South East Strategic Reservoir Option

EIA Scoping Report

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This document has been produced to support Thames Water's request for an Environmental Impact Assessment (EIA) Scoping Opinion under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) for the South East Strategic Reservoir Option. The information presented in this document includes material or data which is still in the course of completion, pending consultation, engagement, further design development and technical assessment as part of the ongoing EIA.

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0 Executive Summary

0.1 Background

0.1.1 Thames Water Utilities Ltd. (hereafter referred to as 'Thames Water' or the 'Applicant') is seeking an Environmental Impact Assessment (EIA) Scoping Opinion under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations') for the proposed South East Strategic Reservoir Option (SESRO), the 'Project'.

0.1.2 The Project sits within the context of both a national water resources framework and national and local planning policies which, together, drive the need and requirements for national water resource management. The south-east of England gets the majority of its potable water supply from groundwater. However, the region has a large and growing population and receives comparatively little rainfall and so is considered to be 'water stressed'.

0.1.3 The Project would be a strategic water resource in the south-east of England to secure water supply for Thames Water, Affinity Water and Southern Water customers. It would comprise a new 150 million cubic metre (Mm^3) embankment reservoir (with a 650 hectare (ha) water surface area) in Oxfordshire, approximately 5km to the southwest of Abingdon.

0.1.4 The Project would abstract and store water taken from the River Thames near Culham. Water would be taken from the River Thames during high flow periods and would be released back into the river during periods of low water flows in the River Thames or during periods of high demand for abstraction further downstream, thereby providing additional resilience during drought conditions. To support the construction and operation of the reservoir the Project also incorporates access roads and diversion of an existing road, pipelines linking the reservoir to the River Thames with associated intake/outfall structures and emergency drawdown infrastructure, temporary rail sidings for material imports, a water treatment works (WTW), watercourse diversions, landscaping and habitat creation.

0.1.5 The Project falls mainly within the Vale of White Horse District with the exception of the far eastern extent which falls within South Oxfordshire District on the eastern bank of the River Thames, in the county of Oxfordshire, on generally flat agricultural land. The agricultural fields are interspersed with isolated houses and farmsteads and bisected by hedgerows and ditches with the occasional small woodland copse. There is a small industrial area in the south, associated with Steventon Depot. The nearest centres of population are Marcham to the north, Drayton to the east, Steventon to the south-east and East Hanney to the south-west. The Great Western Main Line railway runs east-west within the far southern extent of the EIA Scoping Boundary.

0.1.6 As the Project would have a capacity of over 30Mm^3, it is of the scale of project that would qualify as a Nationally Significant Infrastructure Project (NSIP) under section 14(1)(m) and section 27 (Dams and reservoirs) of the Planning Act 2008 that would need to be consented by a Development Consent Order (DCO). DCO applications are examined by an Examining Authority appointed by the Planning Inspectorate (PINS), which will make a recommendation to the Secretary of State (SoS) for the Department for Environment, Food and Rural Affairs (Defra) who will determine whether to grant consent.

0.2 Purpose of the Report

0.2.1 The purpose of this EIA Scoping Report is to support a request to PINS for an EIA Scoping Opinion for the Project. Given the scale of the Project it has been assumed that EIA is required and a request for a Screening Opinion from PINS has not been made.

0.2.2 This report presents the data collected, sets out the potential for likely significant effects from the Project and details the Applicant's intended approach to the EIA in terms of the scope, methodology and content of the Environmental Statement (ES) that will accompany the DCO application.

0.2.3 The process of EIA scoping determines which technical aspects have the potential to be significantly affected by the Project (scoped in) and which are not (scoped out). This EIA Scoping Report aims to deliver a proportionate ES for the SESRO Project. Proportionate EIA means that the assessment focuses on environmental effects that are anticipated to be significant, whilst scoping out, with justification, those that are not.

0.3 Structure of the Report

0.3.1 Chapters 1 to 5 of this report provide an introduction to the Project and its context, formally request a Scoping Opinion from PINS, provide a summary of the consultation undertaken to date and detail the overarching EIA method principles adopted for the preparation of the report.

0.3.2 Each EIA aspect chapter (Chapters 6 -19) follows a consistent structure, as far as practicable, subject to relevant aspect specific guidance. The typical structure is as follows:

- Introduction
- Legislation, Policy, Standards and Guidance Context
- Engagement
- Existing Environment and Baseline Conditions
- Sensitive Receptors and Potential Environmental Effects

- Assessment Methodology
- Mitigation and Environmental Net gain
- Summary of Scope for the EIA

0.3.3 Chapter 20 addresses the approach to the assessment of the cumulative effects of the Project with other proposed developments.

0.3.4 The final Summary and Conclusions chapter summarises the scope conclusions from the previous aspect chapters, sets out the proposed structure for the ES, details the next steps and identifies other environmental documents which will be submitted to support the DCO.

0.4 Scoping Summary

0.4.1 Table 0-1 below summarises the aspects and matters that are proposed to be scoped in and out of the EIA. This is based on the baseline and current Project proposals and whether the Project has the potential to result in significant effects on relevant receptors. The rationale for these scoping conclusions is set out within the individual aspect chapters (Chapters 6 to 20).

Table 0-1 Scoping Summary

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
Water Environment (see Chapter 6)	Flood Risk	IN	IN
	Hydrology	IN	IN
	Fluvial Geomorphology	IN	IN
	Surface Water Quality	IN	IN
	Hydrogeology	IN	IN
Aquatic Ecology (see Chapter 7)	Statutory and non-statutory designated sites and notable (e.g. priority) habitats	IN	IN
	Watercourse and pond habitats	IN	IN
	Fish (including protected and notable species)	IN	IN
	Macroinvertebrates (including protected and notable species)	IN	IN
	Macrophytes (including protected and notable species)	IN	IN
	Phytobenthos (Diatoms)	IN	IN
	Phytoplankton	Out	IN
	Zooplankton	Out	IN
Terrestrial Ecology (see Chapter 8)	European designated sites	IN	IN
	Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR)	IN	IN
	Local Nature Reserves (LNR)	Out	Out
	Local Wildlife Sites (LWS)	IN	Out
	Badger	IN	IN

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
	Bats	IN	IN
	Birds – breeding, wintering and Schedule 1 species	IN	IN
	Hazel dormouse	Out	Out
	Great crested newt	IN	Out
	Otter	IN	IN
	Water vole	IN	IN
	Natterjack toad	IN	Out
	Other amphibians	IN	Out
	Priority species	IN	IN
	Reptiles	IN	Out
	Terrestrial invertebrates	IN	IN
	Ancient woodland	Out	Out
	Ancient/veteran trees	IN	Out
	Priority habitats	IN	Out
	Notable vascular plants	IN	Out
Landscape and Visual Effects (see Chapter 9)	Landscape	IN	IN
	Visual	IN	IN
Historic Environment (see Chapter 10)	Non-designated archaeology	IN	Out
	Non-designated paleoenvironmental resources	IN	IN

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
	Non-designated historic structures	IN	IN
	Listed Buildings	IN	IN
	Non-designated historic landscapes	IN	IN
	Scheduled monuments	IN	Out
	Registered Parks and Gardens	IN	IN
	Historically important hedgerows	IN	Out
Traffic and Movement (see Chapter 11)	Severance	IN	IN
	Driver delay	IN	IN
	Pedestrian delay	IN	IN
	Non-motorised user amenity	IN	IN
	Fear and intimidation	IN	IN
	Road user and pedestrian safety	IN	IN
	Hazardous/large loads	IN	Out
Noise and Vibration (see Chapter 12)	Construction airborne noise	IN	N/A
	Construction vibration	IN	N/A
	Groundborne noise and vibration from tunnelling	IN	N/A
	Construction road traffic noise and vibration	IN	N/A
	Rail noise and vibration	IN	N/A
	Potential use of on-site temporary worker accommodation	IN	N/A

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
	Noise from the pumping station and intake/outfall structures	N/A	IN
	Operational vibration from pumping station and intake/outfall structures	N/A	Out
	Noise from the operation of valves	N/A	Out
	Noise and vibration from the flow of water within the underground pipeline	N/A	Out
	Noise during emergency conditions	N/A	Out
	Noise from transformer substations	N/A	Out
	Operational road traffic noise	N/A	IN
	Operation of diverted 132kV (and lower) overhead powerlines	N/A	Out
Air Quality (see Chapter 13)	Dust and particulate matter	IN	Out
	Emissions from site plant and machinery	Out	N/A
	Emissions from proposed freight trains transporting bulk material	Out	N/A
	Emissions from off-site traffic	Out	Out
	Odour from construction / operational activities	Out	Out
	Operational pollutant emissions	N/A	Out
Geology and Soils (see Chapter 14)	Geological designations	IN	Out
	Soils supporting biomass production	IN	Out
	Soils supporting sites of ecological importance	IN	Out
	Soil carbon	IN	Out
	Land contamination	IN	IN
Materials and Waste	Materials availability	IN	Out

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
(see Chapter 15)	Mineral safeguarding sites	Out	Out
	Landfill void capacity	IN	Out
Carbon and Climate Change (see Chapter 16) Note: Micro-climate - potential changes to frost and fog will be explored in relation to traffic accidents in the Traffic and Movement assessment at the request of highways consultees	Impact on climate (greenhouse gas emissions) - Construction phase greenhouse gas emissions (lifecycle modules A1 – A5)	IN	N/A
	Impact on climate (greenhouse gas emissions) - Operation phase greenhouse gas emissions (lifecycle modules B1 – B8, D2	N/A	IN
	Vulnerability to climate change - projected changes in temperature, dry periods, precipitation, extreme events and flooding	Out	IN
	Vulnerability to climate change - projected changes in wind speed	Out	Out
	Vulnerability to climate change - in combination climate assessment	Out	IN
	Micro-climate - potential changes to local temperatures, and winds	Out	Out
	Micro-climate - potential changes to frost and fog	Out	IN
Communities (see Chapter 17)	Accessibility	IN	IN
	Land take	IN	IN
	Amenity	IN	IN
	Employment	IN	IN
	Economic activity	IN	IN
	Skills	IN	IN
	Accommodation	IN	IN
	Public services	IN	Out
Human Health	Healthy Lifestyles	IN	IN

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
(see Chapter 18)	Safe and cohesive communities: Housing	IN	IN
	Safe and cohesive communities: Built environment	IN	IN
	Safe and cohesive communities: Transport	IN	IN
	Safe and cohesive communities: Community safety	IN	IN
	Safe and cohesive communities: Community identity	IN	IN
	Socio-economic conditions: Education	IN	IN
	Socio-economic conditions: Socio-economic status	IN	IN
	Environmental conditions: Climate change	Out	IN
	Environmental conditions: Air quality	IN	Out
	Environmental conditions: Water	IN	IN
	Environmental conditions: Soil	IN	IN
	Environmental conditions: Noise	IN	IN
	Environmental conditions: Radiation	IN	IN
	Health and social care services	IN	IN
	Wider societal benefits	IN	IN
Major Accidents and Disasters (see Chapter 19) Note: Some matters to be dealt with in other assessment chapters (e.g.	Animal strike (including bird strike)	IN	IN
	Insect infestation/disease	Out	Out
	Healthcare	N/A	IN
	Water supply affected (various factors)	N/A	IN
	Severe weather events (fog and ice)	N/A	IN

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
Water, Geology and Soils and Traffic and Movement)	Severe weather events (heatwaves, drought, rain, low temperatures, heavy snow, hail, lightning, high winds and tornado)	Out	Out
	Landslides/mass movements	Out	N/A
	Sinkholes	N/A	N/A
	Ground hazards/mobilisation of contamination	IN	N/A
	Inland flooding	IN	IN
	Emergency drawdown to the River Thames	N/A	IN
	Reservoir/dam collapse	N/A	Out
	Building fire/failure	N/A	Out
	Critical infrastructure failure/utilities failure not associated with the project	Out	N/A
	Critical failure of the existing electrical substation (Steventon)	Out	Out
	Ground instability	Out	Out
	Groundwater levels (flooding)	IN	IN
	Defence / military accidents (UXO)	Out	N/A
	Industrial sites (Control of Major Accident and Hazards (COMAH) / Major Accident Control Regulations (MACR))	N/A	Out
	Traffic accidents	IN	IN
	Accidents involving pedestrians	IN	IN
	Rail accidents associated with temporary sidings	IN	N/A
	Water sports accidents/drowning	N/A	Out

Environmental Aspect	Environmental Matter	Scoped In/Out	
		Construction	Operation
	Terrorist attack on people (bomb, chemical, vehicle, malicious drone incident)	N/A	Out
Cumulative Effects (see Chapter 20) Note: Intra-development effects assessed within each aspect chapter	Intra-development effects	IN	IN
	Inter-development effects associated with the Short List	IN	IN

1 Introduction

1.1 Background

1.1.1 Thames Water Utilities Ltd. (hereafter referred to as 'Thames Water' or the 'Applicant') is seeking an Environmental Impact Assessment (EIA) Scoping Opinion under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations') for the proposed South East Strategic Reservoir Option (SESRO), the 'Project'.

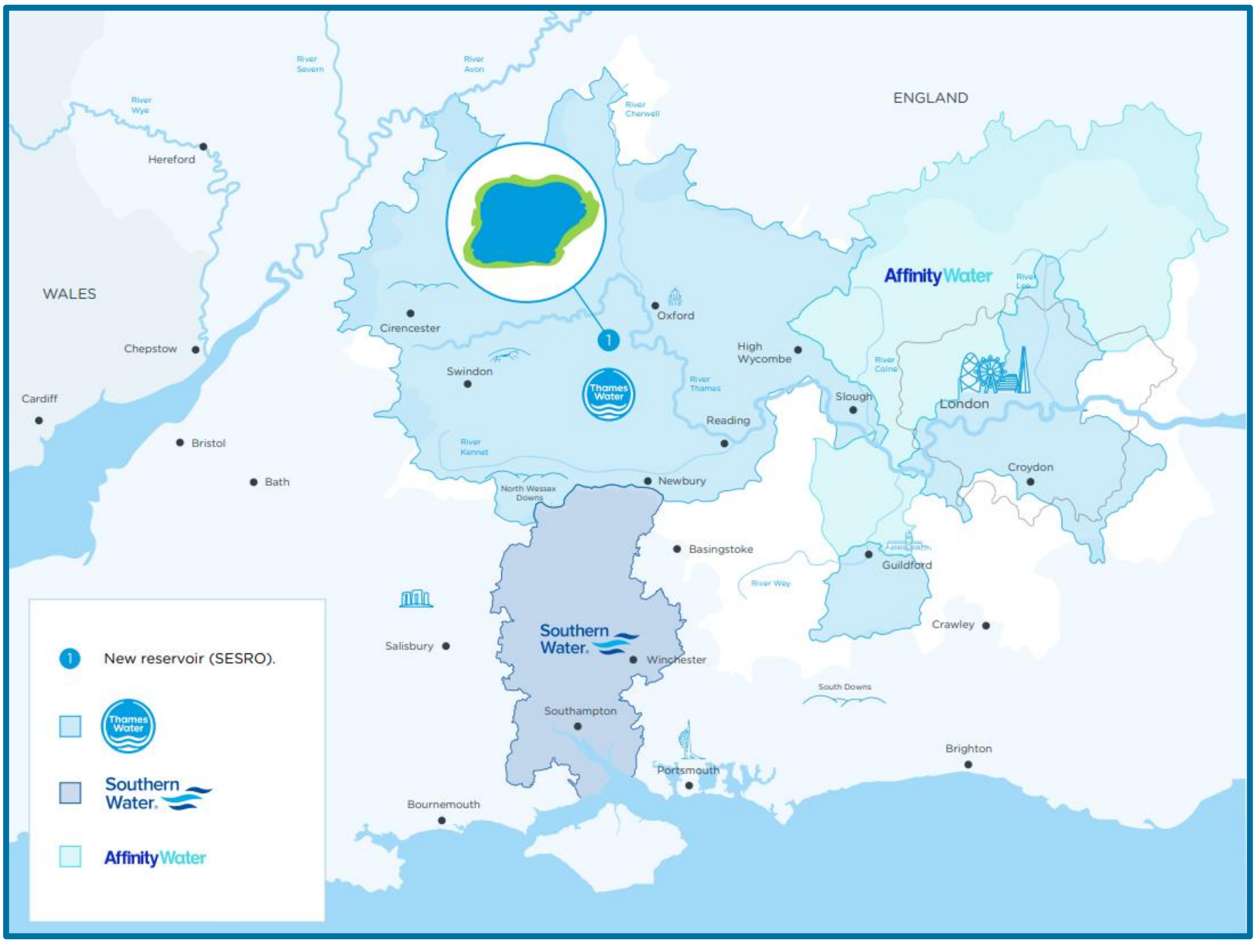
1.1.2 The Project would be a strategic water resource in the south-east of England to secure water supply for Thames Water, Affinity Water and Southern Water customers. It would comprise a new 150 million cubic metre (Mm^3) embankment reservoir (with a 650 hectare (ha) water surface area) in Oxfordshire, approximately 5km to the south-west of Abingdon (see Figure 1.1).

