumper trucks and support vehicles. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of operational traffic required, the potential effects would likely lead to a negligible change in air quality. Although residual effects are unlikely, the close proximity of the dwellings means this Option is assigned an Amber score. **Note emissions from the anticipated 2 trains per day not considered further as it would likely lead to a negligible change in air quality.	Air Quality
ENV20A	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the construction of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of East Hanney, in part due to lighting during night-time construction works.	Landscape & Visual
ENV20B	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the operation of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of East Hanney, in part due to presence of some lighting during winter months.	Landscape & Visual
ENV21A	Minimise impacts associated with solid discharge during construction, e.g. aggregate spills during transport from rail to site, sediment runoff from soil erosion due to excavation of borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from construction likely to be readily controlled using standard construction mitigation	Pollution
ENV21B	Minimise impacts associated with solid discharge during operation, e.g. release of sediment into surrounding environment for the reservoir maintenance such as dredging, debris removal	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from operation likely to be readily controlled using standard construction mitigation	Pollution
ENV22A	Minimise impacts associated with liquid discharge during construction, e.g. discharge of groundwater to during the excavation of the borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard construction mitigation	Pollution
ENV22B	Minimise impacts associated with liquid discharge during operation, e.g. the extent and severity of altered terrestrial and aquatic habitats in affected areas due to emergency release of water	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard mitigation	Pollution
Community and Planning Considerations						
CPC1	Distance to the nearest property that will stay during construction (metres)	GIS	R	Less than 250m from the nearest property	Closest property to the 220,000m3 stockpile option is approximately 170m from the works site, while the closest property to the 370,000m3 stockpile option is approx. 180m away.	Socio-Economic
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	GIS analysis of footprint, community assets, and links with residences.	G	Community access/use of community assets is not disrupted during construction	Rail siding site severs PRoW during construction but community assets would not be affected. PRoW will be severed but these do not appear to directly link to community assets. The severed PRoW also do not appear to be in close proximity to homes.	Socio-Economic

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	GIS analysis of footprint, community assets, and links with residences.	G	Community access/use of community assets is not disrupted during operation	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive.	Socio-Economic
CPC4A	Are public rights of way disrupted or adversely affected?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	A	Recreational resources / rights of way of local importance are disrupted or affected. The site is likely to affect public rights of way	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive.	Socio-Economic
CPC4B	Are there opportunities to create or improve linkages of Public Rights of Way (PRoW) and recreational routes?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	A	Links to a recreational resource / right of way of local importance can be enhanced	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. The proposed redirection of the Wiltshire and Berkshire Canal would link with the severed PRoW. Therefore it would be beneficial to improve linkages with the canal.	Socio-Economic
CPC5	Maximise potential opportunity for recreational benefits	GIS analysis of PRoW, open spaces, cycle routes, canals, other forms of regional/nationally important receptors (e.g. National Cycle Routes), and community assets.	A	Option allows some additional recreational benefits to be realised	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. The proposed redirection of the Wiltshire and Berkshire Canal would link with the severed PRoW. Therefore it would be of beneficial to improve linkages with the canal.	Socio-Economic
CPC6	Support the realisation of socio-economic incentives on SESRO, including employment, skills, tourism, sustainable travel, connecting people with nature and environmental education	GIS analysis of footprint, community assets, private residents, and businesses. Also awareness of overall project objectives is needed to conclude if the designs align with these.	A	Site supports some of the social-economic incentives of the overall scheme	Rail siding site severs PRoW during construction and potentially during operation, unless reinstated or adjusted to maintain access to the Wiltshire and Berkshire Canal. This realises benefits of employment and skills but potentially negatively affects sustainable travel and connecting people with nature.	Socio-Economic
CPC7	Minimise overall SESRO Order Limits extent and land acquisition, without compromising SESRO needs and project benefits	Spatial comparison of land that would likely be included in the DCO Order Limits, including construction working areas, access and highways or PRoW interactions.	A	Requires minor additional Order Limits extent	RSMH4a and 4b lie outside the area currently safeguarded in the VoWH Local Plan, and lie slightly further away from the area that may be used for Steventon to East Hanney road diversion (depending on option chosen for that) than RSMH1. The land required for RSMH4a and 4b including haul road is therefore likely to require a somewhat greater Order Limits extent, overall, than RSMH1. However, the difference is quite small in the context of the overall land-take and the differences between reservoir footprint options. The differences between rail-siding-specific footprints between the various options are also small in that context.	Consenting
CPC8	Aim for consistency with published and (insofar as possible) emerging Local Plan land use allocations	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in existing and any emerging Local Plan documents and any Supplementary Planning Documents.	A	Negotiation required with LPA to accommodate scheme within Local Plan	Lies outside the SESRO safeguarded area in policies CP14 and CP14a. Spatially, the land-take partially conflicts with land safeguarded for transport improvements (policies CP19 and CP19a) in the VoWHDC Local Plan. However, this is safeguarded for the possible future re-opening of Grove Railway Station (albeit there are no firm plans or funding for that at the present time) and there is potential for the legacy of the SESRO rail siding development actually to facilitate being re-purposed into a passenger rail station, thus meeting the policy objective. The same remains true for the consultation draft Joint Local Plan 2041. No land use allocation conflicts with the Oxfordshire County Council Minerals and Waste Local Plans. Not within the area of the South Oxfordshire District Council Local Plan.	Consenting
CPC9	Aim for consistency with any adopted Neighbourhood Plan policy applicable to the land area affected	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in any made Neighbourhood Plan.	G	Low or no impact	RSMH4a is outside (to the south of) the area of the draft East Hanney Neighbourhood Plan, although a potential haul road route might cross the edge of the plan area. No Neighbourhood Plans are known to be in preparation for the Grove, Ardington or Lockinge parishes, at the northernmost edges of which RSMH4a would be located.	Consenting
CPC10	Avoid development of infrastructure within specifically designated areas or their setting, as applicable (e.g. Green Belt, AONB, Common Land, Open Space)	Spatial comparison with designated sites, their settings, and the nature of development works expected.	A	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)	Not located within a specifically designated area, such as Green Belt, AONB, Common Land or Open Space. However, an adverse effect on the AONB setting is expected (see ENV10).	Consenting
CPC11	Avoid encroachment on any safeguarded land in minerals and waste policy, unless the minerals can be beneficially utilised as a result	Spatial comparison of allocated sites and review of policy wording in existing and any emerging Waste and Minerals Local Plan documents.	G	Low or no impact	Not located in minerals safeguarding area or on a site allocated for minerals or waste uses.	Consenting
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)	Review of NSIP projects on PINS's register; review of Network Rail and National Highways investment plans; spatial review of statutory undertakers' assets.	A	Negotiation required with existing infrastructure owner / Nationally Significant Infrastructure Project (NSIP) owner/promoter to accommodate scheme	No NSIPs currently registered. No known proposals from Network Rail – the East West Rail proposal does not affect the site. However, potential for either conflict with or facilitation of the mooted re-opening of Grove Railway Station, promoted by Oxfordshire County Council. No known proposals from National Highways yet – RIS3 Investment Plan will be published in 2024 which will detail the A34 improvements project. Existing gas main and high-voltage line require diversion. However, these are not part of the national gas or electricity grid backbones. Telecoms line follows same path as Great Western Main Line, likely to be similarly affected (if any effect) by all rail siding options.	Consenting
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	Review of the nature of expected development works against the list of other consents and licenses developed at Gateway 2.	A	One or more additional consent/license required	Basic Asset Protection Agreement required with Network Rail. Not likely to add to extent or complexity of FRAP. Likelihood of at least one European protected species relocation licence required (GCN).	Consenting
CPC14	Avoid or minimise the need for any consequential development consenting (i.e. displacement or alteration of other development)	Review of existing development within the likely land-take, its nature and scale.	G	No existing development requires planning permission to relocate or alter	No other built developments likely to be affected and requiring consent to be re-provided elsewhere.	Consenting
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)	Review GIS layers for services against the options. Expert judgement.	A	Several manageable interfaces with others	The location of RSMH 4a/b is likely to be preferred by Network Rail as it will be an extension of the existing 4 track railway and will likely cause less interruption to passenger trains as freight trains slow down to enter the siding. The location will likely require the relocation of an existing overhead HV line - introducing an additional interface with the local DNO.	Consenting
CPC16	Potential for contribution to long-term infrastructure aims	Expert judgement	G	Large contribution	OCC and VoWH have plans for a Wantage and Grove Station. The track extension and infrastructure left behind by RSMH 4a/b after construction has potential to be adopted by the scheme.	Consenting
CPC18	Influence the location and layout of development to maximise the use and value of existing and planned sustainable transport investment	Expert judgement	G	Option supports existing and planned public transport infrastructure between key destinations	RSMH 4a/b would have a bigger influence than RSMH1 on the proposals for the OCC/VoWH proposed Wantage and Grove station. After construction, the area could be adopted as part of the Wantage and Grove station scheme.	Transport Planning
Property & Land Acquisition						

PRP1	Minimise loss of sensitive properties, i.e. residential, commercial, green belt, common land, historical or community assets due to project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of sensitive properties	Land is agricultural land.	Property & Land Acquisition
PRP2	Minimise loss of land allocated within the Local Plan for alternative higher value / social / cultural value uses, i.e. residential, historical or community assets due project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of allocated land for higher value / social value properties	Allocation is not anticipated to be confounded by the proposals. Design and engagement may enable cohesion between parties.	Property & Land Acquisition
PRP3	Minimise permanent loss of best and most versatile agricultural land (grades 1, 2 and 3)	Review of agricultural grading layer on ArcGIS, based on 2019 Provisional Agricultural Land Classification	G	No Grade 1 or 2 agricultural land is affected and loss of <50% Grade 3 agricultural land	Option 4 - Approx. 39% Grade 3 61% Grade 4 Option 4 - Approx. 33% Grade 3 67% Grade 4	Property & Land Acquisition
PRP4	Assessment of Land and Property asset costs and associated compensation due under the Compensation Code	Review of land use / designation on ArcGIS	G	Land acquisition costs likely to be relatively low. Only agricultural land and isolated properties affected	Agricultural land values can range from £8,000 - 14,000 in the area. Landowners may be eligible for Severance claims depending on design and farm practices.	Property & Land Acquisition
PRP5	Assessment of special land considerations, including Special Category Land (SCL) including utility infrastructure, national asset protection agencies and Crown bodies	Review of affected landowners	G	No SCL on identified option	No Special Category landowners are identified.	Property & Land Acquisition
PRP6	Minimise disruptions of landowners access to their land required for temporary works	Review location in conjunction with existing road network	G	Landowners able to access their land during construction and operation phases	Immediate access west to the A338 would enable low impact on sensitive land uses during construction phase. Further detail required on access across site and construction methodology.	Property & Land Acquisition