1.1.3 Details of the SESRO Project are provided in Chapter 2 – Project Description.

1.1.4 As SESRO would have a capacity of over 30 million cubic metres, it is of the scale of project that would qualify as a Nationally Significant Infrastructure Project (NSIP) under section 14(1)(m) and section 27 (Dams and reservoirs) of the Planning Act 2008 that would need to be consented by a Development Consent Order (DCO). DCO applications are examined by an Examining Authority appointed by the Planning Inspectorate (PINS), which will make a recommendation to the Secretary of State (SoS) for the Department for Environment, Food and Rural Affairs (Defra) who will determine whether to grant consent.

1.1.5 The purpose of this EIA Scoping Report is to support a request to PINS for an EIA Scoping Opinion for the Project within the EIA Scoping Boundary shown on Figure 1.2. Given the scale of the Project it has been assumed that EIA is required and a request for a Screening Opinion from PINS has not been made.

Figure 1.1 Location plan



1.2 EIA Notification and Scoping Request

1.2.1 The Applicant intends to submit an Environmental Statement (ES) to PINS, who will examine the application on behalf of the Secretary of State for Environment, Food and Rural Affairs (Defra), to support a DCO application.

1.2.2 The purpose of EIA is to protect the environment by ensuring that decision makers, when deciding whether to grant consent for a Project which is likely to have significant effects on the environment, do so in the full knowledge of the likely effects and take this into account in the decision-making process (Department for Levelling Up, Housing and Communities (DLUHC), 2020).

1.2.3 The EIA process is defined as *'a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects'* (PINS, 2020). There are three main EIA documents produced as part the pre-application process for developments requiring development consent under the Planning Act 2008 (as amended). These are:

- Scoping Report: The Scoping Report sets out the potential for likely significant effects from a proposed project (scope). It also presents the data collected and the proposed assessment methodology and approach that would be used during the EIA. The Scoping Report is issued by PINS to consultees for comment on the scope and methodology proposed
- Preliminary Environmental Information (PEI) Report: The PEI Report sets out the information that '*is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development'* (PINS, 2020). The PEI Report is used by consultees to inform their consultation responses during statutory consultation on a proposed project, and
- Environmental Statement (ES): The ES presents the results of the EIA undertaken for a project. It identifies the likely significant effects that would result if the project was implemented and any proposed mitigation to reduce those significant effects. The ES is submitted as part of the application for development consent and is taken into account during the decision-making process

1.2.4 In relation to the first document set out above (EIA Scoping Report) a request for a formal EIA Scoping Opinion is sought for the SESRO Project from PINS under Regulation 10 of the EIA Regulations.

1.2.5 As the purpose of EIA scoping is to seek agreement with the determining authority (in this case PINS) on the scope and level of detail of the information to be provided in the ES (Regulation 10(1)), an EIA Scoping Report should provide sufficient information for the determining authority to adopt a Scoping Opinion with respect to Regulation 10(3) as follows:

'A request under paragraph (1) must include—

(a) a plan sufficient to identify the land;

(b) a description of the proposed development, including its location and technical capacity;

(c) an explanation of the likely significant effects of the development on the environment; and

(d) such other information or representations as the person making the request may wish to provide or make'.

1.2.6 This EIA Scoping Report has been provided in accordance with the above requirements. The information relating to (a) is provided in Figure 1.2. Information relating to (b) is provided in Chapter 2 – Project Description. The technical aspect chapters (Chapters 6 to 20) set out the remaining information requirements relating to (c) and (d).

1.2.7 In addition, the following PINS advice notes have been taken into account:

- Nationally Significant Infrastructure Projects – Advice Note 3: EIA Notification and consultation – which states that 'It is the responsibility of the Applicant to ensure that their pre-application consultation fully accords with the requirements of the PA2008 [the Planning Act 2008], including associated regulations, and that they have regard to relevant guidance'. Engagement activities with regard to EIA Scoping are set out in Chapter 4 – Consultation and Engagement and in each technical aspect chapter
- Nationally Significant Infrastructure Projects – Advice Note 7: Environmental Impact Assessment: process, preliminary environmental information and environmental statements

1.2.8 In relation to Advice Note 7 (Insert 2), PINS recommend that the following information is supplied in an EIA Scoping Report:

- The Proposed Development
  - an explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development e.g. design parameters; Provided in Chapters 2 – Project Description and 3 – Consideration of Alternatives
  - referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development; Provided throughout this Scoping Report
- EIA Approach and Topic Areas
  - an outline of the reasonable alternatives considered and the reasons for selecting the preferred option; Provided in Chapters 2 – Project Description; and 3 – Consideration of Alternatives
  - a summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues; Provided in Chapter 21 – Summary and Conclusions and at the end of each technical aspect chapter
  - a detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided; Provided in each technical aspect chapter
  - results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters; Provided in each technical aspect chapter

  - aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g. criteria for determining sensitivity and magnitude; Provided in each technical aspect chapter
  - any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects; provided in each technical aspect chapter
- Information Sources
  - references to any guidance and good practice to be relied upon; Provided in each technical aspect chapter
  - evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities); provided in each technical aspect chapter and Chapter 4 – Consultation and Engagement
- An outline of the structure of the proposed ES; Provided in Chapter 21 – Summary and Conclusions

1.3 Purpose of the Report

1.3.1 This EIA Scoping Report sets out the Applicant's intended approach to EIA in terms of the scope, methodology and content of the ES that will accompany the DCO application for SESRO. This report has been produced in accordance with the requirements of EIA Regulations, having regard to relevant PINS Advice Notes, including the requirements of Advice Note 7 as set out in paragraph 1.2.8 above.

1.3.2 The process of EIA scoping determines which technical aspects have the potential to be significantly affected by the Project (scoped in) and which are not (scoped out). This EIA Scoping Report is submitted to PINS to enable it to provide an EIA Scoping Opinion. Even though it is not a legal requirement to request an EIA Scoping Opinion if an EIA is required for a development, it is a requirement that the ES must be based on the most recent EIA Scoping Opinion where a Scoping Opinion has been adopted by PINS.

1.3.3 This EIA Scoping Report aims to deliver a proportionate ES for the SESRO Project. Proportionate EIA means that the assessment focuses on environmental effects that are anticipated to be significant, whilst scoping out, with justification, those that are not. This method has two main advantages:

- The EIA process does not become unnecessarily onerous, focussing on baseline data collection and technical assessment on the issues genuinely likely to cause significant effects
- It avoids excessively long, repetitive and poorly coordinated ES

1.3.4 EIA scoping also allows the assessment methodologies to be applied, the level of detail required, and the data to be used in the assessment to be agreed, as far as practicable, in advance of submission of the ES. This helps minimise change and re-work subsequent to DCO submission and ensures a robust final assessment.

1.4 The Applicant

1.4.1 Thames Water is a private company that supplies around 2,600 million litres per day of water to around 10 million people and 220,000 businesses and is the UK's largest water and wastewater services company. Its activities span a large area of south-east England, over six separate Water Resource Zones. These areas include London as well as parts of Berkshire, Gloucestershire, Hertfordshire, Kent, Oxfordshire, Surrey and Wiltshire; from Cirencester in the west to Dartford in the east and from Banbury in the north to Guildford in the south, covering over 13,000km^2. Thames Water obtains its water supply from a mix of surface water sources (mostly from large storage reservoirs supplied from the River Thames and River Lee) and groundwater sources. The Applicant also has a desalination WTW on the River Thames (Tideway) that can supplement water supplies at times of high demand and / or during drought conditions.

1.5 Context of the Project

Project need

1.5.1 SESRO sits within the context of both a national water resources framework and national and local planning policies which, together, drive the need and requirements for water resource management. The south-east of England gets the majority of its potable water supply from groundwater. However, the region has a large and growing population and receives comparatively little rainfall and so is considered to be 'water stressed'.

1.5.2 The Environment Agency has published The National Framework for Water Resources plans for England's future water needs (Environment Agency, 2020) (the 'Framework') which can be found on the UK Government website[1]. This sets out actions required to ensure resilient water supplies. It is reported that if no action is taken between 2025 and 2050, approximately 3,435 million litres of additional water per day will be required to address future pressures.

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[1]*https://assets.publishing.service.gov.uk/media/5e70c2c4e90e070acfef5077/National_Framework_for_water_resources_summary.pdf*

1.5.3 The Framework requires water companies to work together in regional groups to produce regional plans. Each regional group must produce a single plan that builds resilience to a range of uncertainties and future scenarios. The groups are required to develop a preferred plan for the region, through a set of options that represent the best value to customers, society and the environment. To ensure a secure sustainable water supply for future generations, Thames Water has worked with five other water companies (as part of Water Resources South East (WRSE)). The draft WRSE regional plan (2023) can be found on the WRSE website[2].

1.5.4 Under the Water Industry Act 1991 water companies are further required to produce Water Resources Management Plans (WRMPs) every five years. The water stressed status of south-east England was recognised by Ofwat (the Water Services Regulation Authority) following submission of the Water Resource Management Plans 2019 (Various Water Companies, 2019), and, subsequently, funding was provided for water companies to investigate, then develop, Strategic Resource Options (SROs) that will benefit customers and wider society and help to protect and enhance the environment.

1.5.5 Accordingly, Thames Water developed a revised draft Water Resources Management Plan 2024 (rdWRMP24). The rdWRMP24 was derived from the revised draft WRSE regional plan and establishes the need for a new 150Mm^3 reservoir that will supply Thames Water, Southern Water (including onwards transfer to South East Water) and Affinity Water customers as shown on Figure 1.3. The rdWRMP24 can be found on the Thames Water website[3].

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[2] *https://www.wrse.org.uk/media/osjgqafk/wrse-revised-draft-regional-plan-august-2023-v1-1.pdf*

[3] *https://thames-wrmp.co.uk/document-library/*

Figure 1.3 SESRO a regional water resource

1.5.6 National planning policy was designated for water resources infrastructure projects in the National Policy Statement (NPS) for Water Resources Infrastructure in 2023 (Defra, 2023) which can be found on the UK Government website[4].

1.5.7 The NPS sets out the need, and UK Government policies, for development of nationally significant infrastructure projects (NSIPs) for water resources in England.

1.5.8 Paragraph 1.4.5 of the NPS states:

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

1.5.9 On the basis that SESRO is anticipated to be included in a published final WRMP by the point of the SESRO DCO application submission, the EIA is not expected to set out the need for SESRO.

1.5.10 The legislative and policy context of the SESRO Project is set out in Appendix A. Alternatives are dealt with in Chapter 3 – Consideration of Alternatives.

Proposed project location

1.5.11 The Project falls mainly within Vale of White Horse District with the exception of the far eastern extent which falls within South Oxfordshire District on the eastern bank of the River Thames, in the county of Oxfordshire. It is centred around grid reference NGR SUJ 44808 93501 (see Figures 1.1 and 1.2) and the EIA Scoping Boundary encompasses an area of approximately 2,400ha (24km^2).

1.5.12 The reservoir location for SESRO proposed by the WRMP is within the area bounded by the A34 and the village of Steventon to the east, the Great Western Main Line (London to Bristol) to the south, the A338 and village of East Hanney to the west and the River Ock to the north.

[4]*https://assets.publishing.service.gov.uk/media/6437e3a2f4d420000cd4a1a7/E02879931_National_Policy_Statement_for_Water_Resources.pdf*

Overview of the current environment

1.5.13 Physical constraints to the main project area (i.e. all parts of the development except the intake/outfall structures) are illustrated on Figure 1.4 and include the Childrey Brook and River Ock immediately to the north of the EIA Scoping Boundary, the A34 dual carriageway immediately to the east, the Great Western Main Line railway immediately to the south and the A338 immediately to the west. The nearest centres of population are Marcham to the north, Drayton to the east, Steventon to the south-east and East Hanney to the south-west.

1.5.14 SESRO lies on generally flat agricultural land, sloping gently from approximately 65m AOD along the Great Western Main Line railway in the south, down to 54m AOD along the River Ock to the north, and back up to 57m AOD to the north of the A415 Marcham Road. The agricultural fields are interspersed with isolated houses and farmsteads and bisected by hedgerows and ditches with the occasional small woodland copse. There is a small industrial area in the south, associated with Steventon Depot.

1.5.15 SESRO is underlain by bedrock strata of Kimmeridge and Gault Clays which would be used to construct the embankments. This bedrock strata overlay the Corallian limestone formation which is a principal aquifer.

1.5.16 The EIA Scoping Boundary contains no statutory international or national designations for ecology but does include The Cuttings and Hutchins Copse Local Wildlife Site (LWS) in the southern part of the site, primarily to the north of the Great Western Main Line railway. This comprises broadleaved deciduous woodland and ponds supporting great crested newts (GCN) *Triturus cristatus*. Other LWSs near, but beyond the EIA Scoping Boundary, include; Marcham Salt Springs to the south of Marcham (approximately 100m to the west of the EIA Scoping Boundary) and Cowslip Meadows to the south-east of East Hanney (approximately 350m to the west of the EIA Scoping Boundary). Hyde Copse ancient woodland also lies to the immediate north-east of Marcham (approximately 300m to the north of the EIA Scoping Boundary).

1.5.17 Within the SESRO EIA Scoping Boundary, there is one ancient tree, north-west of Drayton Copse, and several veteran and ancient trees south of Marcham including along the River Ock and in the vicinity of Marcham Mill and Meadow Farmhouse, identified on The Woodland Trust Ancient Tree Inventory (checked July 2024). However, survey may identify other potential ancient and veteran trees. The closest nationally designated Site of Special Scientific Interest (SSSI) is Barrow Farm Fen approximately 400m north of the EIA Scoping Boundary and the closest internationally designated Special Area of Conservation (SAC) is Cothill Fen approximately 2.5km north.

1.5.18 The land within the EIA Scoping Boundary and wider area is known to support protected species such as GCN, various bat species, badgers *Meles meles*, breeding birds, otter *Lutra lutra and* water vole *Arvicola amphibius*.

1.5.19 SESRO is located within the River Ock hydrological catchment, which forms part of the River Thames river basin. The River Ock and its tributaries flow into the River Thames at Abingdon-on-Thames. Watercourses within the SESRO EIA Scoping Boundary generally flow from the south to the north, forming tributaries of the River Ock. The Cow Common Brook and Mere Dyke system (both designated as a Main River by the Environment Agency) cross the site and will need to be diverted around the reservoir. To the west, the East Hanney Ditch will also need to be realigned to make space for the watercourse diversions. The northern area within the EIA Scoping Boundary falls within the floodplain of the Childrey Brook and River Ock (also Main Rivers). The shallow depth of soils over the clay has resulted in surface water flooding in the area in recent years. A small number of ponds and an extensive network of ditches occur within and around the EIA Scoping Boundary.

1.5.20 The aquatic ecology and water study areas are split broadly between those water bodies within the River Ock Catchment (those within the SESRO EIA Scoping Boundary) and the River Thames. All water bodies are at Poor or Moderate Ecological Status/Potential. Those water bodies within the EIA Scoping Boundary for SESRO, as well as the receiving Thames water body, also have a Poor or Moderate biological element class.

1.5.21 Based on currently available data, most watercourses within the Ock catchment are characterised by low fish species richness and abundance. The River Thames supports a comparatively species-rich fish community, dominated by coarse fish with roach *Rutilus rutilus* and bleak *Alburnus alburnus* present in the highest densities. Notable species recorded in the Thames include European eel *Anguila anguila* as well as other, less abundant, notable species including Atlantic salmon *Salmo salar*, barbel *Barbus barbus*, brown/sea trout *Salmo trutta*, bullhead *Cottus gobio* and lamprey *Petromyzon sp*.

1.5.22 Macroinvertebrate communities from watercourses within the Ock Catchment and the River Thames are broadly indicative of good water quality. Several species of conservation interest have been recorded.

1.5.23 Macrophyte communities are variable throughout the study area but are typically characteristic of nutrient enriched rivers. Phytobenthos communities also reflect these conditions.

1.5.24 Phytoplankton and zooplankton communities are also an important component of the River Thames, maintaining primary and secondary productivity that supports the wider function of the river and its macroinvertebrate and fish assemblages.

1.5.25 There are no international historic environment designations within the EIA Scoping Boundary. However, there are six Listed Buildings located within the EIA Scoping Boundary: two milestones on the A338, Marcham Mill; a bridge near Marcham Mill; Stonehill House and attached outbuildings and two barns approximately 30m south-west of Stonehill House. These historic buildings are Grade II Listed. There are, also, several listed buildings present in the surrounding area. These are mainly grade II and II*, with a smaller number of grade I listed buildings, all of which are primarily concentrated in Conservation Areas associated with the surrounding villages and towns including Abingdon Town Centre; Abingdon Albert Park; Sutton Courtenay; Drayton; Milton; Steventon; Grove; East Hanney, West Hanney, Culham and Marcham. East Hanney and Culham Conservation Areas abut the EIA Scoping Boundary. The site is known to contain varied archaeological interest from a range of historic and pre-historic periods. The nearest scheduled monument is Sutton Wick Settlement Site, adjacent to the indicative intake/outfall pipeline route corridor, and the closest registered park and garden is at Sutton Courtenay Manor in Sutton Courtney (approximately 400m south-east of the EIA Scoping Boundary). The route of the old Wiltshire and Berkshire Canal crosses the area within the EIA Scoping Boundary. While the canal has been redundant since 1914, and much of it is infilled, parts of the route remain as watercourses. Some canal features, such as disused canal locks also remain.

1.5.26 The fringe of the Oxford Green Belt falls just within the EIA Scoping Boundary, immediately to the north of A415 Marcham Road and to the east of the River Thames. The North Wessex Downs National Landscape (North Wessex Downs NL) lies over 2km to the south and views of the SESRO site are available from the scarp of the downs, including from the Ridgeway National Trail.

1.5.27 The area within the EIA Scoping Boundary for SESRO is crossed by several public rights of way (PRoW). The intake/outfall structure for the Project, which would facilitate the movement of water in both directions between the proposed reservoir and the River Thames, is proposed in the area around the existing Abingdon STW on the banks of the River Thames. The Thames Path National Trail follows the left (north) bank of the river, while the Vale Way Long Distance Path and National Cycle Network (NCN) Route 5 is located approximately 300m to the west of the river.

1.5.28 The closest Air Quality Management Area (AQMA) is in the village of Marcham on the A415 to the immediate north of the EIA Scoping Boundary for SESRO. Noise Important Areas (NIA) are associated with the A34, A338, A415 Marcham Road and Stert Street in Abingdon and the Great Western Main Line railway in Steventon, none of which are located within the EIA Scoping Boundary.

1.5.29 Details of environmental designations and other baseline environmental information are set out in the individual technical aspect chapters, Chapters 6 to 20.

1.6 Non-statutory Consultation

1.6.1 The Applicant is carrying out a public consultation this summer (2024) in which it is seeking feedback from the public and stakeholders about its proposals and options for the SESRO Project. Feedback received during the public consultation, as well as ongoing engagement, will help to shape the proposals for the new reservoir. Further details are provided in Chapter 4 – Consultation and Engagement.

1.7 Structure of this EIA Scoping Report

1.7.1 This EIA Scoping Report provides details of the surveys and assessments carried out to date and describes how the Applicant proposes to undertake the EIA.

1.7.2 The contents of the EIA Scoping Report are structured as set out in Table 1-1.

Table 1-1 EIA Scoping Report structure

Chapter	Outline
Executive Summary	Provides an overview of the EIA Scoping Report
Introductory chapters	Introduces the Project and its context, formally requests a Scoping Opinion from PINS, provides a summary of consultation undertaken and overarching EIA method principles
1 - Introduction	Sets out the background, project overview and the purpose and structure of the EIA Scoping Report
2 – Project Description	Sets out the proposed Project elements
3 – Consideration of Alternatives	Outlines the alternatives considered as part of the design process to date
4 – Consultation and Engagement	Provides an overview of the consultation and engagement held to date for the Project, specifically relating to EIA scoping
5 – EIA Methodology	Outlines the proposed overarching approach to the EIA
Environmental Aspects	Each EIA aspect chapter (Chapters 6 – 19) follows a consistent structure, where practicable. Note, however, that different assessments include different matters and approaches such that
6 – Water Resources	

Chapter	Outline
7 – Aquatic Ecology 8 – Terrestrial Ecology 9 – Landscape and Visual Effects 10 – Historic Environment 11 – Traffic and Movement 12 – Noise and Vibration 13 – Air Quality 14 – Geology and Soils 15 – Materials and Waste 16 – Carbon and Climate Change 17 – Communities 18 – Human Health 19 – Major Accidents and Disasters	there are some differences in chapter structure and headings in line with relevant aspect specific guidance. The typical structure of each environmental aspect chapter is as follows: • Introduction – sets out what the chapter covers • Legislation, Policy, Standards and Guidance – provides a brief summary of legislation, national and local policy, standards and guidance relevant to defining the scope of the assessment • Engagement – details the outcomes of topic specific engagement regarding EIA scoping undertaken to date relevant to the assessment • Existing environment and baseline conditions – in order to identify the potential for effects of the Project on the EIA aspect, the existing environmental baseline conditions are considered. This includes a review of the available baseline data and identifies where further data needs to be collected • Sensitive receptors and potential environmental effects – the baseline sensitive receptors that have the potential to be impacted by the Project are described. Where any issues are scoped out this is identified and explained • Assessment methodology – sets out the specific methodologies to be used to identify likely significant effects. Where topic specific guidelines are available these are referenced. Any assumptions that are made, or limitations to the assessment, are also set out • Mitigation –mitigation measures are set out, where known at this early stage, and where this would affect the scope of the EIA • Summary of EIA Scope – summarises scoping in or out of issues
20 – Cumulative Effects	Sets out the approach to assessment of cumulative effects with other proposed developments
21 – Summary and Conclusions	• Summarises the Scope of the EIA from the previous aspect chapters • Sets out the proposed structure of the ES • Lists other documentation to supporting the DCO application • Sets out the next steps

1.7.3 Additional information supporting the EIA chapters are provided in the following appendices:

- Appendix A – National Planning Policy and Legislation Context
- Appendix B – Aquatic Ecology Surveys, Scope and Methodology
- Appendix C – Terrestrial Ecology Surveys, Scope and Methodology
- Appendix D – Landscape Policy and Guidance
- Appendix E – Landscape Character
- Appendix F – Arboricultural Survey Strategy
- Appendix G – Landscape and Visual Impact Assessment Methodology
- Appendix H – Historic Environment Asset information
- Appendix I – Glossary of Acoustic Terms and Definitions
- Appendix J – Noise and Vibration Assessment Approach – Supplementary Information
- Appendix K – Air Quality – Baseline Conditions
- Appendix L – Communities – Overview
- Appendix M – Human Health Determinants Scoping Indicators
- Appendix N – Human Health Glossary
- Appendix O – Long List of Developments
- Appendix P – Short List of Developments

1.7.4 This EIA Scoping Report is also supported by the following figures:

- Figure 1.1 – Local plan
- Figure 1.2 – EIA Scoping Boundary
- Figure 1.3 – SESRO a regional water resource
- Figure 1.4 – Physical constraints and environmental designations
- Figure 2.1 – Zoning plan
- Figure 3.1 – Overview of regional and water company water resource planning framework
- Figure 3.2 – SESRO Multi-disciplinary design development process
- Figure 3.3 – Potential intake / outfall structure location options
- Figure 3.4 – Main access road options
- Figure 3.5 – Steventon to East Hanney road diversion options
- Figure 3.6 – Rail sidings and material handling area – search area options
- Figure 3.7 – WTW options
- Figure 3.8 – Interim landscape and environmental master plan
- Figure 3.9 – Interim landscape and environmental master plan indicative embankment cross section (sheets 1 to 3)
- Figure 5.1 – EIA process
- Figure 5.2 – Matrix of significance
- Figure 6.1 – Study area river reaches and WFD waterbodies
- Figure 6.2 – Existing flood risk in proximity to SESRO
- Figure 6.3 – Bedrock geology within water environment study area

1.8 References

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2 Project Description

2.1 Introduction

2.1.1 This chapter presents the land required for the South East Strategic Reservoir Option (SESRO) (Figure 1.2) and provides a description of the Project, including its location and capacity. It describes the proposed reservoir, associated infrastructure, landscape and habitat creation and other works which together constitute the SESRO Project.

2.1.2 The purpose is to provide an initial description of the scale, nature and duration of construction works, the proposed form of the completed development, its operation for water supply and its use by visitors, such that potential environmental and social impact pathways can be identified.

2.1.3 This enables the scope and approach to assessing impact pathways considered to have the potential for likely significant effects to be established and, equally importantly for a proportionate Environmental Impact Assessment (EIA), for non-relevant impact pathways or matters within them to be identified and scoped out of the EIA.

2.2 EIA Scoping Boundary

2.2.1 Figure 1.2 illustrates the EIA Scoping Boundary for SESRO. This has been defined for the EIA scoping stage.

2.2.2 The EIA Scoping Boundary encompasses a total area of approximately 2,400ha and includes those areas in which land, or rights over or under land, are anticipated, at this stage, to potentially be required either temporarily or permanently for the construction and operation of the Project. At this stage, it includes some areas of land that encompass various design options that are being studied and consulted on, as discussed further in section 3.3, thereby representing the anticipated maximum extent of land that could be required for temporary or permanent purposes in order to construct, operate and maintain the Project. All options that are being consulted on have been allowed for in the EIA Scoping Boundary with the exception of an option for a road diversion to the south of the Great Western Main Line railway. This is because, the Access and Diversion Roads Options Appraisal Report (J696-DN-A01A-ZZZZ-RP-ZD-100009) concluded that this road diversion option is the least preferred option for community, landscape, planning and land due to its land take outside the safeguarded area for the SESRO Project.

2.2.3 The EIA Scoping Boundary is also informed by a preliminary assessment of the utility diversions, protection and new supplies required to deliver SESRO. This assessment is based on a desk top study of existing assets shown on plans received from the utility companies; surveys to confirm their location have not yet been undertaken. Further information is provided in section 2.7.

2.2.4 Note that the EIA Scoping Boundary does not represent the boundary within which environmental effects are to be assessed.

2.3 Design Evolution and Flexibility

2.3.1 As noted in section 1.6, the Applicant is currently carrying out a non-statutory public consultation throughout summer 2024, in which it is seeking feedback from the public and stakeholders about its proposals and options for the SESRO Project. It should also be noted that the capture of environmental baseline data is incomplete at this early stage, hence complete integration of design with environmental constraints is consequently a work in progress.

2.3.2 The current proposals are, therefore, subject to change following feedback received as part of the consultation and the emergence of environmental data. For this reason, the EIA Scoping Report has been developed to include an envelope of assessment which is both appropriate and precautionary in its extent, is fully contained within the EIA Scoping Boundary and reflects the need to adjust the future design of the Project as consultation feedback is considered and incorporated and as further environmental survey data becomes available.

2.3.3 The Planning Inspectorate (PINS) Advice Note Nine – Rochdale envelope[5] (2018) states it is for the Applicant to choose whether there is a need to incorporate flexibility (and how much) into applications to address uncertainty. Where the details of the Project cannot be defined precisely, flexibility will be sought, in alignment with the Rochdale envelope approach (also referred to as a 'design envelope' where discussing design parameters).

2.3.4 At this relatively early stage in the design process there is inevitably uncertainty and, therefore, flexibility in proposals is required, both at scoping and for the EIA as part of the Development Consent Order (DCO) submission. This flexibility is addressed through design envelopes based on realistic worst-case scenarios and, in some cases, through optionality where more than one option is being considered (e.g. tunnel route).

[5] *The 'Rochdale envelope' principle (see R v Rochdale MBC ex parte Tew (1999) and R v Rochdale MBC ex parte Milne (2000)) is an accepted way of dealing with uncertainty in preparing development applications. The Rochdale envelope approach is employed 'where the nature of the Proposed Development means that some details of the project have not been confirmed (for instance the precise location or dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty'.*

2.3.5 To the best of the Applicant's knowledge, the maximum parameters, and all likely options where options exist, are presented in the Project Description to allow for the flexibility required to inform the scope of the EIA at this stage. These maximum parameters will be reduced, where possible, subsequent to scoping through the ongoing EIA, consultation and design process.