Appendix F RSMH 4b Criteria Workbook

RSMH 4b

Criteria code	Criteria Description	Method of Assessment	RAG	Description of RAG	Narrative	Sub-Theme
Design Acceptance						
ENG1	Network Rail - Risk that Network Rail would not accept the option	Expert judgement	A	Low to Medium risk that Network Rail would not accept the option	RSMH 4b extends from the four-track section of the mainline. The decelerating freight trains on the four-track section of railway will use the up-relief, so passenger trains on the line will not be interrupted by movements into RSMH 4b. Due to the location of RSMH 4b, the speed of the freight trains when passing the Causeway and Stocks Lane MCB-CCTV level crossings is not likely to significantly impact the barrier-down time of the level crossings compared to existing barrier-down time. RSMH 4b therefore carries a lower risk of being rejected by Network Rail.	Design Acceptance
Constructability						
CON1	Safety - Risk of endangering construction workers or members of the public during construction e.g. water, ground, height, rail, road and utilities	Look at programme and list types of construction involved. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be constructed safely but enhanced control measures required	Working alongside the railway increases risk. Although this option is feasible, it necessitates additional control measures due to the construction of a raised embankment .	Health and Safety
CON2A	Programme - Duration, longest /shortest, but also consider whether the longer duration has an impact on the overall scheme programme	Compare differences in the programmes which would materialise from different options. Consider earthworks seasons.	A	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.	Option 4b requires the construction of a retaining wall alongside significant earthworks, which may increase the construction programme duration. However, the signalling requirements associated with this option are minimal since trains would only exit the sidings in one direction.	Programme
CON2B	Programme - Opportunities for construction programme acceleration through efficiencies	Compare differences in the programmes which would materialise from different options.	A	The option has limited potential to introduce programme efficiencies and reduce the construction programme	There is a potential opportunity for the acceleration of the construction programme for Option 4a if construction access off the existing Steventon to East Hanney Road (or Old Mans Lane) is allowable. Noise bund would need a separate access to the south side of the railway.	Programme
CON2C	Programme - Dependencies i.e. proximity or physical relationships between elements of scope that introduce programme dependencies	Is the options on the critical path? Will it impact other critical activities?	A	Several major dependencies/ multiple minor dependencies	Option 4b requires a HV diversion which crosses over a railway line, likely to require 4-6 months minimum. A415 to SESRO Access Road / perimeter haul roads must be constructed to gain access to the rail siding; and Steventon to East Hanney Road diversion interconnecting haul roads must pass over or under (with temporary bridges). Connection to the existing Network Rail infrastructure at either end of the siding requires possessions. Further Network Rail possessions will be required for the online OLE, signalling and S&C installation.	Programme
CON2D	Programme - Risk	Are there items in the construction which have a significant programme risk	A	Moderate programme risk	Option 4a necessitates significant earthworks, multiple noise mitigation features, and a separate construction road (with access off the public road), introducing additional programme risk.	Programme
CON2E	Programme - Use of existing assets to reduce the amount of construction required	Identify if any existing assets can be used	A	Option does not make use of existing assets	Option 4a or 4b is within a green field site.	Programme
CON3A	Logistics - Space available for construction and materials storage	Determine space constraints using GIS and options layouts from option definition.	A	Limited / restricted space	Option 4a or 4b provide the required amount of space which is estimated for materials delivery. However, there would be limited additional space if volumes were to increase. The site is limited to the west by an area of floodplain, and to the east by access bridges.	Logistics
CON3B	Logistics - Suitable and efficient access for construction workers, deliveries and waste removal including minimisation of lengths of new roads for access during construction	Determine method of access using GIS and options layouts from option definition.	A	Due to restricted access, an additional length of road is likely required for construction of the option.	Option 4a includes a 40m width around the materials handling areas for haul roads and welfare facilities. The location of the main construction compound in the north-east corridor of the SESRO, along with Option 4a situated in the south-west of the site, necessitates a construction/haul road that spans the entire site, encircling the reservoir. Unless the SESRO site were to expand beyond the G2 boundary, or the construction compound were to relocate, this option would require the maximum possible length of construction road for deliveries and access to the main construction compound. It should be noted that the majority of this access road is not "new" as a construction road is likely to span the full perimeter of the reservoir.	Logistics
CON3C	Logistics - Import of materials or resources during construction	Use quantity estimates to assess different options.	R	Large amount of import materials required and/or one or several logistical challenges identified for the import of material.	Option 4a requires the import of materials for the sheet pile retaining wall. This would need to be imported to the site by road. The fill required to form the embankment will need to be extracted from the main construction site and transported to the rail siding location.	Logistics
CON3D	Logistics - Haulage distance required for construction materials arrival on site to the placement location	Determine length using GIS and options layouts from option definition.	A	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.	The haulage distance from the materials handling area to the outer perimeter haulage road is approximately 800m for the largest footprint option, up to 1600m for the smallest footprint option.	Logistics
CON3E	Logistics - Vehicle movements	Use vehicle movement estimates to assess different options.	A	Construction likely to add vehicle movements.	Option 4a or 4b require earthworks / sheet piles, which increases the number of vehicle movements required for construction.	Logistics
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	Determine space using GIS and options layouts from option definition.	A	Sufficient capacity for required storage, but there is limited additional capacity, and the double handling of material cannot be entirely minimised	Option 1 and 4a/b have been developed to store up to ~1 year of imported material. For Option 4a/b, there is limited scope for expanding the area due to flood zone to the west and north and railway bridge to the east.	Logistics
CON4A	Construction Complexity - Temporary conditions/works requirements e.g. embankment slope stability and moisture outside of placement seasons.	Expert Judgement	G	Temporary Works requirements minimal and can be used in the permanent state and no extension to the programme	As there are more earthworks requirements for Option 4 a/b the temporary works would be more complicated than Option 1 - but not significantly enough to score differently. It is very likely that the option will require diversion of the existing overhead 33kV powerline which crosses the GWR mainline.	Construction complexity
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	Determine using GIS and options layouts from option definition.	R	Option requires a complex and/or high number of additional structures and/or modifications to existing structures.	Some risk of a need for adjustments to existing bridges to the east of the site to facilitate Option 4a/b. Due to additional embankment would require culvert / drainage underneath. There may be a need for adjustments to existing gantry towers for Option 4a/b.	Construction complexity
CON4D	Construction Complexity - Volume and / or complexity of rail signalling interventions required	Review technical study to determine RAG assessment	A	Moderate modifications and additional infrastructure required	Signalling requirements associated with this option are reduced since trains would only exit the sidings in one direction. Cost estimate for signalling modifications associated with this option amount to £4.67m.	Construction complexity

CON5B	3rd Party Impact - Potential to disrupt existing rail network during enabling works and construction	Expert judgement	A	Disruption likely to be moderate	Based on Costain estimate would require ~268hr possession.	3rd Party Impact
CON7A	Ground - Terrain of site, and implications for the need for earthworks and engineered slopes	Use of lidar and civil 3D models to assess amount/location of earthworks required	A	Terrain is unfavourable to the design of assets and therefore increases the amount of earthworks required	Option 4a or 4b require embankment works to build the rail siding up to an appropriate elevation (due to the railway being on an embankment at this location). They may also require drainage of the area between existing rail embankment and new embankment for rail siding.	Construction complexity
CON7B	Ground - Risk of unexpected conditions	Use of expert judgement based on comparable areas	R	High exposure to risk of unexpected ground conditions.	Option 4a/b overlaps in the materials handling area with the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions.	Construction complexity
CON7C	Ground - Impact of ground conditions on the complexity of design and construction	Use of expert judgement	G	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	Option 4a/b requires filling in of a pond - but not seen as a major issue / differentiator.	Construction complexity
CON7D	Ground - Risk of ground settlement above line of tunnel affecting other structures/houses	Use of expert judgement	G	No risk of ground settlement affecting other structures	Risk of settlement of the existing railway line caused by the rail siding and materials handling area is similar for all options and would be possible to prevent through design.	Construction complexity
Operability						
OPS1A	Safety - Risk of endangering operational staff, visitors or members of the public during operation	Look at operational activities and public access. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be operated safely but enhanced control measures required	Enhanced control measures during operation required. Option 4b is closer in proximity to diversion of the public right of way (Old Mans Lane), however it may be possible for the haul road to pass under a permanent bridge for the Steventon to East Hanney Road Diversion, rather than have temporary bridges.	Health and Safety
OPS1B	Safety - Access and egress for operational staff, visitors, deliveries and waste removal during normal operations and emergencies	Expert judgement	G	Access/egress can be provided	Access / egress would be controlled for all options. Opportunity for access route to be constructed through the raised embankment for Option 4a/b to improve access to each side of the rail siding.	Health and Safety
OPS2A	Maintenance - Ease of maintenance	Expert judgement	G	Majority of maintenance activities could be undertaken during limited closure periods and / or with limited disruption	Opportunity for access route to be constructed through the raised embankment for Option 4a/b to improve access to each side of the rail siding.	Operational Complexity
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)	Review GIS supported by expert judgement	G	Option is outside the flood zone	With relatively minor adjustments to the shape / location of the noise bund, Option 4a/b would be outside the flood zone 2/3.	Operational Resilience
OPS7A	Sustainability - Reuse of assets or temporary works for permanent items, e.g. materials storage slab, haulage roads, compound car park	Expert judgement	A	Some potential for reuse of assets/temporary works	Due to the location of Option 4a, this option could be used to support or facilitate the construction of a future Wantage and Grove Station. Network Rail may wish to keep the rail sidings should they see benefit to their operations in leaving them in after construction.	Operational Resilience
OPS7B	Operability - Power required for operational energy use	Calculated power requirement for the option	A	Option requires moderate amount of energy to operate	Due to the longer haulage distances for Option 4a/b it is likely to be more energy intensive to operate the rail siding.	Operational Resilience
OPS8B	3rd Party Impact - Potential to disrupt existing rail network during operation	Expert judgement	A	Disruption likely to be limited	Option 4b extends from the 4-track section, minimising disruption to passenger trains during operation of the rail siding. There may be some disruption caused to users of the PRoW.	Transport Planning
Relative Costs						
COS1	Capex cost of the option	Cost estimate calculation for each option.	G	CAPEX estimated to result in an increase of <1% of the CAPEX for the overall SESRO project compared to the lowest cost option	Initial high-level cost estimate indicates that the range in costs for rail and materials handling options represent c 4% of total SESRO costs. Option 4b results in a total project cost of 0.41% more than the lowest cost RSMH option. Option 4a/b have a higher capital cost due to additional earthworks and signalling modifications. However, the difference is not a significant proportion of the overall cost of the scheme.	Cost
COS3	Opportunity for cost-sharing with other SROs, NSIPs and local non-SRO schemes/plans, e.g. STT, T2ST, SWOX/Farmoor, Abingdon flood storage	Cost estimate calculation for each option.	A	Limited opportunities identified for cost saving.	Increased chance of cost sharing with other rail infrastructure activities for Option 4a/b.	Cost
Carbon Costs						
CAR1	Carbon costs associated to the Capex of the option	Carbon estimate calculation for each option.	G	No carbon estimate available for rail options at this time, assume correlate to CAPEX	No carbon estimate available for rail options at this time, however initial assessment shows correlation between carbon and cost, indicating option 4b is likely to site between Option 1 and 4a for carbon cost.	Carbon
CAR3	Opportunity for mitigation e.g. smaller earthworks may lead to less carbon	Carbon estimate calculation for each option.	A	Limited likelihood and magnitude of mitigation opportunity.	Options 4a/b have a higher fill requirement.	Carbon
Environmental Performance						
ENV1A	Minimise impacts on Special Area of Conservation	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SAC's or potential SAC's within the boundary of the proposed RSMH 4b site. The closest SAC to the rail siding is 8.5Km to the north (Cothill Fen SAC).	Biodiversity and Nature Conservation
ENV1B	Minimise impacts on Special Protection Area	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SPA's or potential SPA's within the boundary of the proposed RSMH 4b site. The closest SPA to the rail siding is Thames Basin Heaths SPA located 43Km to the south-east.	Biodiversity and Nature Conservation
ENV1C	Minimise impacts on Ramsar	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no Ramsar sites or potential Ramsar sites within the boundary of the proposed RSMH 4b site. The closest Ramsar to the rail siding is South-west London Waterbodies located 60Km to the south-east.	Biodiversity and Nature Conservation
ENV1D	Minimise impacts on Site of Special Scientific Interest	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SSSI's within the boundary of the proposed RSMH 4b site. The site is also not located within the Impact Risk Zone (IRZ) of any SSSI. The closest SSSI to the rail siding is Frilford Heath ponds and Fens SSSI located 5.6Km to the north.	Biodiversity and Nature Conservation
ENV1E	Minimise impacts on National Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no NNR within the boundary of the proposed RSMH 4b site. The closest NNR to the rail siding is located 8.1Km to the north of the site. Cothill NNR.	Biodiversity and Nature Conservation
ENV1F	Minimise impacts on Local Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no LNR within the boundary of the proposed RSMH 4b site. The closest LNR to the rail siding is located 8.5Km to the south-east of the site. The site is called Mowbray Fields and is located near East Hagbourne.	Biodiversity and Nature Conservation
ENV2A	Minimise impacts on Ancient Woodland	Natural England Ancient Woodland Maps and Professional Judgement.	G	No ancient woodland impacted	Historic mapping indicates that there is no ancient woodland present on-site	Biodiversity and Nature Conservation
ENV2B	Minimise impacts on Ancient and Veteran Trees	Woodland Trust Ancient Tree Inventory map search and professional judgement	A	Development in close proximity with potential indirect impact to ancient or veteran trees	There are no ancient or veteran trees recorded by the Woodland Trusts Ancient Tree Inventory on or close to this option. However, survey may identify trees that could be classified as ancient or veteran. As such, this option scores amber on a precautionary basis pending survey.	Biodiversity and Nature Conservation
ENV2C	Minimise impacts on Protected Trees	Check against published TPO dataset.	G	No protected trees impacted	No protected trees would be impacted.	Landscape & Visual