2.3.6 Where optionality remains, for example an alternative location for a structure, this is made clear, and allowance has been made for this in the scope of assessment.

2.3.7 At future stages, including the submission of the Preliminary Environmental Information (PEI) Report and the Environmental Statement (ES), every attempt will be made to narrow the range of options and explain clearly which elements of the Project have yet to be finalised and why. The Project parameters will be clearly defined in the draft DCO and, therefore, in the accompanying ES. The EIA Scoping Boundary will develop to become the lateral and vertical Limits of Deviation (LoD) presented in the DCO application. The LoD will define the maximum extent within which the Project can be built[6].

2.3.8 The EIA will take a reasonable worst-case approach. This will allow for minor deviations in siting and alignment as design work progresses, considering environmental and technical factors, consultation responses and constructability, without triggering the need to revise the ES.

2.4 Project Description: Introduction and Overview

2.4.1 The Project Description is provided below. This provides:

- A brief overview of the key elements of the Project
- A summary of the key elements within each of the Project's development zones (see Figure 2.1)
- An overview of the construction schedule
- Further details of some of the generic elements that span multiple development zones, such as utility works

[6] *Lateral and vertical LoD will be introduced for the project to define the maximum extent within which physical aspects can be built. Applying LoD is normal practice for DCOs as they allow for the refinement of the preliminary design, on which the DCO plans are based, during the detailed design stage.*

2.4.3 The following elements make up the Project subject to EIA Scoping in this report:

Water infrastructure elements

- Provision of a fully bunded 150Mm^3 raw (untreated) water storage reservoir, 5km to the southwest of Abingdon
- A pumping station at the base of the proposed embankment (on the north-east side of the reservoir) including both inflow pumps and outflow energy-recovery turbines
- A below ground conveyance tunnel (circa (c.) 4km long) to transfer flows via the pumping station to and from an intake / outfall structure, and to facilitate drawdown of the reservoir in an emergency, on the River Thames near Culham
- Thames Water to Southern Water (T2ST) water treatment works (WTW) associated with transfer of water to the south of SESRO (including a waste pipeline to the Abingdon Sewage Treatment Works (STW) and other related pipelines within the EIA Scoping Boundary)

Non-water infrastructure elements

- Main access road into the site from A415 Marcham Road and diversion of the existing East Hanney to Steventon Road
- Temporary rail siding to facilitate delivery of certain construction materials by freight train
- Public access, parking and recreational facilities, public education facilities, landscape and biodiversity habitat proposals
- Local stream channel diversions to both the east and the west of the reservoir and construction of compensatory floodplain
- Provision of renewable energy infrastructure to support operational net zero, anticipated to include energy recovery turbines. Note the specific nature of renewable energy provision on site is subject to further feasibility study

Links to other water infrastructure

2.4.4 SESRO has links to a number of other water supply projects, both directly and indirectly. The direct interfaces with these other projects need to be accounted for within the DCO limits of the SESRO Project to enable future utilisation of SESRO to reflect the requirements of the Thames Water rdWRMP24. The following two schemes are planned to come forward by 2040:

- **Thames to Southern Transfer (T2ST):** One of the direct supplies from SESRO would be to Southern Water, via a new WTW within the SESRO

EIA Scoping Boundary and a potable water transfer pipeline to Hampshire. This is anticipated to have a peak capacity of 120Ml/d. The WTW requirements are included as a key element of the Project, either to be consented as part of the SESRO DCO application, or separately by Southern Water (where it would be considered as part of the cumulative effects assessment within the EIA for SESRO). The SESRO Project also includes those elements of the potable water transfer pipeline within the EIA Scoping Boundary

- Swindon and Oxfordshire (SWOX) raw water transfer: The rdWRMP24 (Thames Water, 2024) indicates the need for a raw water transfer pumping station and transfer pipeline to support Farmoor Reservoir and supply Thames Water's SWOX Water Resource Zone. This could have a transfer capacity of at least 24Ml/day and up to 100Ml/day in the WRMP adaptive pathway. The SWOX transfer would be required by 2040, so it would not be possible for it to be constructed after the commissioning of SESRO. The SWOX transfer would require a set of pumps and an initial section of buried pipeline within the EIA Scoping Boundary. As such, there are significant constructability and environmental benefits of providing this as part of SESRO construction rather than at a later date. Therefore, this initial section of pipeline and pumping station are included within the SESRO Project

2.4.5 In addition, the rdWRMP24 identifies the following schemes as potentially required in the future if the demand reduction target is not achieved, these are on the 'adaptive pathway':

- Severn to Thames Transfer (STT): STT would comprise a potential future pipeline for transfer of water from the north-west and the Midlands, via the River Severn and a pipeline to the River Thames, to the south-east. This does not form part of the current WRSE Regional Water Resources Plan under any of the adaptive planning pathways. While the future requirement for STT is not confirmed, if required, it would likely be developed after SESRO. The potential STT pipeline would pass through the area within the EIA Scoping Boundary and provision to accommodate a future STT connection into the SESRO Project is scoped into the EIA for the SESRO Project. These would mainly be underground and have a relatively small above-ground presence. Therefore, to enable future connectivity and minimise future development impacts, allowance, in the form of minor pipework and valves in and around the SESRO pumping station, and potentially a new shaft on the river tunnel, is included within the SESRO Project for connections with a potential future STT scheme[7]

- **SWOX potable water transfer:** If the demand reduction target looks as though it will not be achieved, additional treatment assets may be required to treat water from SESRO for transfer to the SWOX Water Resource Zone. Therefore, at this stage, passive provision (e.g., space reserved for a WTW) and active provision (e.g., valves on pipework) will be made for the SWOX potable water transfer as part of SESRO, to enable efficiencies should this project come forward

2.4.6 SESRO is designed to convey raw water to and from the River Thames and to allow abstraction of water from the River Thames further downstream. These indirect interactions include:

- **Thames Water:** Abstraction downstream using existing infrastructure at Lower Thames Intakes. In addition, under some future scenarios, new water sources would be required for the Slough, Wycombe and Aylesbury (SWA) WRZ from 2050. The rdWRMP24 identifies this would either be achieved by a new surface water intake and WTW at Medmenham, or by transfer of treated water from the SWOX potable water transfer (see above) using a new pipeline from the SWOX Water Resource Zone to the SWA Water Resource Zone. Future WRMPs will consider if one of these schemes is required, and if so, which scheme. These downstream abstractions require no additional ancillary infrastructure as part of the SESRO Project
- **Thames to Affinity Transfer (T2AT):** SESRO is designed to convey raw water to and from the River Thames and to provide both direct and indirect water supply. This storage and discharge would provide a raw water transfer to Affinity Water for abstraction downstream in Affinity Water's Thames to Affinity Transfer (T2AT) Strategic Resource Option (SRO). This requires no additional ancillary infrastructure as part of the SESRO Project

7 The potential future requirement for STT is subject to ongoing design development and optionality outwith the SESRO Project. As such, it is not intended that STT pipeline infrastructure will form part of the SESRO DCO application and hence the EIA.

Should the STT project come forward in the future, construction and operation of the pipeline would form part of its DCO application and EIA. The STT infrastructure elements would be expected to be fully assessed for the STT DCO application in due course, including impacts in combination with SESRO, either as part of the baseline, or as part of the STT CEA.

2.5 Project Description: Development Zones

2.5.1 A Zoning Plan has been developed to show the likely location of elements of the Project within the EIA Scoping Boundary. The Project is subdivided into seven broad zones, along with areas accounting for optionality and future design flexibility to allow for ongoing consultation and design work on options for associated infrastructure (refer to section 3.3) which are indicated as Zones P. The zones are illustrated on Figure 2.1, with a description of the indicative elements included in Table 2-1.

2.5.2 The zones are summarised as follows:

- Zone 1 – Western wetlands
- Zone 2 – Main visitor and operational access and eastern wetlands
- Zone 3 – Operational facilities and main gateway for recreation / leisure facilities
- Zone 4 – Eastern watercourse diversion corridor
- Zone 5 – Steventon to East Hanney vehicular and active travel corridor
- Zone 6 – Reservoir waterbody and embankments
- Zone 7 – Conveyance link to the River Thames
- Zones P - Areas accounting for optionality and future design flexibility to allow for ongoing consultation and design work

2.5.3 The indicative elements in each zone are summarised in Table 2-1.

Figure 2.1 Zoning plan

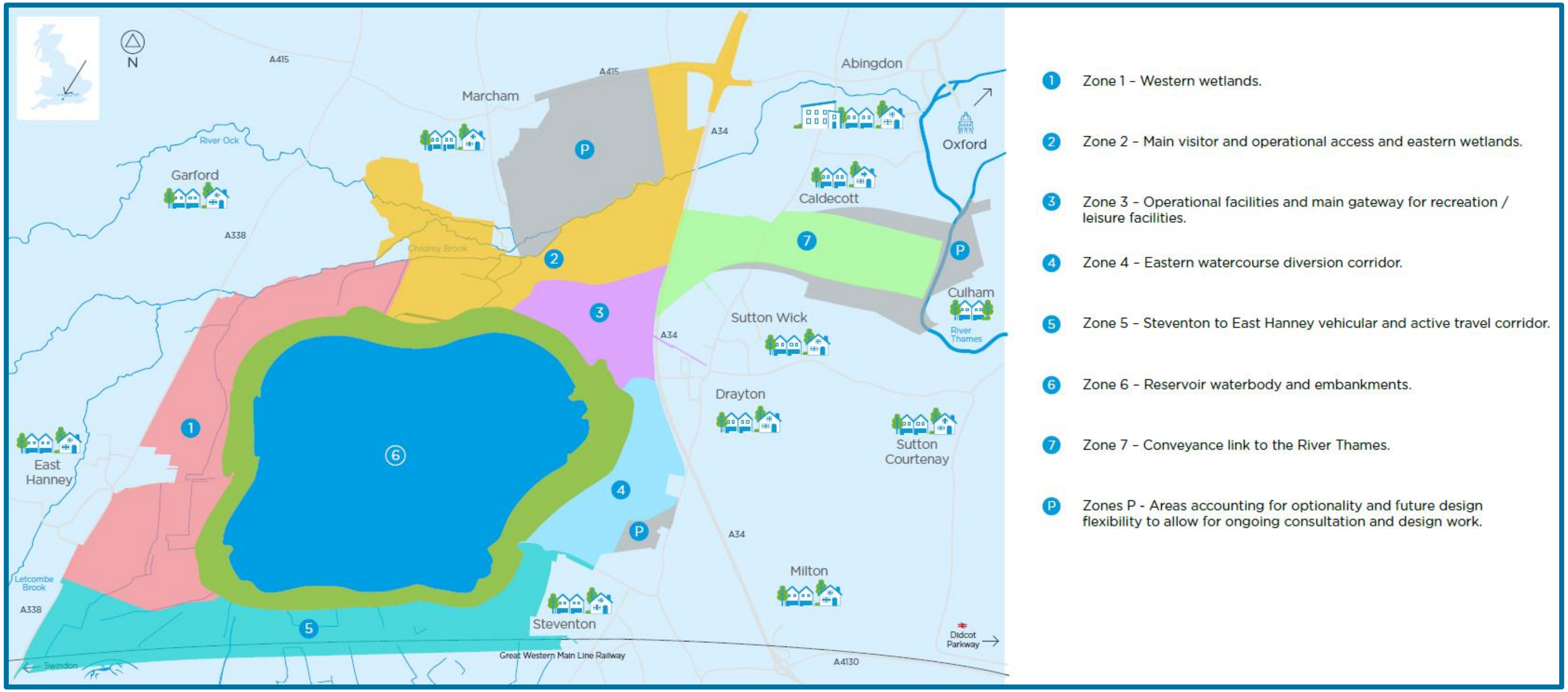


Table 2-1 Elements of the Project, listed by development zone

Zone	Key elements
Zone 1 – Western wetlands	• Western watercourse diversion of Cow Common Brook, realignment of East Hanney Ditch and diversion of other ditches which lie within the reservoir footprint, meeting Water Framework Directive (WFD) requirements • Replacement floodplain storage, hydraulically connected to the watercourses that may flood • Western extent of Steventon to East Hanney road diversion, incorporating a segregated footway and cycleway • Minor car park • Corridor with provision to enable the potential future Wiltshire and Berkshire Canal • Recreational access via public rights of way (PRoW) or permissive paths • Landscape and biodiversity habitat proposals, such as wetland habitat mosaic, wet woodland, intermittent trees and shrubs, hedgerows, grasslands, wildlife ponds, scrapes and pools • Some land may be reinstated and returned to agriculture • Environmental bunding south of the road diversion • Works to utilities, such as diversions for gas and water mains
Zone 2 – Main visitor and operational access and eastern wetlands	• Main access road from the A415 Marcham Road for construction, visitor and operational access with new A415 roundabout as a rural-type two-lane carriageway with cycle/footpaths, including measures to cross the floodplain and River Ock • T2ST WTW and all associated infrastructure, buried pipeline transfers, utility connections and operational access and parking facilities as required (optional WTW location also included in Zone 3) • Eastern watercourse diversion of watercourses which lie within the reservoir footprint, such as ditches that comprise the Mere Dyke system, and realignment of the River Ock, meeting WFD requirements • Replacement floodplain storage • Corridor with provision to enable the potential future Wiltshire and Berkshire Canal • Recreational access via PRoW or permissive paths

Zone	Key elements
	• Landscape and biodiversity habitat proposals, such as wetland habitat mosaic, wet woodland, hedgerows, grasslands, wildlife ponds, scrapes and pools • Some land may be reinstated and returned to agriculture • SWOX raw water transfer buried pipeline transfer and connection chamber • Works to utilities, such as diversions for gas mains (see paragraphs 2.7.1 to 2.7.4 for further details)
Zone P to west of zone 2	• Further space for main access road options that are being consulted on, as explained in Section 3.3 and illustrated on Figure 3.4
Zone 3 – Operational facilities and main gateway for recreation / leisure facilities	• Continuation of the main access road from Zone 2, including measures to cross the eastern watercourse diversion • Pumping station to draw water through the conveyance tunnel from the river intake and pump it into the reservoir, anticipated to be partially buried with an above-ground control building • Discharge in the other direction from the reservoir would flow by gravity, via energy recovery turbines in the pumping station • Part of an underground reservoir conveyance tunnel (refer to Zone 7 for further information), transfer of water between the reservoir and the River Thames would be intermittent depending on river flows and water demand • Pumping station for SWOX raw water transfer to Farmoor Reservoir, with associated water infrastructure connections and operational car parking • Allowance for connections to STT, should this be required • T2ST WTW, as for Zone 2 (optional WTW location also included in Zone 2) • Eastern watercourse diversion of watercourses such as ditches that comprise the Mere Dyke system • Replacement floodplain storage • Corridor with provision to enable the potential future Wiltshire and Berkshire Canal • Main visitor car park • Clear separation between publicly accessible and operational areas, such as a road junction off the main access road to control access

Zone	Key elements
	• Recreational facilities, visitor and/or public education facilities with associated access and parking, such as recreational lakes and café • Recreational access via PRoW or permissive paths, including via the existing bridleway from Drayton that crosses the A34 on an existing bridge • Landscape and biodiversity habitat proposals, such as marginal habitat and wet woodland associated with recreational lakes, other woodland, intermittent trees and shrubs, hedgerows and grasslands • Environmental bunding alongside the A34 • Works to utilities, such as diversion of existing overhead powerlines, diversion or reinforcement of gas and water mains and wastewater with potential connection to the existing Thames Water sewerage network
Zone 4 – Eastern watercourse diversion corridor	• T2ST buried pipeline transfer • Eastern watercourse diversion, incorporating the proposed route of watercourses such as ditches that comprise the Mere Dyke system • Recreational access via PRoW or permissive paths • Landscape and biodiversity habitat proposals, such as wetland habitat mosaic, wet woodland, other woodland, intermittent trees and shrubs, scrub, hedgerows, grasslands, great crested newt (GCN) *Triturus cristatus* habitat ponds and other wildlife ponds, scrapes and pools • Some land may be reinstated and returned to agriculture • Environmental bunding to the north-west of Steventon and along the A34 • Space for Steventon to East Hanney road diversion options that are being consulted on, as explained in section 3.3 and illustrated on Figure 3.5
Zone P to the south-east of Zone 4	• Further space for Steventon to East Hanney road diversion options that are being consulted on, as explained in section 3.3 and illustrated on Figure 3.5
Zone 5 – Steventon to East Hanney vehicular and active travel corridor	• Steventon to East Hanney road diversion as a rural-type two-lane carriageway with footpaths or cycle/footpath, including crossings of the western watercourse diversion, potentially providing secondary construction access • Minor car park • Origin of eastern and western watercourse diversions, incorporating the proposed route of watercourses such as

Zone	Key elements
	ditches that comprise the Mere Dyke system and the Cow Common Brook • Replacement floodplain storage • Recreational access via PRoW or permissive paths • Landscape and biodiversity habitat proposals, such as wetland habitat mosaic, wet woodland, other woodland, intermittent trees and shrubs, hedgerows, grasslands, GCN habitat ponds and other wildlife ponds, scrapes and pools • Environmental bunding west of Steventon • Temporary rail siding and materials handling area (RSMH) during construction to facilitate delivery of certain construction materials by freight train, with material storage • T2ST buried pipeline transfer and connection chamber • Works to utilities, such as diversion of an existing overhead powerline, diversion or reinforcement for gas main and removal and diversion of water mains
Zone 6 – Reservoir waterbody and embankments	• Creation of a reservoir through excavation of clay from a central ‘borrow pit’ and building this clay into embankments above ground level at the edge of the pit, aiming for an earthworks ‘cut and fill’ balance on site minimising materials import and export • Reservoir will be designed, constructed and operated in full compliance with the Reservoirs Act 1975 (as amended) • Reservoir waterbody, with a surface area approximately 6.5km2 and up to approximately 35m depth in the deepest part at full capacity • ‘Live’ (usable) water storage of 150Mm3 plus a suitable allowance for ‘dead’ (not suitable for use) storage at the base of the central borrow pit trench • Reservoir embankment with indicative height of between c.15m and c.25m relative to existing ground levels, which slope gently downwards from the south to the north • Topsoil, subsoil and overburden excavated from within the zone and the excavation of the conveyance tunnel to the River Thames would be used as landscape fill. This would provide a layer on top of the structural embankment clay fill, allowing the outer slope and crest to be varied and enabling planting and the creation of facilities for recreation • Maintenance access track and permissive path on the embankment crest • Water inlet and outlet arrangements, currently envisaged to be towers with an indicative height of up to 18m above the embankment, connected with a culvert/ conveyance tunnel

Zone	Key elements
	to enable water to be discharged into the reservoir and extracted from it (refer to Zone 7 for further information) • Facilities to enable the water level to be drawn down during an emergency in line with requirements of the Reservoirs Act 1975 such as siphon pipes or similar, buried below the surface of the reservoir embankment • Internal edges of the reservoir to be provided with appropriate wave and erosion protection, supplemented as required by wave walls and access features such as steps or ramps in some sections • Reservoir embankment drainage, including internal drainage system and embankment toe drain, the latter of which would prevent unauthorised vehicular access onto the embankment • A system to supplement the circulation and mixing of water, such as an air diffuser network or a recirculation pumping system, or a combination of these, would be included to maintain good water quality and minimise algae growth • Recreational facilities, visitor and/or public education facilities with associated access and parking, such as water sports facilities and cafe • Recreational access via PRoW or permissive paths, including diversion of existing PRoW • Landscape and biodiversity habitat proposals, such as floating islands, wetland lagoons, pasture for sheep grazing, woodland belts and copses and hedgerows
Zone 7 – Conveyance link to the River Thames	• Combined intake/outfall structure located on either the right (west) or left (east) bank of the River Thames near Culham, anticipated to include intake screens, an outfall weir, control building and associated access • Within the river, protection measures to protect the intake structure and screens from collision with watercraft • Underground conveyance tunnel to move water between the River Thames and SESRO in both normal operation and for drawdown of the reservoir in an emergency, travelling under the river (for left bank options) and under the A34, excavated by a tunnel boring machine (TBM) • Potential realignment of the existing outfall from the Abingdon STW, as required to help manage water quality at the SESRO intake • Landscape and biodiversity habitat proposals, such as intermittent trees, shrubs and grasslands

Zone	Key elements
	• Potential permanent diversion of the existing PRoW (including the Thames Path National Trail) and/or National Cycle Network (NCN) Route 5 around the intake/outfall structure • Works to utilities, such as diversion or reinforcement for a gas main and wastewater pipe with potential connection to the existing Thames Water sewerage network • Wastewater pipe from T2ST WTW to Abingdon STW
Zones P – to the north, east and south of Zone 7	• Space for conveyance tunnel and intake/outfall structure options that are being consulted on, as explained in section 3.3 and illustrated on Figure 3.3

2.6 Project Description: Indicative Construction Schedule

2.6.1 The current indicative construction programme extends across approximately ten years, currently assumed to be from around 2030 to 2040.

2.6.2 During the first two years, environmental, ecology and archaeology mitigation and enhancement works would be carried out. Road, rail, utility and water diversions would be implemented to prepare the site, including the main access road which would be completed early to reduce impacts on the local road network. The watercourse diversions would also be completed early to meet expected environmental mitigation requirements.

2.6.3 Construction would continue from year two onwards with a variety of activities, such as the Steventon to East Hanney road diversion, the river intake and outfall works, and the water conveyance tunnel. The main earthworks to create the new reservoir embankments would also begin and are expected to take around five years to complete. Work would also be carried out on the supporting infrastructure, such as the pumping station, and ancillary infrastructure for T2ST, STT and SWOX.

2.6.4 When the reservoir embankments and main works are finished, the construction of the public and recreational facilities would begin. Around this time, the reservoir would start to be filled. It would take approximately 18 months to completely fill the reservoir to full capacity.

2.6.5 A Construction Code of Practice (CoCP) would be implemented in advance of construction commencing and enforced and monitored throughout the construction period by a suitably qualified environmental clerk of works, supported by specialist clerks of works, as required.

2.7 Project Description: Generic Elements Spanning Multiple Zones

Utilities

Overview

2.7.1 The SESRO Project would require diversion or protection of various existing utilities to enable construction works. These include water, wastewater, gas electricity and telecommunications infrastructure, assets and networks. At the current design stage, the extent and location of these works is not yet fully defined and would be affected by the location, extent and construction methodology of works as described above.

2.7.2 There are also new utility service requirements to facilitate the construction, commissioning and operation phases of SESRO and any other SRO project elements included within the SESRO DCO application. In construction, SESRO would require an electricity supply from the electricity distribution network rather than reliance on generators, as there would be substantial power demand for aspects such as the TBM and RSMH operation. Potable water, wastewater drainage and telecoms supplies or connections would be required for the construction workforce at many locations including the main reservoir site and at the intake/outfall location.

2.7.3 For commissioning and operation, an electricity network supply to the reservoir site and intake/outfall site would be required for operational equipment and for the visitor facilities and electric vehicle (EV) charging. Potable water, wastewater, drainage and telecoms connections would be required for SESRO including the operational workforce at the main reservoir site and the intake/outfall site and for visitor facilities.

2.7.4 The T2ST WTW would require a buried wastewater pipeline connection, expected to be to Abingdon STW, for discharge of sludge from the treatment process.

Design Development

2.7.5 The extent of utility diversions required and the routes for these is dependent on other aspects of the SESRO Project design. For the purpose of EIA scoping, the utility diversions have been based on plans received from the utility companies of their existing assets. The accuracy and extent of these plans have not been verified and, therefore, it is expected that some utilities will be uncharted or in different locations. Therefore, the current utility proposals are subject to change during subsequent design development.

2.7.6 Points of connection into the existing utility networks, either for diversions or new supplies, will be determined in agreement with the network owner/operator. These connection points may extend beyond the EIA Scoping Boundary.

Renewable energy

2.7.7 The provision of on-site renewable or other low/zero carbon generation is subject to further design, but with a goal of enabling net zero operational carbon from operation. As power generation and demand on site would not necessarily be temporally matched, renewable generation would require an export connection to the electricity network and/or storage on site. Details will be established through further design.

Landscape and environment

2.7.8 A landscape and environment led master planning process is being adopted, seeking to integrate all of the elements of SESRO into a holistic design. This is anticipated to include:

- Embankment earthworks with varied and slackened slopes, combined with proposals for woodland belts and copses, hedgerows and pasture, which are proposed to help to integrate the reservoir into the surrounding landscape and to mitigate for loss of existing habitats and provide Biodiversity Net Gain (BNG)
- Watercourse diversions and associated wetlands and replacement floodplain storage areas are proposed to the west and east of the reservoir to manage flood risk, contribute to BNG and ensure WFD compliance
- Extensive habitat creation and enhancement is proposed to improve the terrestrial and aquatic habitat available for wildlife locally, and to capture carbon
- Extensive facilities for access and recreation, such as water sports and PRoW and permissive paths for walking, wheeling, cycling and riding (including permanent diversion of some existing PRoW)
- Environmental bunding for noise and visual screening is also proposed in key locations to provide mitigation for sensitive receptors or to provide screening for visitors to SESRO

Biodiversity Net Gain (BNG)

2.7.9 Under current government policy, mandatory BNG for NSIPs is expected to come into force from November 2025, so should be in place at the time of the SESRO DCO application. A Defra Biodiversity Net Gain Statement, with details of the requirements alongside further NSIP guidance, is anticipated to be published in September 2024. It is expected that this will specify a minimum of 10% BNG, in line with the requirement set in the Environment Act 2021. It is also expected that BNG calculations for NSIPs will need to be calculated using a biodiversity metric and an approved BNG plan will need to be submitted. Habitats would likely need to be protected for a minimum of 30 years via obligations secured by DCO requirements and/or conservation covenants.

2.7.10 The Project aims to secure enough land within the final DCO order limits to achieve a minimum of 10% BNG on-site. Off-site areas including BNG habitat banks will only be used once all on-site opportunities have been exhausted. BNG will also be applied in conjunction with the mitigation hierarchy (avoid, minimise, mitigate, compensate) to ensure impacts to habitats are avoided or minimised where possible.

2.8 References

Thames Water, (2024). *Revised draft Water Resources Management Plan.* [Online]. Available at: https://www.thameswater.co.uk/about-us/regulation/water-resources#wrmp19 [Accessed July 2024].

Planning Inspectorate, (July 2018). *Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope*. [Online]. Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope [Accessed June 2024].

Reservoirs Act 1975 (as amended). [Online]. Available at: https://www.legislation.gov.uk/ukpga/1975/23. [Accessed August 2024].

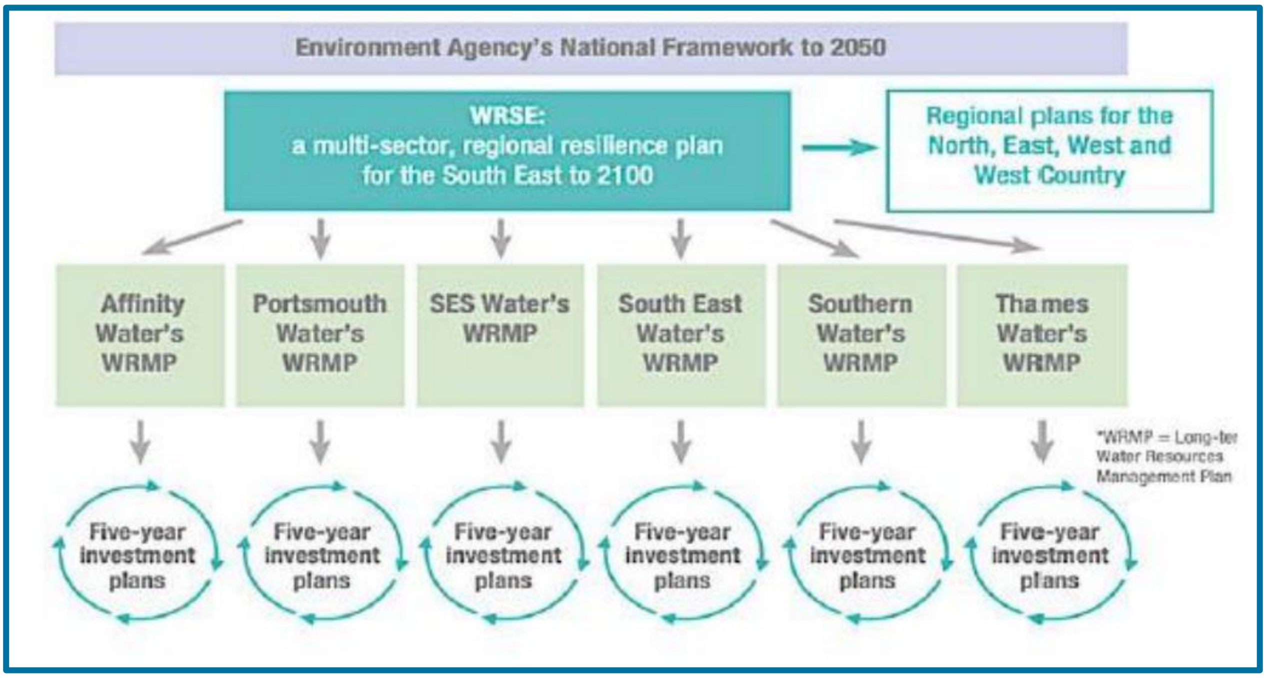
3 Consideration of Alternatives

3.1 Project Need

3.1.1 Under the Water Industry Act 1991, every five years water companies are required to produce a Water Resources Management Plan (WRMP). The primary objective of the plan is to ensure that there is sufficient water available to meet anticipated demands under various weather conditions including during dry and very dry conditions, whilst protecting the environment. SESRO is one option considered in Thames Water's WRMP. The current plan, WRMP19, is published on the Thames Water website and the revised draft version of the new plan, WRMP24, is currently with government for approval (and also published on the website).