ENV2D	Minimise impacts on vegetation (including trees, woodland, hedges and shrubs)	Check against baseline resources and based upon high level knowledge of site from previous site visits. Professional judgement.	R	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.	Construction of the RSMH 4a rail siding and associated noise bunding will require the removal of a large area of woodland with some grassland and agricultural land lost too. Woodland is assumed to be likely to include A or B grade trees. Hedgerows and other habitat types including waterbodies may also require removal. These habitats likely support protected and notable species including badgers, bats and great crested newts.	Biodiversity and Nature Conservation and Landscape
ENV3	Minimise impacts on Local Wildlife Sites (LWS)	Professional Judgement and LWS Citation provided by TVERC.	R	LWS impacted and mitigation not feasible	RSMH 4b is located within The Cuttings and Hutchin's Copse LWS. The site is designated for the presence of ponds and wet woodland with ancient woodland indicator species. Initial inspection confirmed ancient woodland indicator species and ponds suitable for GCN.	Biodiversity and Nature Conservation
ENV4A	Minimise impacts on Scheduled monuments or activities which could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No scheduled monuments are located within the option location or in the immediate vicinity, with the nearest lying 4.6km to the north-east	Historic Environment
ENV4B	Minimise impacts on listed buildings or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	A	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	No listed buildings lie within the option footprint but the nearest listed building lies approximately 400m to the south and setting changes could occur	Historic Environment
ENV4C	Minimise impacts on Registered Parks and Garden or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No Registered Parks and Gardens are within the option location or in the immediate vicinity, with the nearest being 7.8km to the north-east	Historic Environment
ENV4D	Minimise impacts on Registered Battlefields or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no Registered Battlefields within the option or in the vicinity, with the nearest being 22.4km to the east	Historic Environment
ENV4E	Avoid impacts on World Heritage Sites or activities that could lead to a loss of significance, including setting	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no World Heritage Sites within the option or in the vicinity, with Blenheim Palace being the nearest 23km to the north	Historic Environment
ENV4F	Minimise impacts on conservation areas which could result in loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no conservation areas within the option location but the East Hanney Conservation Area lies approximately 900m north-west of it, so there is no potential for setting change given topography and distance	Historic Environment
ENV5A	Minimise loss to non-designated built heritage	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no known non-designated built heritage assets within the option location but this will have to be borne out through detailed assessment	Historic Environment
ENV5B	Minimise loss to paleoenvironmental remains	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	The resource is unknown at this location and would require investigation to establish presence, extent and significance	Historic Environment
ENV5C	Minimise loss to non-designated historic landscapes	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	There are no known designed landscapes within this option or in the immediate vicinity	Historic Environment
ENV5D	Minimise loss of non-designated archaeological remains	Professional judgement, incorporating the use of the IEMA's Principles of Cultural Heritage Assessment in the UK and the Chartered Institute for Archaeologists standard and guidance document for desk based assessment	A	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	No known archaeological remains within the main body of the rail siding option but the connecting rail lines into the reservoir area extend across two high value non-designated clusters of archaerological remains, leading to likely partial loss	Historic Environment
ENV6A	Minimise loss of fluvial flood storage within Flood Zone 2 or 3	Measure using GIS	G	Site is outside flood zone 2 and 3	RSMH 4a/b is not in any flood zone	Flood Risk
ENV6B	Minimise impacts of pluvial flood risk.	Expert judgement	G	No predicted impacts on pluvial flood risk	RSMH 4a/b is not located in an area with existing pluvial flooding. Although the materials handling area shall be hardstanding, assuming the drainage is designed correctly it is not expected to have an adverse impact on pluvial flooding.	Flood Risk
ENV6C	Minimise impacts of groundwater flood risk.	Checking existing national and local records	G	No predicted impacts on groundwater flood risk	Option is not considered to have a significant impact on groundwater flood risk. The options are considered to score similarly against this criteria.	Flood Risk
ENV7A	Minimise disturbance of potentially contaminated land	Checking existing national and local records	A	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	This site is adjacent to the London – Bristol Great Western Rail trainline which presents a potential source of contamination.	Land

ENV7B	Minimise disturbance of potentially contaminated land specifically in relation to authorised and historic landfills	Checking existing national and local records	G	Not within authorised and historic landfills or previous industrial sites or within 250m of authorised and historic landfills or previous industrial sites	There is no authorised or historical landfill within 250m of this option	Land
ENV8	Minimise disturbance of land with known potential for Unexploded Ordnance (UXO)	Checking existing national and local records	A	Disturbance of a low quantity of UXO which can be easily managed / remediated. Unlikely to have significant cost or program implications	A pre-desk study assessment from Zetica acquired for gate 2 identified various potential UXO risks across the SESRO area and recommended a detailed UXO survey of the area.	Land
ENV9A	Minimise loss of terrestrial priority habitats (use narrative to describe type and quantum)	Use of aerial imagery, MAGIC maps and Professional Judgement	R	Priority habitat directly impacted	Habitats within the site of the RSMH 4b include those which are classified as priority habitats under the NERC Act (2006). Priority habitats likely to be present include ponds, hedgerows, lowland mixed deciduous woodland and arable field margins.	Biodiversity and Nature Conservation
ENV9B	Minimise loss of aquatic priority habitats (use narrative to describe type and quantum)	Professional judgement based on knowledge of Water Framework Directive.	G	No priority habitat directly impacted by proposed option footprint	RSMH4b is located relatively close to the headwaters of this WFD waterbody (within 500 m). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning that would be no loss of aquatic habitats / watercourse.	Aquatic Environment
ENV10A	Reduce effects on North Wessex Downs National Landscape and its setting	Professional judgement.	G	National Landscape and its setting would not be affected.	Removal of vegetation belts along field boundaries and woodland along the GWR Main Line would erode a key characteristic which currently contributes positively to the setting of the North Wessex Downs National Landscape. However, other intervening woodland and urban areas in the landscape would limit the intervisibility between the National Landscape and the rail sidings/material storage and associated haul road and noise bunds. As such, the landscape character and tranquillity of the of the National Landscape and its setting would be unlikely to be affected.	Landscape & Visual
ENV10B	Reduce effects on local landscape character	Professional judgement.	R	Effect on local landscape character is likely to be significant.	Removal of vegetation belts along field boundaries and woodland along the GWR Main Line would erode a key characteristic which currently contributes positively to the local landscape character. The rail sidings/material storage and associated haul road and noise bunds would introduce new infrastructure into a part of the landscape which is generally unaffected by infrastructure. This would erode the generally rural landscape character and levels of tranquillity which would also be affected by noise. Effect on local landscape character potentially significant.	Landscape & Visual
ENV11A	Reduce effects on panoramic views from national trail, open access land and important viewpoints in the National Landscape	Professional judgement.	G	Panoramic views from national trail, open access land and important viewpoints in the National Landscape unlikely to be affected or the proposal is likely to be barely discernible in views.	The proposals would either not be visible or barely discernible in panoramic views from the National Landscape due to the topography, intervening woodland and urban areas.	Landscape & Visual
ENV11B	Reduce effects on sensitive local visual receptors	Professional judgement.	R	Effect on local views of sensitive visual receptors likely to be significant.	Material storage, noise bund, infrastructure at rail sidings and haulage traffic would be locally visible in views from PRoWs, a smaller number of isolated residential properties and the edge of East Hanney. However, the noise bunds would help to provide partial screening of the material storage. The effect would likely be significant for the most affected views.	Landscape & Visual
ENV12	Minimise disturbance/encroachment into Air Quality Management Area (AQMA)	Based on an understanding of the scale and nature of activities, air quality management areas (AQMAs) were identified in close proximity to the proposed works.	G	Site is located further than 1km from AQMA OR no construction traffic must go through an AQMA	Marcham AQMA is the closest AQMA to RSMH4b and is approximately 5.1 km north-northeast of the works boundary. The anticipated construction and operational activities would likely lead to a negligible change in air quality.	Air Quality
ENV13	Minimise disturbance/encroachment into Groundwater Source Protection Zone (SPZ)	Magic maps	G	Site is within Zone 3 or not within a SPZ	The nearest SPZ is south of the town of Wantage, approximately south west of the scheme - approx. 5 km away from RSMH4a.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	RSMH4b is located relatively close to the headwaters of this WFD waterbody (within 500 m). There may be a requirement for site water management which would likely require a discharge into a nearby watercourse, which is most likely to be the headwaters of the East Hanney Ditch, which forms part of the Childrey Brook and Norbrook at Common Barn WFD waterbody (see ENV14E). It is also assumed that the haulage road leaving the RSMH at the eastern end does not have additional crossings over the WWD; or where there are crossings these use bridges (not culverts) along with measures to prevent sediment ingress. The screening bund to the south has been placed on top of a watercourse meaning there would be some loss of aquatic habitats / watercourse (~400-500m) as well as a rectangular pond feature . The impact will be localised and is not likely to cause deterioration at a waterbody scale provided local mitigation is provided. In addition, there is a short section of ditch around Hutchins Copse LWS which would be lost due to the site footprint - approx. 50 m.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment

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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	RSMH4b is located relatively close to the headwaters of this WFD waterbody (within 500 m). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning that would be no loss of aquatic habitats / watercourse. There may be a requirement for site water management which would likely require a discharge into the East Hanney Ditch. Successful implementation of best practice pollution prevention measures is critical for this option to attain WFD compliance for this waterbody and the Childrey Brook WFD waterbody; as any downstream pollution e.g. sediments could compromise WFD compliance of the WWD system project as a whole by affecting the water quality or ecology.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
ENV15A	Maximise potential for future environmental benefits (terrestrial), e.g. increase tree planting	Professional Judgement	R	Site allows only the minimum environmental benefits to be realised	No specific space for environmental benefits and removes part of existing pond and woodland LWS.	Biodiversity and nature conservation
ENV15B	Maximise potential for future environmental benefits (aquatic), e.g. increase wetlands area	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	R	Site allows only the minimum environmental benefits to be realised	No specific space for aquatic improvements identified. Some watercourse and ponds lost, which require mitigation.	Aquatic Environment
ENV16	Maximise flexibility in routing diverted watercourses so their habitats can be of sufficiently high quality to contribute to catchment Water Framework Directive objectives	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Site allows some flexibility in routing watercourses / Good quality habitat options are available	Haulage road quite close to WWD and will run to the western edge of new proposed WWD corridor, potentially reducing flexibility in design (if needed) and introducing risk of sediment ingress.	Aquatic Environment
ENV17	Minimise disturbance/encroachment into Local Geological Sites (LGS)	Checking existing national and local records	G	Site is located more than 250m from LGS	No LGS present	Biodiversity and nature conservation
ENV18A	Minimise impacts associated with Noise and Vibration as a consequence of the construction of the option	Based on information available at Gate 2, worst-case construction impacts from the rail sidings were predicted to be associated with material handling (see ENV18B). Impacts arising during other construction works are predicted to be no greater than those presented for ENV18B (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Noise and vibration impacts would be predicted to be no greater than those presented for ENV18B	Noise
ENV18B	Minimise impacts associated with Noise and Vibration as a consequence of the operation of the option	Indicative assessment with noise sensitive properties within RAG bands identified based on predicted construction noise levels during Gate 2 assessment (inc. bunding around sidings). Red band is from works site to the SOAEL+5dB distance, and Amber is from SOAEL+5dB distance to the SOAEL. Rail Sidings: Red 675m, Amber 676-1209m, Green 1210m. This is based on worst-case activity, Material Handling, which includes potential for works between 06:00 to 07:00 and was assessed using night-time noise assessment criteria at Gate 2 as a precautionary approach. The noise emission for the activity is based on G2 assumptions, with update made following review by Costain (JB 05Jun). Professional judgement used in assigning a single RAG rating for each option under review, which includes a review of the number of properties in each band and how close they are located to the RAG boundaries. Property counts do not consider screening of receptors by nearby buildings, screening at second row of properties by first row of properties. This will result in a precautionary assessment of noise impacts. NOTES: buildings to be demolished are excluded from assessment, RAG bands based on assessment approach for residential properties but all NV sensitive receptors identified at Gate 2 are included in analysis. (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Closest noise sensitive receptor to the 220,000m3 stockpile option is approximately 170m from the works site, while the closest receptor to the 370,000m3 stockpile option is approx. 180m away. At these distances, and with provision of screening bunds (to completely block line of sight), there is the potential for significant noise effects during the construction phase of the project. Total property counts: Option 220,000m3 Red=9, Amber=200+; Option 370,000m3 Red=9, Amber=180+. A RED rating is considered appropriate for both stockpile capacity options.	Noise

ENV19A	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the construction of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	A	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.	There are three high sensitivity human receptors (i.e. dwellings) within 350 m of the RSMH4b works boundary with the closest (Bradfield Barns) <180 m NW from the works boundary. There are between 1 - 10 medium sensitivity human receptors (barns and outbuildings) and between 1 - 10 low sensitivity human receptors within 350 m of RSMH4b works boundary. Furthermore, RSMH 4b is located within The Cuttings and Hutchin's Copse LWS, which is considered a low sensitivity receptor. The haulage route is potentially off Old Mans Lane or via the SESRO access. Construction activities include the material storage bays, a crane platform area, sidings and screening mounds. The platform will be constructed using sheet piles / retaining wall to provide greater visibility to the crane driver. It is considered that there are no proposed dust-generating construction activities that could not be managed using normal good practices (IAQM construction dust guidance, 2016) to prevent significant effects at any off-site receptor. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of construction traffic required (whether accessing the site via the SESRO access road or via East Hanney), the potential effects would likely lead to a negligible change in air quality. Although residual effects are unlikely, the close proximity of the human receptors means this Option is assigned an Amber score. The appraisal score assigned is also applicable to Decommissioning (demolition).	Air Quality
ENV19B	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the operation of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	A	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.	The material storage capability for RSMH4b will be 220,000 m3 (small handling area) and 370,000 m3 (large handling area). Based on the number and sensitivity of nearby receptors, it is considered that there are no proposed dust-generating operational activities that could not be managed using normal good practices (IAQM construction dust guidance, 2016) to prevent significant effects at any off-site receptor. Operation related vehicles include one crane, dumper trucks and support vehicles. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of operational traffic required, the potential effects would likely lead to a negligible change in air quality. Although residual effects are unlikely, the close proximity of the dwellings means this Option is assigned an Amber score. **Note emissions from the anticipated 2 trains per day not considered further as it would likely lead to a negligible change in air quality.	Air Quality
ENV20A	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the construction of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of East Hanney, in part due to lighting during night-time construction works.	Landscape & Visual
ENV20B	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the operation of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of East Hanney, in part due to presence of some lighting during winter months.	Landscape & Visual
ENV21A	Minimise impacts associated with solid discharge during construction, e.g. aggregate spills during transport from rail to site, sediment runoff from soil erosion due to excavation of borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from construction likely to be readily controlled using standard construction mitigation	Pollution
ENV21B	Minimise impacts associated with solid discharge during operation, e.g. release of sediment into surrounding environment for the reservoir maintenance such as dredging, debris removal	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from operation likely to be readily controlled using standard construction mitigation	Pollution
ENV22A	Minimise impacts associated with liquid discharge during construction, e.g. discharge of groundwater to during the excavation of the borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard construction mitigation	Pollution
ENV22B	Minimise impacts associated with liquid discharge during operation, e.g. the extent and severity of altered terrestrial and aquatic habitats in affected areas due to emergency release of water	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard mitigation	Pollution
Community and Planning Considerations						
CPC1	Distance to the nearest property that will stay during construction (metres)	GIS	R	Less than 250m from the nearest property	Closest property to the 220,000m3 stockpile option is approximately 170m from the works site, while the closest property to the 370,000m3 stockpile option is approx. 180m away.	Socio-Economic
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	GIS analysis of footprint, community assets, and links with residences.	G	Community access/use of community assets is not disrupted during construction	Rail siding site severs PRoW during construction but community assets would not be affected. PRoW will be severed but these do not appear to directly link to community assets. The severed PRoW also do not appear to be in close proximity to homes .	Socio-Economic
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	GIS analysis of footprint, community assets, and links with residences.	G	Community access/use of community assets is not disrupted during operation	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive.	Socio-Economic
CPC4A	Are public rights of way disrupted or adversely affected?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	A	Recreational resources / rights of way of local importance are disrupted or affected. The site is likely to affect public rights of way	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive.	Socio-Economic
CPC4B	Are there opportunities to create or improve linkages of Public Rights of Way (PRoW) and recreational routes?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	A	Links to a recreational resource / right of way of local importance can be enhanced	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. The proposed redirection of the Wiltshire and Berkshire Canal would link with the severed PRoW. Therefore it would be beneficial to improve linkages with the canal.	Socio-Economic

CPC5	Maximise potential opportunity for recreational benefits	GIS analysis of PRoW, open spaces, cycle routes, canals, other forms of regional/nationally important receptors (e.g. National Cycle Routes), and community assets.	A	Option allows some additional recreational benefits to be realised	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. The proposed redirection of the Wiltshire and Berkshire Canal would link with the severed PRoW. Therefore it would be beneficial to improve linkages with the canal.	Socio-Economic
CPC6	Support the realisation of socio-economic incentives on SESRO, including employment, skills, tourism, sustainable travel, connecting people with nature and environmental education	GIS analysis of footprint, community assets, private residents, and businesses. Also awareness of overall project objectives is needed to conclude if the designs align with these.	A	Site supports some of the social-economic incentives of the overall scheme	Rail siding site severs PRoW during construction and potentially during operation, unless reinstated or adjusted to maintain access to the Wiltshire and Berkshire Canal. This realises benefits of employment and skills but potentially negatively affects sustainable travel and connecting people with nature.	Socio-Economic
CPC7	Minimise overall SESRO Order Limits extent and land acquisition, without compromising SESRO needs and project benefits	Spatial comparison of land that would likely be included in the DCO Order Limits, including construction working areas, access and highways or PRoW interactions.	A	Requires minor additional Order Limits extent	RSMH4a and 4b lie outside the area currently safeguarded in the VoWH Local Plan, and lie slightly further away from the area that may be used for Steventon to East Hanney road diversion (depending on option chosen for that) than RSMH1. The land required for RSMH4a and 4b including haul road is therefore likely to require a somewhat greater Order Limits extent, overall, than RSMH1. However, the difference is quite small in the context of the overall land-take and the differences between reservoir footprint options. The differences between rail-siding-specific footprints between the various options are also small in that context.	Consenting
CPC8	Aim for consistency with published and (insofar as possible) emerging Local Plan land use allocations	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in existing and any emerging Local Plan documents and any Supplementary Planning Documents.	A	Negotiation required with LPA to accommodate scheme within Local Plan	Lies outside the SESRO safeguarded area in policies CP14 and CP14a. Spatially, the land-take partially conflicts with land safeguarded for transport improvements (policies CP19 and CP19a) in the VoWHDC Local Plan. However, this is safeguarded for the possible future re-opening of Grove Railway Station (albeit there are no firm plans or funding for that at the present time) and there is potential for the legacy of the SESRO rail siding development actually to facilitate being re-purposed into a passenger rail station, thus meeting the policy objective. The same remains true for the consultation draft Joint Local Plan 2041. No land use allocation conflicts with the Oxfordshire County Council Minerals and Waste Local Plans. Not within the area of the South Oxfordshire District Council Local Plan.	Consenting
CPC9	Aim for consistency with any adopted Neighbourhood Plan policy applicable to the land area affected	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in any made Neighbourhood Plan.	G	Low or no impact	RSMH4b is outside (to the south of) the area of the draft East Hanney Neighbourhood Plan, although a potential haul road route might cross the edge of the plan area. No Neighbourhood Plans are known to be in preparation for the Grove, Ardington or Lockinge parishes, at the northernmost edges of which RSMH4a would be located.	Consenting
CPC10	Avoid development of infrastructure within specifically designated areas or their setting, as applicable (e.g. Green Belt, AONB, Common Land, Open Space)	Spatial comparison with designated sites, their settings, and the nature of development works expected.	A	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)	Not located within a specifically designated area, such as Green Belt, AONB, Common Land or Open Space. However, an adverse effect on the AONB setting is expected (see ENV10).	Consenting
CPC11	Avoid encroachment on any safeguarded land in minerals and waste policy, unless the minerals can be beneficially utilised as a result	Spatial comparison of allocated sites and review of policy wording in existing and any emerging Waste and Minerals Local Plan documents.	G	Low or no impact	Not located in minerals safeguarding area or on a site allocated for minerals or waste uses.	Consenting
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)	Review of NSIP projects on PINS's register; review of Network Rail and National Highways investment plans; spatial review of statutory undertakers' assets.	A	Negotiation required with existing infrastructure owner / Nationally Significant Infrastructure Project (NSIP) owner/promoter to accommodate scheme	No NSIPs currently registered. No known proposals from Network Rail – the East West Rail proposal does not affect the site. However, potential for either conflict with or facilitation of the mooted re-opening of Grove Railway Station, promoted by Oxfordshire County Council. No known proposals from National Highways yet – RIS3 Investment Plan will be published in 2024 which will detail the A34 improvements project. Existing gas main and high-voltage line require diversion. However, these are not part of the national gas or electricity grid backbones. Telecoms line follows same path as Great Western Main Line, likely to be similarly affected (if any effect) by all rail siding options.	Consenting
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	Review of the nature of expected development works against the list of other consents and licenses developed at Gateway 2.	A	One or more additional consent/license required	Basic Asset Protection Agreement required with Network Rail. Not likely to add to extent or complexity of FRAP. Likelihood of at least one European protected species relocation licence required (GCN).	Consenting
CPC14	Avoid or minimise the need for any consequential development consenting (i.e. displacement or alteration of other development)	Review of existing development within the likely land-take, its nature and scale.	G	No existing development requires planning permission to relocate or alter	No other built developments likely to be affected and requiring consent to be re-provided elsewhere.	Consenting
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)	Review GIS layers for services against the options. Expert Judgement.	A	Several manageable interfaces with others	The location of RSMH 4a/b is likely to be preferred by Network Rail as it will be an extension of the existing 4 track railway and will likely cause less interruption to passenger trains as freight trains slow down to enter the siding. The location will likely require the relocation of an existing overhead HV line - introducing an additional interface with the local DNO.	Consenting
CPC16	Potential for contribution to long-term infrastructure aims	Expert judgement	G	Large contribution	OCC and VoWH have plans for a Wantage and Grove Station. The track extension and infrastructure left behind by RSMH 4a/b after construction has potential to be adopted by the scheme.	Consenting
CPC18	Influence the location and layout of development to maximise the use and value of existing and planned sustainable transport investment	Expert judgement	G	Option supports existing and planned public transport infrastructure between key destinations	RSMH 4a/b would have a bigger influence than RSMH1 on the proposals for the OCC/VoWH proposed Wantage and Grove station. After construction, the area could be adopted as part of the Wantage and Grove station scheme.	Transport Planning
Property & Land Acquisition						
PRP1	Minimise loss of sensitive properties, i.e. residential, commercial, green belt, common land, historical or community assets due to project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of sensitive properties	Land is agricultural land.	Property & Land Acquisition