3.1.2 The planning framework for water resources has changed significantly since WRMP19, in recognition of the significant future challenges faced for water supply and the need to invest to ensure a secure and sustainable water supply for future generations, as well as protecting the environment. In 2020 the Environment Agency published the National Framework for Water Resources. This set out an expectation that water companies would work together in regional groups to plan for water resources. Thames Water is part of the Water Resources South East (WRSE) regional group and Figure 3.1 shows the relationship between the regional plan and the company plan.

Figure 3.1 Overview of regional and water company water resource planning framework



Source: Thames Water revised draft WRMP24.

3.1.3 The revised draft WRMP24 plan covers the period from 2025 to 2075. Thames Water has taken a long-term view, setting a 50-year planning period, recognising the challenges and risks that are faced for future water supply. The plan builds on the previous plan, WRMP19, published in March 2020 and reflects the South East best value regional plan.

3.1.4 The WRMP process considers the likely demand for water in the timeline of the plan and the water resources currently available to predict the need for more water. It then considers options to meet the need by either reducing demand (demand options) or developing new water resources infrastructure (supply options). Each option is developed at high level to provide metrics for programme appraisal, which is the process of developing a long-term plan for water resources. This process is described further in WRSE and WRMP documents and is not covered here. A 150Mm3 SESRO reservoir is included in the WRMP19 preferred plan, WRSE and the rdWRMP24 best value plan, indicating a need for the Project to be implemented by 2040.

3.2 Alternatives to the Proposed Project

3.2.1 Potential WRSE and WRMP supply options are identified by the individual companies. Thames Water identified reservoir options through a site selection / feasibility process that considered suitable sites for a range of reservoir sizes. Similar work was undertaken for other option types such as water transfers, desalination etc. Feasible reservoir options (including SESRO) were added to the Feasible List and were available for selection in the WRSE and WRMP plans through the programme appraisal process. The WRSE and WRMP process identified that the 150 Mm^3 SESRO is the best value option. As set out in section 1.5, the EIA is not expected to set out the need for SESRO.

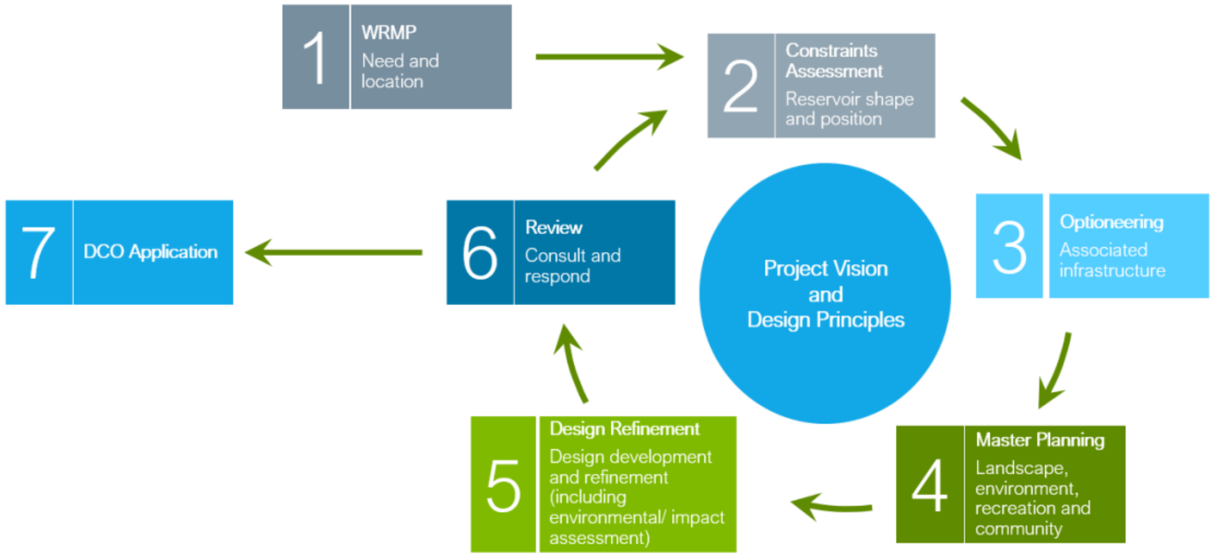
3.2.2 The SESRO location was selected because it:

- Is close to the River Thames (<5km)
- Has reasonably flat land (53m to 65m AOD)
- Has the right geology and ground conditions for a reservoir, e.g., the site has enough thickness of clay to retain large volumes of water (underlain by thick deposits of Kimmeridge and Gault clay)
- Is adjacent to a railway line (the Great Western Main Line railway – London to Bristol) and has major road links that could be used to deliver construction materials (the A34 to the immediate east and A415 to the north)

3.3 Alternatives considered within the Proposed Project

3.3.1 Whilst the need, size and location of SESRO are defined by the WRMP, the high-level design used in the WRMP process is indicative and requires development for EIA, DCO submission and construction. SESRO is a large project and requires an iterative design development process that considers the core purpose of the reservoir and its potential to deliver environmental gain and social value. Figure 3.2 summarises the design development process as a series of steps that can be repeated as the design progresses and increasing design data (included survey work and consultations) becomes available. The process is underpinned by a Project Vision and draft Design Principles (J696-AA-ZZZZ-RP-ZDP100001, Thames Water, 2024), available as part of the public consultation (Thames Water, 2024).

Figure 3.2 SESRO Multi-disciplinary design development process



3.3.2 A number of options for associated infrastructure have been studied under Step 3 of the design development process and an Interim Landscape and Environmental Master Plan (hereafter referred to as 'Interim Master Plan' has been developed under Step 4. These are summarised in the remainder of this Chapter. The full options assessment process and results are reported in detail in the following documents, available as part of the public consultation (Thames Water, 2024):

- Option Appraisal – Context and Methodology report
- Option Appraisal – Rail Siding and materials handing area report
- Option Appraisal – Access and diversion roads report
- Option Appraisal – Connectivity to the River Thames report
- Option Appraisal – Thames to Southern Transfer SRO, WTW site identification report
- Interim Master Plan

- Draft Design Principles

Overview of optioneering methods

3.3.3 A range of options appraisals for infrastructure required for SESRO were undertaken using a stepwise method as set out within SESRO Gate 3 Option Appraisal Documents Option Appraisal Context and Methodology Report J696-DN-A01A-ZZZZ-RP-100006 (Thames Water May 2024). The process is summarised as follows:

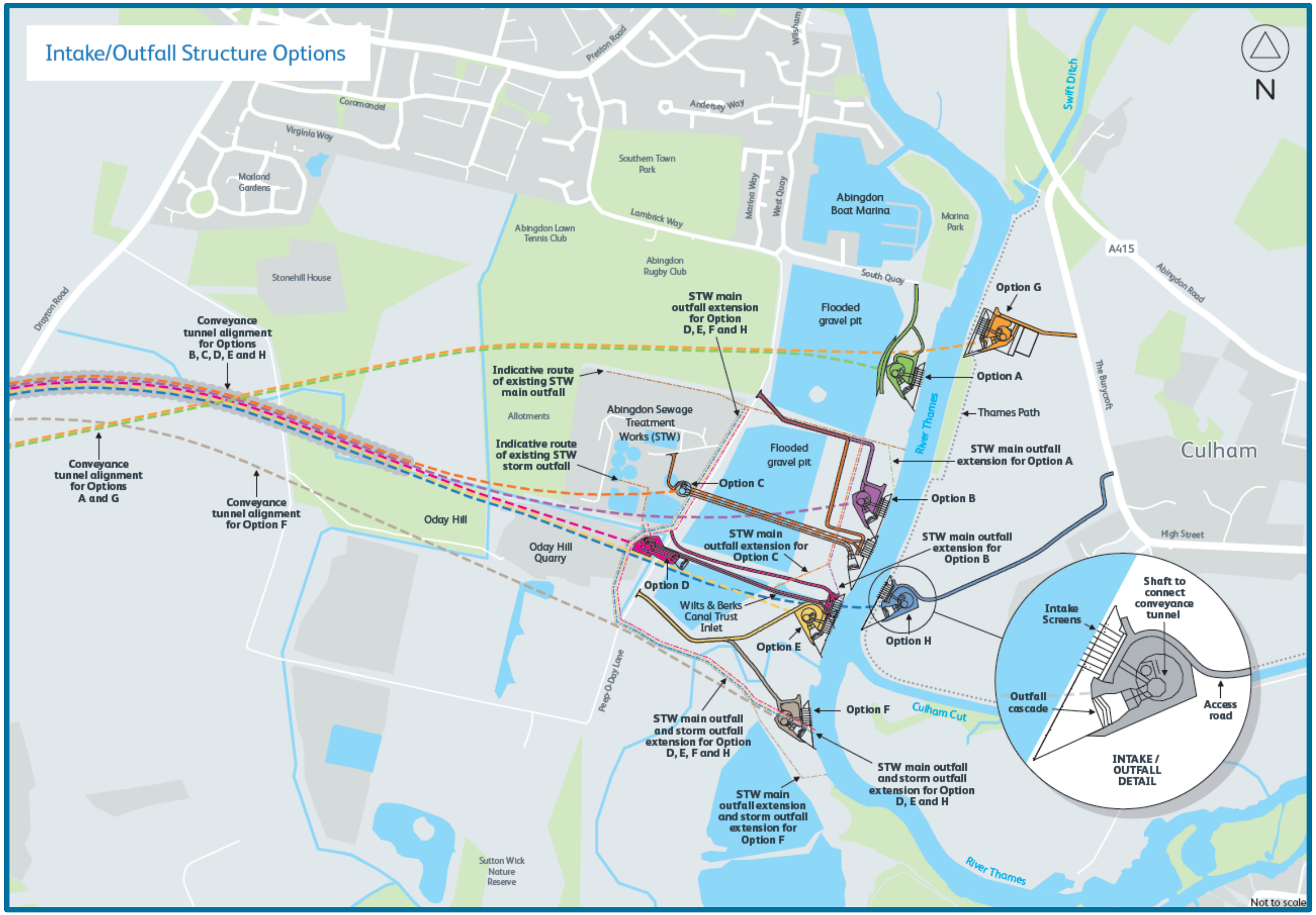
- Step 1 – Define Scope and Objectives of Appraisal – identified the associated infrastructure requiring optioneering and the objectives for the option appraisal exercise
- Step 2 – Define Constraints on Option Definition – the need for a staged assessment was reviewed for each option study
- Step 3 – Develop Appraisal Criteria – a master list of assessment criteria (covering engineering, cost and carbon, environment and community, planning and land themes) was developed taking into account relevant legislation, policy and guidance. Further study specific criteria were identified to ensure that the option assessment took account of the specific assets required and any other issues particular to the options under consideration
- Step 4 – Define Options – options were defined based on the constraints identified in Step 2
- Step 5 – Undertake Assessments – options were assessed by relevant competent experts in-line with the method developed at Steps 2 and 3. Assessments were captured in a standard format and scored against a Red / Amber / Green (RAG) rating for each criteria, a narrative was recorded on the outcome and a record provided of the evidence used
- Step 6 – Workshop – a workshop was held for each option study to bring together subject matter experts for each criterion, discuss the outcomes of Stage 5 and identify a preferred option for consultation (and/or further work required to support identification of a preferred option)
- Step 7 – Consider the outcome of all appraisals – identified whether all preferred options could be incorporated into the Master Plan, identified any adjustments to options required. If adjustments were required, Steps 4, 5 and 6 were repeated to redefine the option and undertake assessments and workshop on the adjusted option
- Step 8 – Develop consultation material and Interim Landscape and Environmental Master Plan – the outputs of the various studies were brought together in the Interim Master Plan and material for non-statutory public consultation in summer 2024

3.3.4 Infrastructure options appraised in this way included those for intake/outfall locations, emergency drawdown, access roads, road diversions, rail sidings and Water Treatment Works (WTW) locations.

Alternative intake / outfall locations

3.3.5 The intake/outfall structure enables operational abstraction of flows from the river to fill the reservoir during periods of high flow in the River Thames. Conversely, it also enables discharge of water from the reservoir into the Thames during low flows, when needed for abstraction downstream. Multi-criteria analysis options appraisal set out in SESRO Connectivity to the River Thames Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100010 (Thames Water May 2024) considered eight options and identified a preferred location, a summary of the findings is in Table 3-1 and locations are shown Figure 3.3.

Figure 3.3 Potential intake / outfall structure location options



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

Table 3-1 Alternative options for the intake / outfall locations

Option	Description	Reason for preferred / not preferred
A	Located on the western bank, upstream of Abingdon STW outfall, south of Abingdon Marina	Not preferred – difficulties with space and logistics and relatively long programme. Requires significantly more complex additional structures compared to other options. Will likely result in the disruption of National Cycle Network (NCN) Route 5 during construction
B	Located on the western bank, upstream of the Wiltshire & Berkshire Canal Trust inlet	Preferred – performs moderately well across all themes, particularly for engineering and constructability
C	The intake and outfall for this option are located on the western bank, upstream of the Wiltshire & Berkshire Canal Trust inlet	Not preferred – has the highest total cost, although this is not a material differentiator. Requires two separate site locations which would increase haulage distance for construction materials. Option C is the only option which reuses an existing asset, which is both a risk and opportunity. Requires significantly more complex additional structures compared to other options. Will likely result in the disruption of NCN 5 during construction
D	The intake is located on the western bank, south of the Abingdon STW and the outfall is located on the western bank, upstream of the Wiltshire & Berkshire Canal inlet	Not preferred - The option requires two separate site locations which would increase haulage distance for construction materials. Requires significantly more complex additional structures compared to other options. Will likely result in the disruption of NCN 5 during construction
E	Located on the western bank, immediately downstream of the Wiltshire & Berkshire Canal Trust inlet	Not preferred – least preferred as the intake/outfall would affect floodplain grazing marsh priority habitat
F	Located on the western bank, downstream of Culham Cut	Not preferred - least preferred as the intake/outfall would affect floodplain grazing marsh priority habitat

Option	Description	Reason for preferred / not preferred
G	Located on the eastern bank, upstream of Abingdon STW outfall, south of Abingdon Marina	Not preferred – has the longest tunnel, requiring an extra eight weeks to complete compared to other options
H	Located on the eastern bank, upstream of Culham Cut	Not preferred - has the longest tunnel, requiring an extra eight weeks to complete compared to other options. Requires significantly more complex additional structures compared to other options

3.3.6 Overall, Option B is preferred as it provides sufficient space during construction, requires fewer structures and less complex construction techniques, and has one of the shorter tunnel lengths, leading to less programme risk. It also performs moderately in terms of capital costs. Option B is also preferred primarily for Land Quality as there is little risk of landfill disturbance from the associated pipeline route. Overall, Option B was deemed to be the preferred option as it performs moderately well across all themes.

Alternative emergency drawdown

3.3.7 The emergency drawdown is necessary to enable the water level in the reservoir to be lowered quickly in an emergency. Water removed from the reservoir needs to be conveyed to a watercourse with sufficient hydraulic capacity to safely receive this flow during normal conditions. Multi-criteria analysis options appraisal set out in set out in SESRO Connectivity to the River Thames Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100010 (Thames Water May 2024) considered three options and identified a preference, a summary of the findings is in Table 3-2 below.

Table 3-2 Alternative options for the emergency drawdown

Option	Description	Reason for preferred / not preferred
A	Option A consists of two elements for discharging flows from the reservoir during emergency events. The Auxiliary Drawdown Channel (ADC) is a surface channel capable of transferring 45m^3/s, and a conveyance tunnel that is capable of transferring	Not preferred – Option A was discounted as it included levees for the ADC across the River Thames floodplain which would have unacceptable impacts on flooding. The design was, therefore, revised and developed into Option B

Option	Description	Reason for preferred / not preferred
	$30m^3/s$ via gravity to the River Thames outfall structure	
B	Option B consists of both the ADC and a conveyance tunnel, capable of transferring the same flows as Option A but without the associated levees for the ADC	Not preferred – has more surface works than Option C due to the need for the ADC and greater potential to impact the existing road network during construction as the ADC requires a crossing under the A34 (including permanent diversion of the A34). Also introduces additional operation and maintenance activities associated with locks and gated structures. This option would also require the removal of priority habitats but would represent an opportunity for habitat creation and recreation. However, public benefit would not outweigh the costs
C	Option C does not include the ADC and instead utilises the conveyance tunnel alone to transfer $75m^3/s$ to the River Thames in an emergency	Preferred option – this is preferred in relation to engineering as it does not include the ADC and for environment as it will have the least impact upon vegetation clearance, priority habitats and noise receptors. It also has lower capital and carbon costs

3.3.8 Overall, Option C (tunnel only) is the provisionally preferred option. From an engineering perspective Option C is preferred as it does not include the ADC, which would represent a major infrastructure project in itself due to the need to permanently divert the A34 to allow the ADC to pass under it. It is also preferred for most environmental topics as it will have the least impact upon surface receptors and minimises land take despite potential advantages associated with recreation and habitat creation. Only Option C (tunnel only) has been considered when developing this EIA Scoping Report.

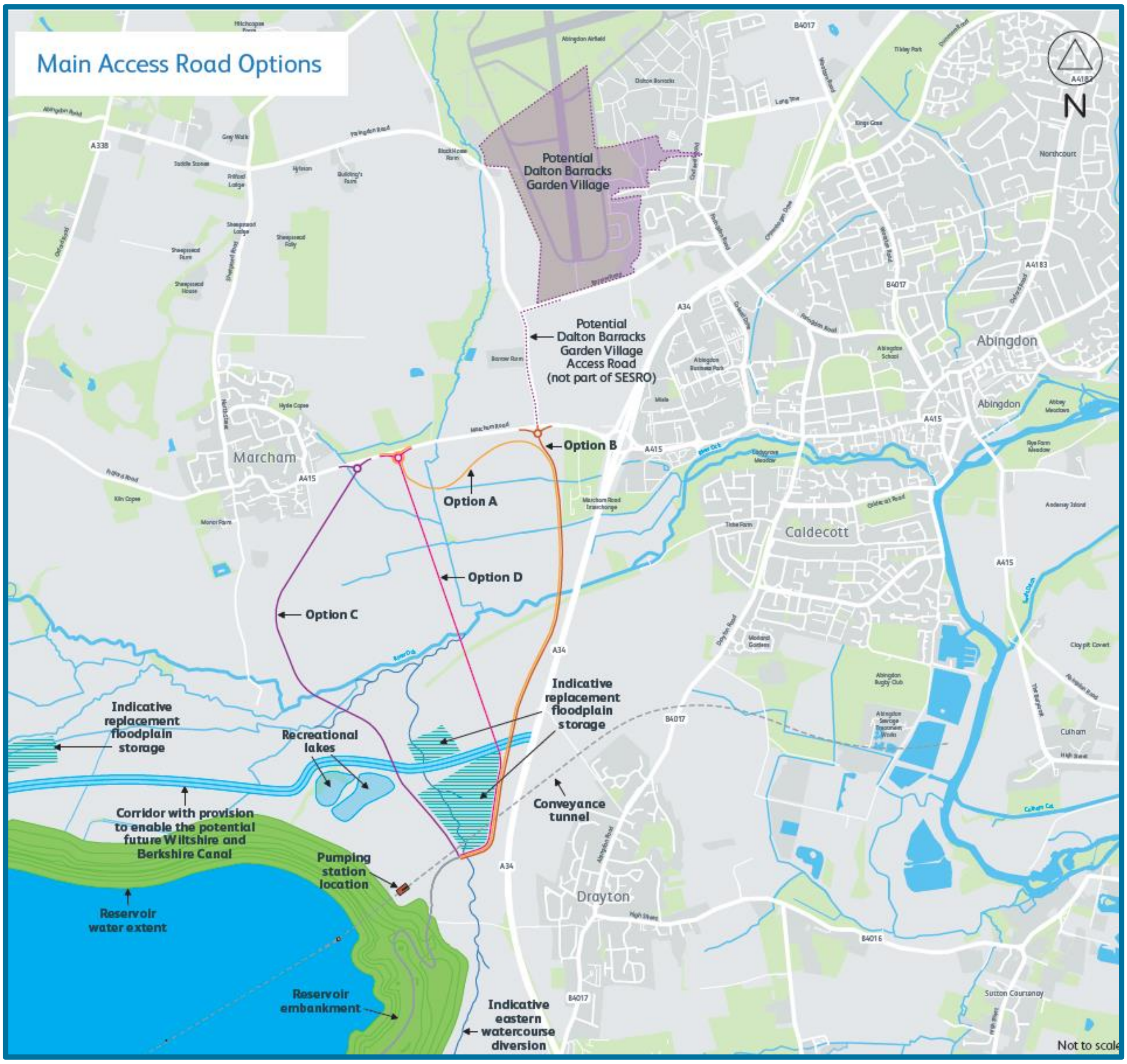
Alternative access and road diversions

Access roads

3.3.9 A new main access road to the SESRO site is required to provide both temporary construction and permanent operational / visitor access to the reservoir.

3.3.10 Multi-criteria analysis options appraisal set out in SESRO Access and Diversion Roads Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100009 (Thames Water May 2024) considered four options and identified a preferred alignment for the new main access road, a summary of the findings is in Table 3-3 below and locations are shown in Figure 3.4.

Figure 3.4 Main access road options



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

Table 3-3 Alternative options for the access and road diversions

Option	Description	Reason for preferred / not preferred
A	Option A is approximately 5.1km long and connects to the A415 with a roundabout junction approximately 1.2km west of the Marcham Interchange to the east of the village of Marcham	Not preferred – has the largest relative capital cost, however, this is not a strong justification for selection of one option over another. Similar environmental impacts as Option B and D
B	Option B is approximately 4.3km long and connects the A415 with a roundabout junction approximately 440m west of the Marcham Interchange	Preferred – performs slightly better than other options in terms of landscape and visual effects as it would be located next to existing highways infrastructure and would require the least additional land
C	Option C is approximately 4.4km long with a new A415 roundabout located ~1.6km west of the Marcham Interchange	Not preferred – has the largest estimated earthworks required and more watercourse crossings. Has a higher proportion of its length within the floodplain making construction more complicated and longer in duration. Option C does not provide better opportunities to facilitate external schemes, such as the South Abingdon movement corridor and flood storage reservoir (FSR) for Abingdon. Option C is least preferred regarding the environment due to potential noise impacts and potential effects on the setting of more historic receptors than other options. From a transport planning perspective, Option C is slightly more favourable due to the route being better connected to existing settlements
D	Option D is the most direct alignment from the A415 to SESRO and is approximately 4km long and uses the same junction location as Option A	Not preferred - Option D (to a lesser extent than Options A and B) provides better opportunities to facilitate external schemes, more space for construction compounds and more volume for the Replacement Flood Storage (RFS) required for the roads. Option D has the lowest relative capital cost. From a

Option	Description	Reason for preferred / not preferred
		transport planning perspective, Option D is slightly more favourable due to the route being better connected to existing settlements

3.3.11 The outcome from the assessment for the main access road was that there is little to differentiate options across Engineering, Cost and Carbon, Environment and Community, Planning and Land themes. However, Option B performs slightly better than the other options in a few areas, as set out in the table above.

East Hanney to Steventon road diversion

3.3.12 The current East Hanney to Steventon Road runs under the reservoir footprint. As such, there is a need for it to be diverted to the south of the reservoir. Multi-criteria analysis options appraisal set out in SESRO Access and Diversion Roads Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100009 (Thames Water May 2024) considered four options and identified a preferred alignment for the diversion, a summary of the findings is in Table 3-4 and locations are shown in Figure 3.5.

Figure 3.5 Steventon to East Hanney road diversion options

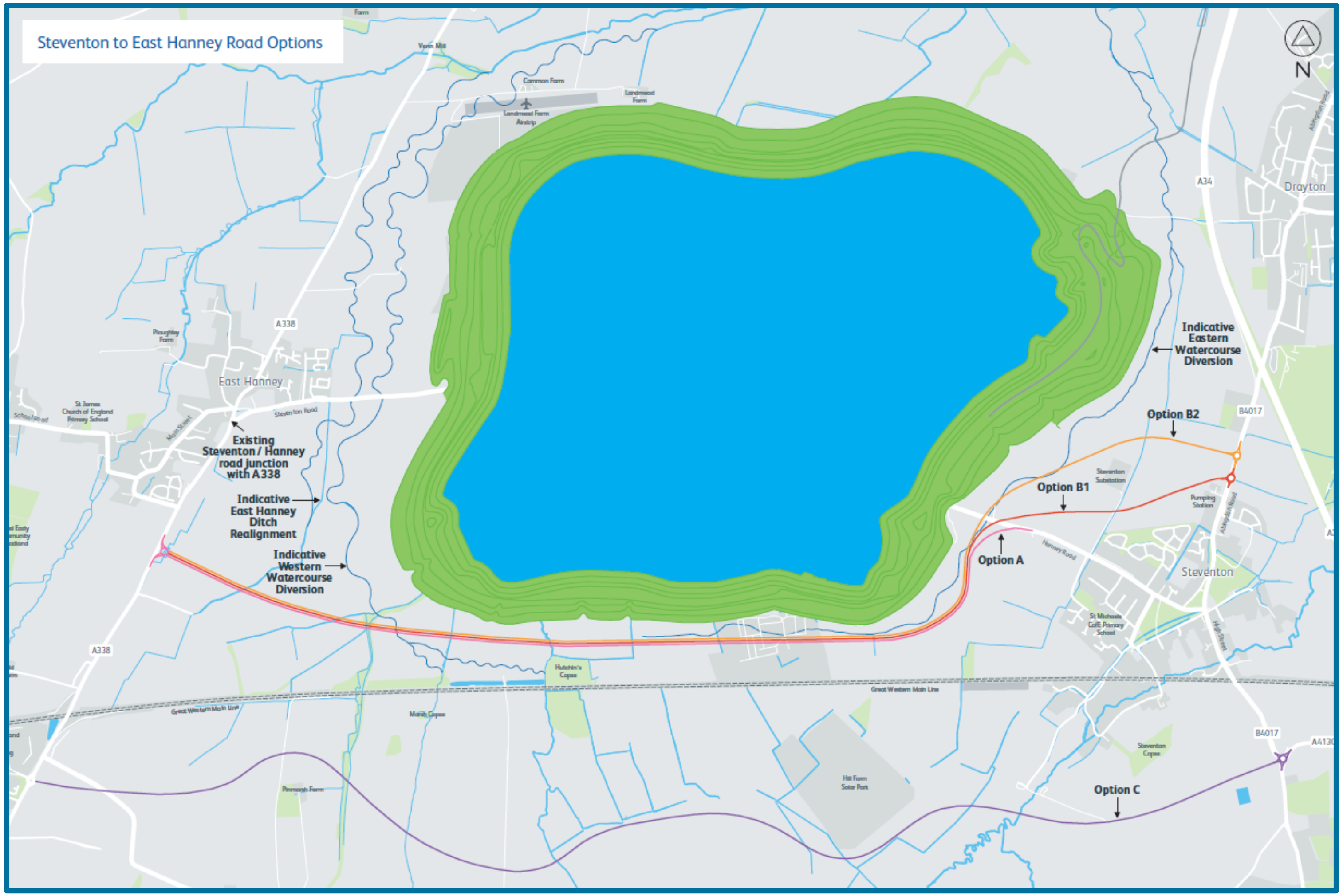


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Table 3-4 East Hanney to Steventon road diversions options

Option	Description	Reason for preferred / not preferred
A	Outside of Steventon the road is diverted to the south from its current alignment from Hanney Road and routed west along the southern extent of the reservoir embankment. The option is approximately 5.1km long and would include a new roundabout junction with the A338 around 800m south of the existing junction	Preferred – performs slightly better than other options as it maintains the shortest direct road link between the two villages, would have the least effect on the visual amenity of Steventon and has the potential to require fewer utility diversions than B1 and B2
B1	Similar to Option A, however, B1 differs at the eastern end where a new junction with the B4017 is introduced to the north of Steventon. Routed north of the existing sub-station the route has a total length of approximately 6.4km	Not preferred – requires utility diversions and has more interaction with existing high voltage overhead lines and water infrastructure. Option B1 would be the furthest away from Steventon. Has similar environmental impacts as Option A and B2
B2	Similar to Option A, B2 differs at the eastern end where a new junction with the B4017 is introduced to the north of Steventon. Routed south of the sub-station, closer to existing properties than B1, this option is approximately 6.2km long	Not preferred – slightly preferred over B1 as it is likely to require less diversion of the overhead high voltage cables. Option B2 would be relatively close to residential properties. Has similar environmental impacts as Option A and B1
C	Option C is routed south of the Great Western Main Line railway. At the alignment's eastern end, the existing junction of the B4017 and the A4130 would likely need to be upgraded. At the western end of the alignment the road connects into the existing roundabout on the A338 in north Grove and is approximately 7.2km long	Not preferred – performs poorly in relation to all themes. Option C is the most complex route to construct and introduces additional third-party impacts by being located away from the main SESRO site. Option C has the highest relative cost, however, this is not a material differentiator. Least preferred from an environmental perspective as it is located closer to the North Wessex Downs National Landscape (NL). Option C also moves the route further away from its existing

Option	Description	Reason for preferred / not preferred
		location, which is likely to increase journey times and impact existing bus routes

Source: SESRO Access and Diversion Roads Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100009 (Thames Water May 2024).

3.3.13 Following option appraisal to date, the initially preferred option is that connecting to the existing Hanney Road through Steventon, marked as Option A. Whilst the EIA Scoping is based upon the preferred option, allowance has also been made for changes to scope that may be associated with options B1 and B2. Option C, to the south of the railway (unlike the existing road), is excluded from the EIA Scoping Boundary. This is because the option appraisal concluded that this option is the least preferred for community, landscape, planning and land due to its land take outside the safeguarded area for SESRO. As such, it is considered highly unlikely to be taken forward.