PRP2	Minimise loss of land allocated within the Local Plan for alternative higher value / social / cultural value uses, i.e. residential, historical or community assets due project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of allocated land for higher value / social value properties	Allocation is not anticipated to be confounded by the proposals. Design and engagement may enable cohesion between parties.	Property & Land Acquisition
PRP3	Minimise permanent loss of best and most versatile agricultural land (grades 1, 2 and 3)	Review of agricultural grading layer on ArcGIS, based on 2019 Provisional Agricultural Land Classification	G	No Grade 1 or 2 agricultural land is affected and loss of <50% Grade 3 agricultural land	Option 4 - Approx. 39% Grade 3 61% Grade 4 Option 4 - Approx. 33% Grade 3 67% Grade 4	Property & Land Acquisition
PRP4	Assessment of Land and Property asset costs and associated compensation due under the Compensation Code	Review of land use / designation on ArcGIS	G	Land acquisition costs likely to be relatively low. Only agricultural land and isolated properties affected	Agricultural land values can range from £8,000 - 14,000 in the area. Landowners may be eligible for Severance claims depending on design and farm practices.	Property & Land Acquisition
PRP5	Assessment of special land considerations, including Special Category Land (SCL) including utility infrastructure, national asset protection agencies and Crown bodies	Review of affected landowners	G	No SCL on identified option	No Special Category landowners are identified.	Property & Land Acquisition
PRP6	Minimise disruptions of landowners access to their land required for temporary works	Review location in conjunction with existing road network	G	Landowners able to access their land during construction and operation phases	Immediate access west to the A338 would enable low impact on sensitive land uses during construction phase. Further detail required on access across site and construction methodology.	Property & Land Acquisition

Appendix G RSMH 5 Criteria Workbook

RSMH 5

Criteria code	Criteria Description	Method of Assessment	RAG	Description of RAG	Narrative	Sub-Theme
Design Acceptance						
ENG1	Network Rail - Risk that Network Rail would not accept the option	Expert judgement	A	Low to Medium risk that Network Rail would not accept the option	RSMH 5 extends from the four-track section of the mainline. The decelerating freight trains on the four-track section of railway will use the up-relief, so passenger trains on the line will not be interrupted by movements into RSMH 5. Due to the location of RSMH 5, the speed of the freight trains when passing the Causeway and Stocks Lane MCB-CCTV level crossings is not likely to significantly impact the barrier-down time of the level crossings compared to existing barrier-down time. RSMH 5 therefore carries a lower risk of being rejected by Network Rail.	Design Acceptance
Constructability						
CON1	Safety - Risk of endangering construction workers or members of the public during construction e.g. water, ground, height, rail, road and utilities	Look at programme and list types of construction involved. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be constructed safely but enhanced control measures required	Working next to the railway increases risk, while the option is considered to be deliverable, it would require extra control measures. The option requires earthworks for the construction of a raised embankment which introduces additional risk, but which should be mitigable.	Health and Safety
CON2A	Programme - Duration, longest /shortest, but also consider whether the longer duration has an impact on the overall scheme programme	Compare differences in the programmes which would materialise from different options. Consider earthworks seasons.	A	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.	Option 5 is favourable in that it has a moderate amount of switches and crossings to install. Of these switches and crossings relatively few are online which is likely to have a reduced impact on Overhead Line Equipment. However, the option requires earthworks to create the rail siding embankment, and the installation of sheet piles for a retaining wall between the rail sidings and the materials handling area. Furthermore, the required haul roads for Option 5 are long.	Programme
CON2B	Programme - Opportunities for construction programme acceleration through efficiencies	Compare differences in the programmes which would materialise from different options.	A	The option has limited potential to introduce programme efficiencies and reduce the construction programme	There is a potential opportunity for the acceleration of the construction programme for Option 5 if construction access off the existing Steventon to East Hanney Road (or Old Mans Lane) is allowable. The southern noise bund would need a separate access to the south side of the railway, the assumption is that the A338 would be used to access the south side of the railway line. With Option 5, there are other opportunities for programme acceleration: relocate part of the southern noise bund to the north side adjacent to the wildlife site and the track / material handling area could be moved further east by extension of the 'spur' (reducing haul distances).	Programme
CON2C	Programme - Dependencies i.e. proximity or physical relationships between elements of scope that introduce programme dependencies	Is the options on the critical path? Will it impact other critical activities?	A	Several major dependencies/ multiple minor dependencies	Option 5 requires a HV diversion which crosses over a railway line, likely to require 4-6 months minimum. A415 to SESRO Access Road / perimeter haul roads (must be constructed to gain access to the rail siding); and Steventon to East Hanney Road diversion (interconnecting haul roads must pass over or under (with temporary bridges)). Connection to the existing Network Rail infrastructure at either end of the siding requires possessions for all options. Further Network Rail possessions will be required for the online OLE, signalling and S&C installation.	Programme
CON2D	Programme - Risk	Are there items in the construction which have a significant programme risk	A	Moderate programme risk	Option 5 requires earthworks and a noise bund to the south requiring spoil and a separate construction road (with access off the public road). There is a moderate risk of flooding during construction due to the adjacent floodplain. Access to the south side of the railway to construct the noise bund requires traffic management on the A338. Option 5 signalling modifications are simplified by the omission of the crossover on the mainline to the east. Option 5 OLE modifications are simplified by the omission of the crossover on the mainline to the east. Network Rail requirements for a Section 61 agreement could impose a risk to the programme	Programme
CON2E	Programme - Use of existing assets to reduce the amount of construction required	Identify if any existing assets can be used	A	Option does not make use of existing assets	Option 5 is within a green field site.	Programme
CON3A	Logistics - Space available for construction and materials storage	Determine space constraints using GIS and options layouts from option definition.	A	Limited / restricted space	Option 5 provides the required amount of space which is estimated for materials delivery and storage. However, there would be limited additional space if volumes were to increase. The site is limited to the west and north by an area of floodplain, and to the northeast by an existing watercourse.	Logistics
CON3B	Logistics - Suitable and efficient access for construction workers, deliveries and waste removal including minimisation of lengths of new roads for access during construction	Determine method of access using GIS and options layouts from option definition.	A	Due to restricted access, an additional length of road is likely required for construction of the option.	Option 5 includes 40m width around the materials handling areas for haul roads / welfare facilities. However, the site is further away from the main construction works and so would require longer construction road (in comparison to Option 1).	Logistics
CON3C	Logistics - Import of materials or resources during construction	Use quantity estimates to assess different options.	R	Large amount of import materials required and/or one or several logistical challenges identified for the import of material.	Option 5 requires the import of materials for sheet pile retailing wall (which is not required for Option 1). This would need to be imported to the site by road. The fill required to form the embankment will need to be extracted from the main construction site and transported to the rail siding location.	Logistics
CON3D	Logistics - Haulage distance required for construction materials arrival on site to the placement location	Determine length using GIS and options layouts from option definition.	A	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.	The haulage distance from the materials handling area to the outer perimeter haulage road is approximately 1000m.	Logistics
CON3E	Logistics - Vehicle movements	Use vehicle movement estimates to assess different options.	A	Construction likely to add vehicle movements.	Option 5 requires additional works, such as sheet piles which increases the number of vehicle movements required for construction. Construction of the noise bund to the south will require construction vehicles to access off the A338. This will require some form of traffic management which will impact traffic flows.	Logistics
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	Determine space using GIS and options layouts from option definition.	A	Sufficient capacity for required storage, but there is limited additional capacity, and the double handling of material cannot be entirely minimised	Option 5 has been developed to store up to ~1 year of imported material. However, there is limited scope for expanding the area due to flood zone to the west and north and watercourse to the east. The railway 'spur' does provide the opportunity to be lengthened in later design stages to provide additional storage capacity.	Logistics
CON4A	Construction Complexity - Temporary conditions/works requirements e.g. embankment slope stability and moisture outside of placement seasons.	Expert Judgement	G	Temporary Works requirements minimal and can be used in the permanent state and no extension to the programme	In terms of signalling, OLE and switches and crossing updates on the existing NR infrastructure, Option 5 offers a relatively simple solution. It is very likely that the option will require diversion of the existing overhead 33kV powerline which crosses the GWR mainline.	Construction complexity
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	Determine using GIS and options layouts from option definition.	R	Option requires a complex and/or high number of additional structures and/or modifications to existing structures.	Some risk of a need for adjustments to existing bridges to the east of the site to facilitate Option 5. Due to additional embankment would require culvert / drainage underneath. There may be a need for adjustments to existing gantry towers for Option 5.	Construction complexity
CON4D	Construction Complexity - Volume and / or complexity of rail signalling interventions required	Review technical study to determine RAG assessment	A	Moderate modifications and additional infrastructure required	Estimate of cost of construction (as an indicator for complexity) - highest for 4a. Similar cost for Option 1, 4b and 5.	Construction complexity
CON5B	3rd Party Impact - Potential to disrupt existing rail network during enabling works and construction	Expert judgement	A	Disruption likely to be moderate	Based on Costain estimate would require ~268hr possession.	3rd Party Impact
CON7A	Ground - Terrain of site, and implications for the need for earthworks and engineered slopes	Use of lidar and civil 3D models to assess amount/location of earthworks required	A	Terrain is unfavourable to the design of assets and therefore increases the amount of earthworks required	Option 5 requires embankment works to build the rail siding up to an appropriate elevation (due to the railway being on an embankment at this location). They may also require drainage of the area between existing rail embankment and new embankment for rail siding.	Construction complexity
CON7B	Ground - Risk of unexpected conditions	Use of expert judgement based on comparable areas	R	High exposure to risk of unexpected ground conditions.	Option 5 overlaps in the materials handling area with the Lower Greensand/ Kimmeridge Clay, which increases the risk of unexpected ground conditions.	Construction complexity

CON7C	Ground - Impact of ground conditions on the complexity of design and construction	Use of expert judgement	G	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	No foreseen issues with ground conditions.	Construction complexity
CON7D	Ground - Risk of ground settlement above line of tunnel affecting other structures/houses	Use of expert judgement	G	No risk of ground settlement affecting other structures	Risk of settlement of the existing railway line caused by the rail siding and materials handling area is similar for all options and would be possible to prevent through design.	Construction complexity
Operability						
OPS1A	Safety - Risk of endangering operational staff, visitors or members of the public during operation	Look at operational activities and public access. Identify any that could potentially score red or amber. Sub-list of activities which would make it amber i.e. Tunnelling = Amber	A	Works can be operated safely but enhanced control measures required	All options will have enhanced control measures during operation. Option 5 would have closer proximity to diversion of the public right of way (Old Mans Lane), however it may be possible for the haul road to pass under a permanent bridge for the Steventon to East Hanney Road Diversion, rather than have temporary bridges.	Health and Safety
OPS1B	Safety - Access and egress for operational staff, visitors, deliveries and waste removal during normal operations and emergencies	Expert judgement	G	Access/egress can be provided	Access / egress would be controlled for all options. Opportunity for access route to be constructed through the raised embankment for Option 5 to improve access to each side of the rail siding.	Health and Safety
OPS2A	Maintenance - Ease of maintenance	Expert judgement	G	Majority of maintenance activities could be undertaken during limited closure periods and / or with limited disruption	Opportunity for access route to be constructed through the raised embankment for Option 5 to improve access to each side of the rail siding.	Operational Complexity
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)	Review GIS supported by expert judgement	G	Option is outside the flood zone	With relatively minor adjustments to the shape / location of the noise bund and the introduction of a small area of replacement flood storage, Option 5 would be outside the flood zone 2/3.	Operational Resilience
OPS7A	Sustainability - Reuse of assets or temporary works for permanent items, e.g. materials storage slab, haulage roads, compound car park	Expert judgement	A	Some potential for reuse of assets/temporary works	Due to the location of Option 5, could be used to help support / facilitate the construction of a future Wantage and Grove Station. Network Rail may wish to keep the rail sidings should they see benefit to their operations in leaving them in after construction.	Operational Resilience
OPS7B	Operability - Power required for operational energy use	Calculated power requirement for the option	A	Option requires moderate amount of energy to operate	Due to the longer haulage distances for Option 5 it is likely to be more energy intensive to operate the rail siding.	Operational Resilience
OPS8B	3rd Party Impact - Potential to disrupt existing rail network during operation	Expert judgement	A	Disruption likely to be limited	As Option 5 extends from the 4-track section - there is likely to be less disruption to passenger trains during operation of the rail siding (in comparison to Option 1). There may be some disruption caused to users of the PRoW.	Transport Planning
Relative Costs						
COS1	Capex cost of the option	Cost estimate calculation for each option.	G	CAPEX estimated to result in an increase of <1% of the CAPEX for the overall SESRO project compared to the lowest cost option	Initial high-level cost estimate indicates that the range in costs for rail and materials handling options represent c 4% of total SESRO costs. Option 5 results in a total project cost of 0.65% more than the lowest cost RSMH option. Option 5 have a higher capital cost due to additional earthworks and signalling modifications. However, the difference is not a significant proportion of the overall cost of the scheme.	Cost
COS3	Opportunity for cost-sharing with other SROs, NSIPs and local non-SRO schemes/plans, e.g. STT, T2ST, SWOX/Farmoor, Abingdon flood storage	Cost estimate calculation for each option.	A	Limited opportunities identified for cost saving.	Increased chance of cost sharing with other rail infrastructure activities for Option 5.	Cost
Carbon Costs						
CAR1	Carbon costs associated to the Capex of the option	Carbon estimate calculation for each option.	G	No carbon estimate available for rail options at this time, assume correlate to CAPEX	No carbon estimate available for rail options at this time, however initial assessment shows correlation between carbon and cost, indicating option 5 is likely to have a higher carbon cost than 4b. But this is not considered to be a material differentiator between options.	Carbon
CAR3	Opportunity for mitigation e.g. smaller earthworks may lead to less carbon	Carbon estimate calculation for each option.	A	Limited likelihood and magnitude of mitigation opportunity.	Options 4a/b have a higher fill requirement.	Carbon
Environmental Performance						
ENV1A	Minimise impacts on Special Area of Conservation	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SAC's or potential SAC's within the boundary of the proposed RSMH 5 site. The closest SAC to the rail siding is 8.4Km to the north (Cothill Fen SAC).	Biodiversity and Nature Conservation
ENV1B	Minimise impacts on Special Protection Area	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SPA's or potential SPA's within the boundary of the proposed RSMH 5 site. The closest SPA to the rail siding is Thames Basin Heaths SPA located 43Km to the south-east.	Biodiversity and Nature Conservation
ENV1C	Minimise impacts on Ramsar	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no Ramsar sites or potential Ramsar sites within the boundary of the proposed RSMH 5 site. The closest Ramsar to the rail siding is South-west London Waterbodies located 60Km to the south-east.	Biodiversity and Nature Conservation
ENV1D	Minimise impacts on Site of Special Scientific Interest	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no SSSI's within the boundary of the proposed RSMH 5 site. The site is also not located within the Impact Risk Zone (IRZ) of any SSSI. The closest SSSI to the rail siding is Frilford Heath ponds and Fens SSSI located 5.9Km to the north.	Biodiversity and Nature Conservation
ENV1E	Minimise impacts on National Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no NNR within the boundary of the proposed RSMH 5 site. The closest NNR to the rail siding is located 8.9Km to the north of the site. Cothill NNR.	Biodiversity and Nature Conservation
ENV1F	Minimise impacts on Local Nature Reserve	Professional Judgement and use of MAGIC maps.	G	No statutory designated sites within 100m of proposed option footprint OR no indirect impact on statutory designated site	There are no LNR within the boundary of the proposed RSMH 5 site. The closest LNR to the rail siding is located 10.5Km to the south-east of the site. The site is called Mowbray Fields and is located near East Hagbourne.	Biodiversity and Nature Conservation
ENV2A	Minimise impacts on Ancient Woodland	Natural England Ancient Woodland Maps and Professional Judgement.	G	No ancient woodland impacted	Historic mapping indicates that there is no ancient woodland present on-site	Biodiversity and Nature Conservation
ENV2B	Minimise impacts on Ancient and Veteran Trees	Woodland Trust Ancient Tree Inventory map search and professional judgement	A	Development in close proximity with potential indirect impact to ancient or veteran trees	There are no ancient or veteran trees recorded by the Woodland Trusts Ancient Tree Inventory on or close to this option. However, survey may identify trees that could be classified as ancient or veteran. As such, this option scores amber on a precautionary basis pending survey.	Biodiversity and Nature Conservation
ENV2C	Minimise impacts on Protected Trees	Check against published TPO dataset.	G	No protected trees impacted	No protected trees would be impacted.	Landscape & Visual
ENV2D	Minimise impacts on vegetation (including trees, woodland, hedges and shrubs)	Check against baseline resources and based upon high level knowledge of site from previous site visits. Professional judgement.	A	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.	Construction of the RSMH 5 rail siding and associated noise bunding will require the removal of some intermittent vegetation along the GWR Main Line and tree belts along Old Man's Lane with some grassland and agricultural land lost too. Hedgerows and other habitat types including waterbodies may also require removal. These habitats likely support protected and notable species including badgers, bats and great crested newts.	Biodiversity and Nature Conservation and Landscape
ENV3	Minimise impacts on Local Wildlife Sites (LWS)	Professional Judgement and LWS Citation provided by TVERC.	G	No impacts to LWS	There are no LWS within the boundary of the proposed RSMH 5 site. The closest LWS to the rail siding is located 80-100m to the east - The Cuttings and Hutchin's Copse LWS. A new section of track will be required between the LWS and RSMH 5 but this should not increase disturbance impacts to the LWS any more than the existing railway line. In addition, the noise bund to the south of the railway line will be located within 50m of the LWS. Construction of the noise bund is considered unlikely to impact the LWS. The rail siding is considered to be far enough away from the LWS that noise impacts will not disturb any protected or notable species which may be present such as bats, badgers and breeding birds. Any dust created as a result of the rail siding can be mitigated using best practice methodologies. Root protection areas will be protected from harm.	Biodiversity and Nature Conservation
ENV4A	Minimise impacts on Scheduled monuments or activities which could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No scheduled monuments are located within the option location or in the immediate vicinity, with the nearest lying 4.6km to the north-east	Historic Environment

ENV4B	Minimise impacts on listed buildings or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	A	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	A listed building lies approximately 400m to the south and changes to setting could occur	Historic Environment
ENV4C	Minimise impacts on Registered Parks and Garden or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	No Registered Parks and Gardens are within the option location or in the immediate vicinity, with the nearest being 8km to the north-east	Historic Environment
ENV4D	Minimise impacts on Registered Battlefields or activities that could lead to a loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no Registered Battlefields within the option or in the vicinity, with the nearest being over 22.4km to the east	Historic Environment
ENV4E	Avoid impacts on World Heritage Sites or activities that could lead to a loss of significance, including setting	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no World Heritage Sites within the option or in the vicinity, with Blenheim Palace being the nearest 23km to the north	Historic Environment
ENV4F	Minimise impacts on conservation areas which could result in loss of significance	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no conservation areas within the option location but the East Hanney Conservation Area lies approximately 900m north-west of it, so there is no potential for changes to setting given topography and distance	Historic Environment
ENV5A	Minimise loss to non-designated built heritage	Professional judgement, incorporating Historic England's Good Practice Advice Note no.3 regarding the setting of heritage assets	G	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	There are no known non-designated built heritage assets within the option, but this will have to be borne out in detailed assessment. Assets outside the option location likely to be present around Grove and East Hanney approximately 800m south-west and 800m north-west of the option respectively	Historic Environment
ENV5B	Minimise loss to paleoenvironmental remains	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	The resource is unknown at this location and would require investigation to establish presence, extent and significance	Historic Environment
ENV5C	Minimise loss to non-designated historic landscapes	Professional judgement, based on Historic England's guidance on the establishing the significance of heritage assets	G	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	There are no known designed landscapes within this option or in the immediate vicinity	Historic Environment
ENV5D	Minimise loss of non-designated archaeological remains	Professional judgement, incorporating the use of the IEMA's Principles of Cultural Heritage Assessment in the UK and the Chartered Institute for Archaeologists standard and guidance document for desk based assessment	G	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.	Location has no archaeological, built heritage designations or non-designated remains, cropmarks or geophysical survey anomalies according to the OHER records. However, this area has not yet been subject to archaeological investigation. Given known remains nearby there is a moderate to high archaeological potential but any remains can be investigated and a mitigation strategy formed based on the results.	Historic Environment
ENV6A	Minimise loss of fluvial flood storage within Flood Zone 2 or 3	Measure using GIS	A	Site is within flood zone 2 and 3 but loss of storage is minor or mitigation is available	RSMH 5 is partially within Flood Zone 2 and 3.	Flood Risk
ENV6B	Minimise impacts of pluvial flood risk.	Expert judgement	G	No predicted impacts on pluvial flood risk	RSMH 5 is not located in an area with of medium (between 1% and 3.3% chance of surface water flooding each year) or high risk (more than 3.3% chance of surface water flooding each year) of surface water flooding. Although the materials handling area shall be hardstanding, assuming the drainage is designed correctly it is not expected to have an adverse impact on pluvial flooding.	Flood Risk
ENV6C	Minimise impacts of groundwater flood risk.	Checking existing national and local records	G	No predicted impacts on groundwater flood risk	Option 5 is not considered to have a significant impact on groundwater flood risk.	Flood Risk
ENV7A	Minimise disturbance of potentially contaminated land	Checking existing national and local records	A	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	This site is adjacent to the London – Bristol Great Western Rail trainline which presents a potential source of contamination. The southern part of the RSMH 5 is outside the data search area.	Land
ENV7B	Minimise disturbance of potentially contaminated land specifically in relation to authorised and historic landfills	Checking existing national and local records	G	Not within authorised and historic landfills or previous industrial sites or within 250m of authorised and historic landfills or previous industrial sites	There is no authorised or historical landfill within 250m of this option.	Land
ENV8	Minimise disturbance of land with known potential for Unexploded Ordnance (UXO)	Checking existing national and local records	G	No disturbance of land contaminated by UXO	The Zetica detailed desk study and risk assessment hazard plan shows the area to be low risk, however, it should be noted that the southern part of the RSMH 5 is outside the Zetica data search area.	Land
ENV9A	Minimise loss of terrestrial priority habitats (use narrative to describe type and quantum)	Use of aerial imagery, MAGIC maps and Professional Judgement	R	Priority habitat directly impacted	Habitats within the site of the RSMH 5 include those which are classified as priority habitats under the NERC Act (2006). Priority habitats likely to be present include ponds, hedgerows, lowland mixed deciduous woodland and arable field margins.	Biodiversity and Nature Conservation
ENV9B	Minimise loss of aquatic priority habitats (use narrative to describe type and quantum)	Professional judgement based on knowledge of Water Framework Directive.	A	Priority habitat directly impacted but mitigation feasible	The materials handling area itself is not placed over any watercourses. The bund to the south has been placed on top of a watercourse meaning there would be some loss of aquatic habitats / watercourse. This loss can be mitigated elsewhere on the site.	Aquatic Environment
ENV10A	Reduce effects on North Wessex Downs National Landscape and its setting	Professional judgement.	G	National Landscape and its setting would not be affected.	Removal of vegetation belts along field boundaries and intermittent vegetation along the GWR Main Line would erode a key characteristic which currently contributes positively to the setting of the North Wessex Downs National Landscape. However, other intervening woodland and urban areas in the landscape would limit the intervisibility between the National Landscape and the rail sidings/material storage and associated haul road and noise bunds. As such, the landscape character and tranquillity of the of the National Landscape and its setting would be unlikely to be affected.	Landscape & Visual

ENV10B	Reduce effects on local landscape character	Professional judgement.	R	Effect on local landscape character is likely to be significant.	Removal of vegetation belts along field boundaries, notably along Old Man's Lane and intermittent often scrubby vegetation along the GWR Main Line would erode a key characteristic which currently contributes positively to the local landscape character. The rail sidings/material storage and associated haul road and noise bunds would introduce additional infrastructure into a part of the landscape where the GWR Main Line is on embankment, with limited planting to screen it. This would add to the erosion of the generally rural landscape character and levels of tranquillity which would also be affected by noise. Effect on local landscape character potentially significant.	Landscape & Visual
ENV11A	Reduce effects on panoramic views from national trail, open access land and important viewpoints in the National Landscape	Professional judgement.	G	Panoramic views from national trail, open access land and important viewpoints in the National Landscape unlikely to be affected or the proposal is likely to be barely discernible in views.	The proposals would either not be visible or barely discernible in panoramic views from the National Landscape due to the topography, intervening woodland and urban areas.	Landscape & Visual
ENV11B	Reduce effects on sensitive local visual receptors	Professional judgement.	R	Effect on local views of sensitive visual receptors likely to be significant.	Material storage, noise bunds, infrastructure at rail sidings and haulage traffic would be locally visible in views from PRoWs, a smaller number of isolated residential properties, notably at Bradfield Barn and the edge of East Hanney. However as vegetation in this area is quite sparse the existing GWR Main Line is currently visible to local receptors and the noise bunds would help to provide partial screening of the material storage, sidings and GWR Main Line. The effect would likely be significant for the most affected views.	Landscape & Visual
ENV12	Minimise disturbance/encroachment into Air Quality Management Area (AQMA)	Based on an understanding of the scale and nature of activities, air quality management areas (AQMAs) were identified in close proximity to the proposed works.	G	Site is located further than 1km from AQMA OR no construction traffic must go through an AQMA	Marcham AQMA is the closest AQMA to RSMH 5 and is approximately 5.5 km north-northeast of the works boundary. The anticipated construction and operational activities would likely lead to a negligible change in air quality.	Air Quality
ENV13	Minimise disturbance/encroachment into Groundwater Source Protection Zone (SPZ)	Magic maps	G	Site is within Zone 3 or not within a SPZ	The nearest SPZ is south of the town of Wantage, approximately south west of the scheme - approx. 5 km away from RSMH4a.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	RSMH5 is located relatively close to the headwaters of this WFD waterbody (within 500 m). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning this would not result in a loss of aquatic habitats / watercourse. There may be a requirement for site water management which would likely require a discharge into a nearby watercourse, which is most likely to be the headwaters of the East Hanney Ditch, which forms part of the Childrey Brook and Norbrook at Common Barn WFD waterbody (see ENV14E) It is also assumed that the haulage road leaving the RSMH at the eastern end does not have additional crossings over the WWD; or where there are crossings these use bridges (not culverts) along with measures to prevent sediment ingress. The screening bund to the south has been placed on top of a watercourse meaning there would be some loss of aquatic habitats / watercourse (~400-500m) as well as a rectangular pond feature . The impact will be localised and is not likely to cause deterioration at a waterbody scale provided local mitigation is provided.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	RSMH4b is located within the headwaters of this WFD waterbody (East Hanney Ditch). The materials handling area itself is not placed over any of this WFD waterbody's headwaters themselves, meaning there would be no loss of aquatic habitats / watercourse. There may be a requirement for site water management which would likely require a discharge into the East Hanney Ditch. Successful implementation of best practice pollution prevention measures is critical for this option to attain WFD compliance for this waterbody and the Childrey Brook WFD waterbody; as any downstream pollution e.g. sediments could compromise WFD compliance of the WWD system project as a whole by affecting the water quality or ecology.	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
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	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	G	Minor adverse impacts likely; no risk to attaining Water Framework Directive objectives for this waterbody	No impacts anticipated - location of RSMH4b does not interact directly or indirectly with this WFD waterbody	Aquatic Environment
ENV15A	Maximise potential for future environmental benefits (terrestrial), e.g. increase tree planting	Professional Judgement	R	Site allows only the minimum environmental benefits to be realised	No specific space for environmental benefits and removes a small area of broadleaved woodland along the railway line and hedgerow. There may be potential for environmental benefits	Biodiversity and nature conservation

ENV15B	Maximise potential for future environmental benefits (aquatic), e.g. increase wetlands area	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	R	Site allows only the minimum environmental benefits to be realised	No specific space for aquatic improvements identified. Some watercourse and ponds lost, which require mitigation.	Aquatic Environment
ENV16	Maximise flexibility in routing diverted watercourses so their habitats can be of sufficiently high quality to contribute to catchment Water Framework Directive objectives	Professional judgement based on knowledge of Water Framework Directive and Biodiversity Net Gain legislation	A	Site allows some flexibility in routing watercourses / Good quality habitat options are available	Haulage road quite close to WWD and will run to the western edge of new proposed WWD corridor, potentially reducing flexibility in design (if needed) and introducing risk of sediment ingress.	Aquatic Environment
ENV17	Minimise disturbance/encroachment into Local Geological Sites (LGS)	Checking existing national and local records	G	Site is located more than 250m from LGS	No LGS present	Biodiversity and nature conservation
ENV18A	Minimise impacts associated with Noise and Vibration as a consequence of the construction of the option	Based on information available at Gate 2, worst-case construction impacts from the rail sidings were predicted to be associated with material handling (see ENV18B). Impacts arising during other construction works are predicted to be no greater than those presented for ENV18B (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Noise and vibration impacts would be predicted to be no greater than those presented for ENV18B	Noise
ENV18B	Minimise impacts associated with Noise and Vibration as a consequence of the operation of the option	Indicative assessment with noise sensitive properties within RAG bands identified based on predicted construction noise levels during Gate 2 assessment (inc. bunding around sidings). Red band is from works site to the SOAEL+5dB distance, and Amber is from SOAEL+5dB distance to the SOAEL. Rail Sidings: Red 675m, Amber 676-1209m, Green 1210m. This is based on worst-case activity, Material Handling, which includes potential for works between 06:00 to 07:00 and was assessed using night-time noise assessment criteria at Gate 2 as a precautionary approach. The noise emission for the activity is based on G2 assumptions, with update made following review by Costain (JB 05Jun). Professional judgement used in assigning a single RAG rating for each option under review, which includes a review of the number of properties in each band and how close they are located to the RAG boundaries. Property counts do not consider screening of receptors by nearby buildings, screening at second row of properties by first row of properties. This will result in a precautionary assessment of noise impacts. NOTES: buildings to be demolished are excluded from assessment, RAG bands based on assessment approach for residential properties but all NV sensitive receptors identified at Gate 2 are included in analysis. (AB Mar24)	R	Significant effects likely which would be difficult to mitigate	Closest noise sensitive receptor to the 370,000m3 stockpile option is approximately 90m from the works site, followed by properties at approximately 100m, 155m, 220m, 240m (x2) 250m, and 265m. At these distances, and with provision of screening bunds (to completely block line of sight), there is the potential for significant noise effects. Total property counts: Option 370,000m3 Red=22, Amber=~250. A RED rating is considered appropriate for the 370,000m3 capacity option. An assessment of the smaller 220,000m3 capacity option has not been possible, as the layout drawing was not available at the time of assessment. Based on the option appraisal study completed for siding options 1 and 4, it is considered that the smaller capacity option is likely to result in slightly lower noise impacts, but that a RED rating would also be considered appropriate for the 220,000m3 option.	Noise
ENV19A	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the construction of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	A	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.	There are high sensitivity human receptors (i.e. dwellings) within 250 m of the RSMH5 works boundary with the closest (Bradfield Barns) <180 m NW from the works boundary. There are between 1 - 10 medium sensitivity human receptors (including an equestrian centre, barns and outbuildings) and between 1 - 10 low sensitivity human receptors within 200 m of RSMH 5 works boundary. Furthermore, RSMH 5 is located approximately 80-100m west of The Cuttings and Hutchin's Copse LWS, which is considered a low sensitivity receptor. Access would likely be via the new A415 to SESRO Access Road and a haul road. Construction activities include the material storage bays, a crane platform area, sidings and screening mounds. The platform will be constructed using sheet piles / retaining walls to provide greater visibility to the crane driver. It is considered that there are no proposed dust-generating construction activities that could not be managed using normal good practices (IAQM construction dust guidance, 2024) to prevent significant effects at any off-site receptor. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of construction traffic required, the potential effects would likely lead to a negligible change in air quality. Although residual effects are unlikely, the close proximity of the human receptors means this Option is assigned an Amber score. The appraisal score assigned is also applicable to Decommissioning (demolition).	Air Quality
ENV19B	Minimise impacts associated with Air Quality including dust, smell, fumes and smoke as a consequence of the operation of the option	Based on an understanding of the scale and nature of activities, sensitive receptors were identified in close proximity to the proposed works.	A	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.	The material storage capability for RSMH 5 will be 220,000 m3 (small handling area) and 370,000 m3 (large handling area). Based on the number and sensitivity of nearby receptors, it is considered that there are no proposed dust-generating operational activities that could not be managed using normal good practices (IAQM construction dust guidance, 2024) to prevent significant effects at any off-site receptor. Operation related vehicles include one crane, dumper trucks and support vehicles. Given that relatively low numbers of plant and items of machinery would be used and the anticipated number of operational traffic required, the potential effects would likely lead to a negligible change in air quality. Although residual effects are unlikely, the close proximity of the dwellings, equestrian centre, barns and outbuildings means this Option is assigned an Amber score. **Note emissions from the anticipated 2 trains per day not considered further as it would likely lead to a negligible change in air quality.	Air Quality
ENV20A	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the construction of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of East Hanney, in part due to lighting during night-time construction works. Little effect on visual amenity of Grove due to intervening vegetation.	Landscape & Visual
ENV20B	Minimise impacts associated with Visual Amenity including light pollution, as a consequence of the operation of the option	Professional judgement.	A	Noticeable changes to visual amenity of local community	Noticeable change to visual amenity of local community in vicinity of East Hanney, in part due to presence of some lighting during winter months. Little effect on visual amenity of Grove due to intervening vegetation.	Landscape & Visual
ENV21A	Minimise impacts associated with solid discharge during construction, e.g. aggregate spills during transport from rail to site, sediment runoff from soil erosion due to excavation of borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from construction likely to be readily controlled using standard construction mitigation	Pollution
ENV21B	Minimise impacts associated with solid discharge during operation, e.g. release of sediment into surrounding environment for the reservoir maintenance such as dredging, debris removal	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of solids and sediment in runoff from operation likely to be readily controlled using standard construction mitigation	Pollution
ENV22A	Minimise impacts associated with liquid discharge during construction, e.g. discharge of groundwater to during the excavation of the borrow pit	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard construction mitigation	Pollution
ENV22B	Minimise impacts associated with liquid discharge during operation, e.g. the extent and severity of altered terrestrial and aquatic habitats in affected areas due to emergency release of water	Professional judgement	G	Impacts unlikely, or adverse impacts likely to be mitigated if they occur	Spillages of liquids unlikely and readily controlled using standard mitigation	Pollution
Community and Planning Considerations						
CPC1	Distance to the nearest property that will stay during construction (metres)	GIS	R	Less than 250m from the nearest property	The closest property to the 370,000m3 stockpile option is is less than 250m away from RSMH 5.	Socio-Economic
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	GIS analysis of footprint, community assets, and links with residences.	R	Community access/use of community assets is severed, without alternative access, during construction	Rail siding site severs PRoW during construction but community assets would not be affected. PRoW will be severed but these do not appear to directly link to community assets. Land take from the possible equestrian centre and construction activities will affect the centre's operation. Although it is more a commercial asset than a community asset - it is a form of recreation that the local population may utilise and take satisfaction from.	Socio-Economic

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	GIS analysis of footprint, community assets, and links with residences.	R	Community access/use of community assets is severed, without alternative access, during operation	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. Land take from the possible equestrian centre may continue during reservoir operation and, therefore, may affect the equestrian centre's operation. Although it is more a commercial asset than a community asset - it is a form of recreation that the local population may utilise and take satisfaction from .	Socio-Economic
CPC4A	Are public rights of way disrupted or adversely affected?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	A	Recreational resources / rights of way of local importance are disrupted or affected. The site is likely to affect public rights of way	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive.	Socio-Economic
CPC4B	Are there opportunities to create or improve linkages of Public Rights of Way (PRoW) and recreational routes?	GIS analysis of PRoW, open spaces, cycle routes, canals and other forms of regional or nationally important receptors (e.g. National Cycle Routes).	A	Links to a recreational resource / right of way of local importance can be enhanced	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. The proposed redirection of the Wiltshire and Berkshire Canal would link with the severed PRoW. Therefore it would be beneficial to improve linkages with the canal.	Socio-Economic
CPC5	Maximise potential opportunity for recreational benefits	GIS analysis of PRoW, open spaces, cycle routes, canals, other forms of regional/nationally important receptors (e.g. National Cycle Routes), and community assets.	R	Option allows only the minimum recreational benefits to be realised	Rail siding site severs PRoW during construction but during operation it is assumed that PRoW will be reinstated to an extent, allowing travel between Old Mans Lane and Grove Park Drive. Land take from the possible equestrian centre during construction and, potentially, during reservoir operation may affect the equestrian centre's operation. Although it is more a commercial asset than a community asset - it is a form of recreation that the local population may utilise and take satisfaction from. The proposed redirection of the Wiltshire and Berkshire Canal would link with the severed PRoW. Therefore it would be beneficial to improve linkages with the canal.	Socio-Economic
CPC6	Support the realisation of socio-economic incentives on SESRO, including employment, skills, tourism, sustainable travel, connecting people with nature and environmental education	GIS analysis of footprint, community assets, private residents, and businesses. Also awareness of overall project objectives is needed to conclude if the designs align with these.	R	Site does not support the social-economic incentives of the overall scheme	Rail siding site severs PRoW during construction and potentially during operation, unless reinstated or adjusted to maintain access to the Wiltshire and Berkshire Canal. This realises benefits of employment and skills but potentially negatively affects sustainable travel and connecting people with nature. The possible equestrian centre provides services to the local community, recreation, connecting people with nature and environment, employment and skills. These are desirable aims and option 5 could significantly affect the centre's operation.	Socio-Economic
CPC7	Minimise overall SESRO Order Limits extent and land acquisition, without compromising SESRO needs and project benefits	Spatial comparison of land that would likely be included in the DCO Order Limits, including construction working areas, access and highways or PRoW interactions.	A	Requires minor additional Order Limits extent	RSMH5 is not within the land safeguarded for SESRO in the VoWH Local Plan and may lie outside the area that would have been required for SESRO construction works, including road diversions, requiring a larger Order Limits extent.	Consenting
CPC8	Aim for consistency with published and (insofar as possible) emerging Local Plan land use allocations	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in existing and any emerging Local Plan documents and any Supplementary Planning Documents.	A	Negotiation required with LPA to accommodate scheme within Local Plan	RSMH5 lies outside the SESRO safeguarded area in policies CP14 and CP14a. Spatially, the land-take partially conflicts with land safeguarded for transport improvements (policies CP19 and CP19a) in the VoWHDC Local Plan. However, this is safeguarded for the possible future re-opening of Grove Railway Station (albeit there are no firm plans or funding for that at the present time) and there is potential for the legacy of the SESRO rail siding development actually to facilitate being re-purposed into a passenger rail station, thus meeting the policy objective. The same remains true for the consultation draft Joint Local Plan 2041. No land use allocation conflicts with the Oxfordshire County Council Minerals and Waste Local Plans. Not within the area of the South Oxfordshire District Council Local Plan.	Consenting
CPC9	Aim for consistency with any adopted Neighbourhood Plan policy applicable to the land area affected	Spatial comparison of allocated sites and other policy areas, and review of policy wording, in any made Neighbourhood Plan.	G	Low or no impact	RSMH5 is located within the area of Grove and Ardington and Lockinge parishes. No Neighbourhood Plan is known to be in preparation for Grove, but a plan is being prepared for Ardington and Lockinge (although a draft of this is not available for viewing at this time).	Consenting
CPC10	Avoid development of infrastructure within specifically designated areas or their setting, as applicable (e.g. Green Belt, AONB, Common Land, Open Space)	Spatial comparison with designated sites, their settings, and the nature of development works expected.	A	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)	Not located within a specifically designated area, such as Green Belt, AONB, Common Land or Open Space.	Consenting
CPC11	Avoid encroachment on any safeguarded land in minerals and waste policy, unless the minerals can be beneficially utilised as a result	Spatial comparison of allocated sites and review of policy wording in existing and any emerging Waste and Minerals Local Plan documents.	G	Low or no impact	Not located in minerals safeguarding area or on a site allocated for minerals or waste uses.	Consenting
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)	Review of NSIP projects on PINS's register; review of Network Rail and National Highways investment plans; spatial review of statutory undertakers' assets.	A	Negotiation required with existing infrastructure owner / Nationally Significant Infrastructure Project (NSIP) owner/promoter to accommodate scheme	No NSIPs currently registered. No known proposals from Network Rail – the East West Rail proposal does not affect the site. However, potential for either conflict with or facilitation of the mooted re-opening of Grove Railway Station, promoted by Oxfordshire County Council. No known proposals from National Highways yet – RIS3 Investment Plan will be published in 2024 which will detail the A34 improvements project. Existing high-voltage line require diversion. However, these are not part of the electricity grid backbone. Telecoms line follows same path as Great Western Main Line, likely to be similarly affected (if any effect) by all rail siding options.	Consenting
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	Review of the nature of expected development works against the list of other consents and licenses developed at Gateway 2.	A	One or more additional consent/license required	Basic Asset Protection Agreement required with Network Rail. Not likely to add to extent or complexity of FRAP. Likelihood of at least one European protected species relocation licence required (GCN).	Consenting
CPC14	Avoid or minimise the need for any consequential development consenting (i.e. displacement or alteration of other development)	Review of existing development within the likely land-take, its nature and scale.	G	No existing development requires planning permission to relocate or alter	Mapping indicates that RSMH5 would affect land that appears to be in equestrian use. There are no planning applications that would be impacted by this option.	Consenting
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)	Review GIS layers for services against the options. Expert Judgement.	A	Several manageable interfaces with others	The location of RSMH 5 is likely to be preferred by Network Rail as it will be an extension of the existing 4 track railway and will likely cause less interruption to passenger trains as freight trains slow down to enter the siding. The location will likely require the relocation of an existing overhead HV line - introducing an additional interface with the local DNO.	Consenting
CPC16	Potential for contribution to long-term infrastructure aims	Expert judgement	G	Large contribution	OCC and VoWH have plans for a Wantage and Grove Station. The track extension and infrastructure left behind by RSMH 5 after construction has potential to be adopted by the scheme.	Consenting
CPC18	Influence the location and layout of development to maximise the use and value of existing and planned sustainable transport investment	Expert judgement	G	Option supports existing and planned public transport infrastructure between key destinations	RSMH 5 could facilitate proposals for the OCC/VoWH proposed Wantage and Grove station. After construction, the area could be adopted as part of the Wantage and Grove station scheme.	Transport Planning
Property & Land Acquisition						
PRP1	Minimise loss of sensitive properties, i.e. residential, commercial, green belt, common land, historical or community assets due to project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of sensitive properties	Land use is a combination agricultural and amenity (equine).	Property & Land Acquisition
PRP2	Minimise loss of land allocated within the Local Plan for alternative higher value / social / cultural value uses, i.e. residential, historical or community assets due project delivery	Review Land allocation mapping on ArcGIS.	G	No permanent or temporary loss of allocated land for higher value / social value properties	No permanent or temporary loss of allocated land for higher value / social value properties but amenity land might be associated with a business.	Property & Land Acquisition
PRP3	Minimise permanent loss of best and most versatile agricultural land (grades 1, 2 and 3)	Review of agricultural grading layer on ArcGIS, based on 2019 Provisional Agricultural Land Classification	A	Results in loss of any Grade 2 agricultural land or >50% Grade 3 agricultural land	Approximately 70% is Grade 3 and 30% is Grade 4.	Property & Land Acquisition
PRP4	Assessment of Land and Property asset costs and associated compensation due under the Compensation Code	Review of land use / designation on ArcGIS	A	Land acquisition costs likely to be moderate. Local or regional business or other facilities affected in addition to agricultural land	Low cost but likely to include claims for the residential properties to the west and north, and possibly business loss relating to the amenity (equine) use of some of the land.	Property & Land Acquisition

PRP5	Assessment of special land considerations, including Special Category Land (SCL) including utility infrastructure, national asset protection agencies and Crown bodies	Review of affected landowners	G	No SCL on identified option	No Special Category landowners have identified to date.	Property & Land Acquisition
PRP6	Minimise disruptions of landowners access to their land required for temporary works	Review location in conjunction with existing road network	A	Landowners unable to access their land during construction and operation phases, but access can be provided using reasonable mitigation measures	Moderate level of disruption, but this might not be an issue if property was acquired. Access to some of the amenity (equine) land would not be possible and the use of other parts for equine purposes might not be possible because of noise impacts.	Property & Land Acquisition

Appendix H Excluded Appraisal Criteria

RSMH Options - Excluded Criteria

Criteria Code	Criteria Description	Subtheme	Reason for exclusion
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	Construction Complexity	Criteria not required - The RSMH area is a temporary facility for use during construction of SESRO. Options are developed to ensure no conflict with SESRO itself and the facility will be removed following construction so there will be no conflict with future projects.
CON5A	3rd Party Impact - Potential to disrupt existing road network during enabling works and construction	3rd Party Impact	Criteria not required - all rail options are located away from the existing road network.
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	Operational Resilience	Criteria not required - this is not relevant to the rail siding infrastructure
OPS5A	Adaptability - Space available for future expansion of social / recreation infrastructure	Operational Resilience	This is not considered to be a differentiator for rail options. No social/recreation infrastructure is identified within the scope of this asset.
OPS5B	Adaptability - Flexibility for future modifications e.g. increasing reservoir storage volume, rail station at wantage and grove, construction of Marcham Bypass	Operational Resilience	The RSMH area is a temporary asset - therefore this topic is covered under OPS7A - reuse of assets of temporary works for permanent items.
OPS8A	3rd Party Impact - Potential to disrupt existing road network during operation	Transport Planning	Criteria not required - all rail options are located away from the existing road network.
CPC19	Maximise the benefits of travel for non-motorised users between key destinations	Transport Planning	At the time of appriasal, the RSMH area is not anticiapted to impact local transport infrastructure or transport planning - not considering the impact on the railway which is considered elsewhere.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