Alternative rail sidings

3.3.14 The rail siding and materials handling (RSMH) area is considered part of the essential infrastructure associated with the reservoir. 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. Analysis of a longer list of options for the location and layout of this area initially identified three options to be considered in more detail; subsequent iterations of the location and layout identified a further option. Multi-criteria analysis options appraisal set out in SESRO Rail Sidings and Material Handling Area Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100008 (Thames Water May 2024) considered four options and identified a preferred location, a summary of the findings is in Table 3-5 below and locations are shown in Figure 3.6. Any preferred option is subject to the approval of Network Rail.

Table 3-5 Alternative rail sidings options

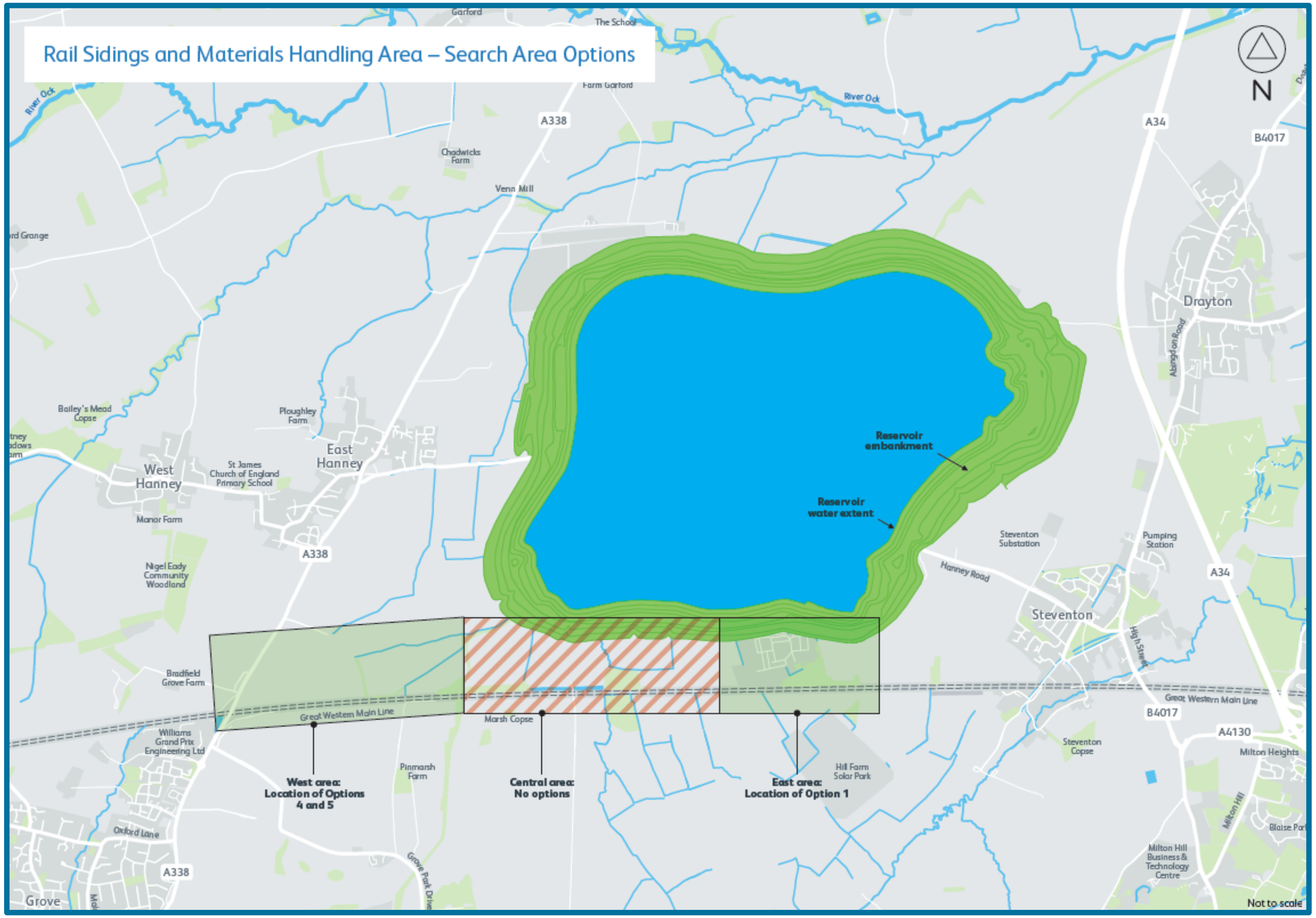
Option	Description	Reason for preferred / not preferred
1	Located approximately 1.5km west of Steventon and 260m south of the southern edge of the reservoir embankment. RSMH 1 lies partially within the Steventon Depot. RSMH 1would provide the required signalling and track	Not preferred – Option 1 does not require significant earthworks and has potentially better ground options than Options 4a and 4b and would have a shorter construction programme with less risk. It is preferred over Option 4a and 4b as it is not anticipated to have

Option	Description	Reason for preferred / not preferred
	modifications to allow trains to exit to the east and west	an impact upon The Cuttings and Hutchings Copse Local Wildlife Site (LWS), however, it is least preferred for land quality as it crosses the Steventon Depot, which is a possible source of contamination. The principal concern is that it is unlikely to be acceptable to Network Rail as it would cause disruption to passenger services from freight trains running at reduced speeds over this section of the line
4a	Located approximately 1km south of East Hanney, 400m from the proposed Steventon to East Hanney Road Diversion and 1km southwest of the reservoir embankment. RSMH 4a would provide the required signalling and track modifications to allow trains to exit to the east and west	Not preferred – the signalling modifications required for RSMH 4a are more extensive than 1 and 4b. Option 4a has the greatest cost, however, this is not considered a material differentiator. Least preferred from an environmental perspective as the location of the RSMH 4a impinges on the LWS. Option 4a will sever a public right of way (PRoW) during construction, which is expected to be reinstated during operation
4b	Located in the same place as Option 4a. RSMH 4b only provides the required signalling and track modifications to allow trains to exit to the east	Not preferred – Least preferred from an environmental perspective for the same reasons as Option 4a
5	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 embankment. RSMH 5 would only provide the required signalling and track modifications to allow trains to exit the site to the east	Preferred – RSMH 5 is located away from the LWS and would, therefore, have the least impact from an environmental perspective. However, it impinges on an equestrian centre and is relatively close to properties. The exit for RSMH 5 is from a section of existing 4-track railway on the GWR mainline and so the risk of impact on passenger services is lower than RSMH 1

Source: SESRO Rail Sidings and Material Handling Area Option Appraisal Report J696-DN-A01A-ZZZZ-RP-ZD-100008 (Thames Water May 2024).

3.3.15 After RSMH 1, 4a and 4b were assessed it was determined that none of these three options were suitable to take forward to the final design. Therefore, RSMH 5 was developed and uses an additional siding rail spur off the main rail siding to move RSMH 5 away from The Cuttings and Hutchings Copse LWS. However, the location and use of this siding remains subject to agreement with Network Rail.

Figure 3.6 Rail sidings and material handling area – search area options



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Alternative watercourse diversions

3.3.16 Given the scale and nature of the SESRO Project the only option for watercourse diversions was to divert them around the embankments and their location was set by constraints analysis rather than optioneering.

Alternative ancillary infrastructure locations and design

Alternative T2ST WTW locations

3.3.17 The T2ST WTW is a SRO transferring available water from SESRO to the Southern Water Hampshire area, Thames Valley and South East Water's Basingstoke area.

3.3.18 Southern Water is progressing an assessment for the WTW location in respect of the T2ST project. Preliminary findings indicate that the WTW would most appropriately be located at SESRO which is the preferred position for operational, engineering, environmental and planning reasons, including the need for water treatment to be located north of the River Lambourn for water quality reasons, proximity to SESRO as the source of water for the scheme and available wastewater treatment near to SESRO. The work undertaken to date has shown that for reasons including those relating to invasive and non-native species risk associated with raw water transfer and consideration of potential effects on the North Wessex Downs NL, it is preferred that the T2ST WTW is located at, or close to, the head of the T2ST pipeline route. It has also identified that there are no preferred alternative sites for locating the T2ST WTW outside of the SESRO EIA Scoping Boundary due to length of raw water supply and return pipelines to the WTW and length of wastewater main that this would require.

3.3.19 Analysis of a longer list of options for the location of the WTW on the SESRO site identified four options to be considered. Multi-criteria analysis options appraisal set out in SESRO Thames to Southern Transfer SRO, WTW Site Identification Report J696-DN-A01A-ZZZZ-RP-ZD-100007 (Thames Water May 2024) considered these options and identified a preferred location, a summary of the findings is in Table 3-6 below and locations are shown in Figure 3.7.

Table 3-6 Alternative T2ST WTW locations options

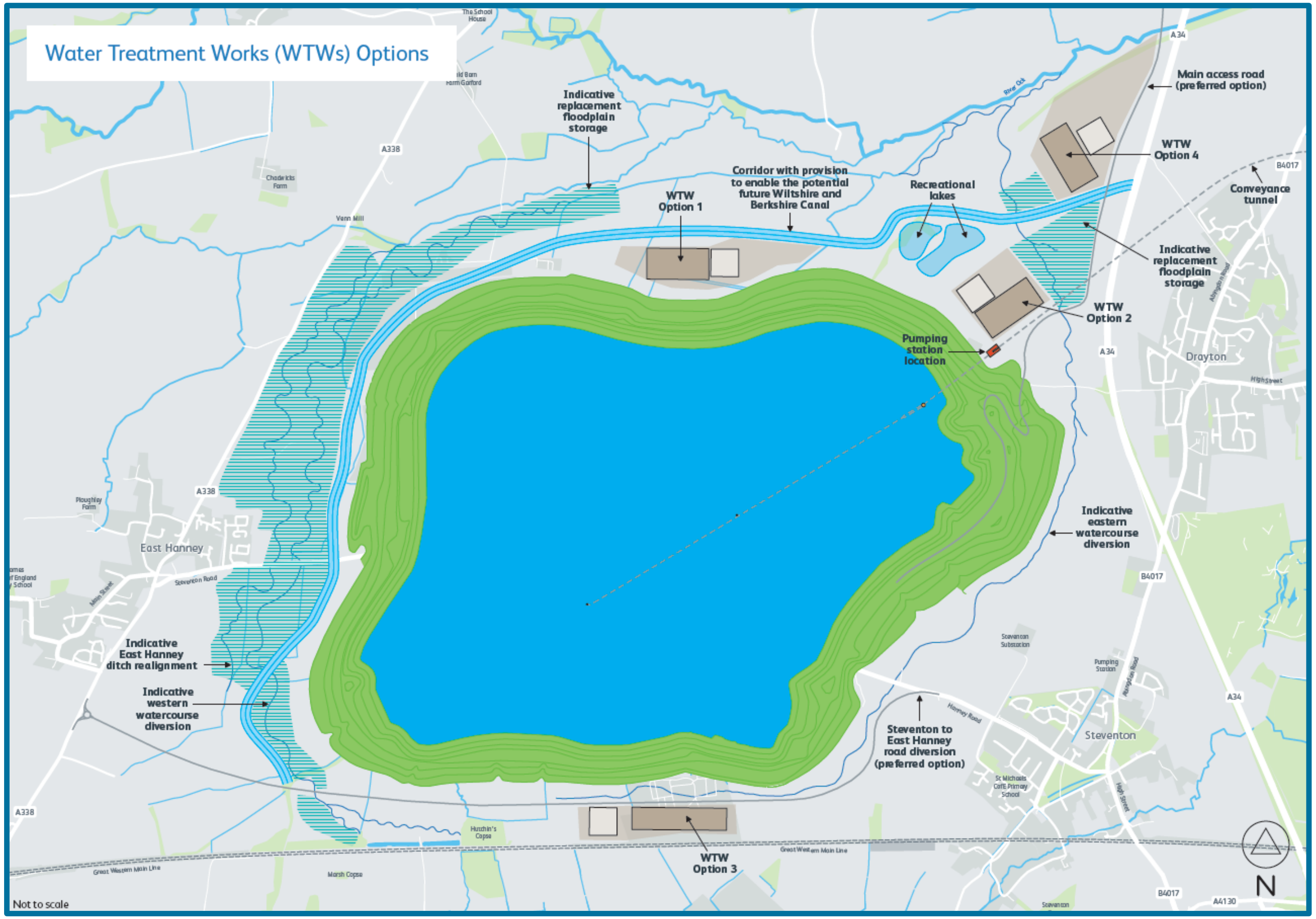
Option	Description	Reason for preferred / not preferred
1	Option 1 is located along the northern edge of the outer reservoir embankment, approximately 1.9km south of Marcham. The corridor with	Not preferred – From an environmental perspective, the option has the potential to affect curlew habitats

Option	Description	Reason for preferred / not preferred
	provision to enable the potential future Wiltshire and Berkshire Canal lies immediately to the north. By avoiding the northeast corner of the site, this option effectively reduces potential interactions with recreational facilities and public parking	
2	Option 2 is located within the northeast corner of the SESRO site, approximately 0.7km west of Drayton. This location places the works near the reservoir embankment, the main access road, the pump house, and the tunnel. This option falls within Zone 3 and effectively consolidates the majority of SESRO operational assets within a single region	Preferred (1st) – performs better overall than other options as it requires the shortest length of pipework due to it being situated closest to the raw water pumping station (RWPS), resulting in the lowest vehicle movements, program duration and pipeline construction complexity. It also has no identified biodiversity and nature conservation constraints and is not situated in a known potential contamination zone
3	Option 3 is located on the southern edge of the SESRO site, approximately 1.6km west of Steventon. This location positions the works within a narrow corridor of land between the Great Western Main Line railway and the Steventon to East Hanney road diversion. This option avoids the northeast corner of the site, effectively minimising interactions with recreational facilities and public parking	Not preferred – due to program risk and likely safety precautions associated with working near a live railway and road. From an environmental perspective, the pipeline for this option lies underneath the eastern watercourse diversion, posing a Water Framework Directive (WFD) risk, it is also most visible from the North Wessex Downs NL and the Ridgeway National Trail. In addition, Option E will require the removal of priority deciduous woodland and has the potential to impact on protected and notable species
4	Option 4 is located near the entrance of the SESRO site, approximately 0.6km northwest of Drayton. This location is within a relatively spacious land parcel, situated 1km northeast of the reservoir. The higher elevation of	Preferred (2nd) as it provides ample space for future expansion and construction, away from other SESRO construction activities. Is second preferred in relation to cost and carbon due to reductions in pipeline length associated with moderate proximity to

Option	Description	Reason for preferred / not preferred
	this section of the site would likely require landscape mitigation and additional earthworks to reduce the visual impacts and integrate it into the landscape	the RWPS, alongside the shortest length of wastewater pipeline required

3.3.20 Overall, Options 2 and 4 are preferred, with Option 2 performing marginally better than Option 4 as it requires the shortest length of pipework and as there are no identified environmental constraints.

Figure 3.7 WTW options



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Alternative Swindon and Oxford (SWOX) Water Resource Zone Infrastructure locations

3.3.21 As noted in section 2, the rdWRMP24 also includes a potential treated water transfer as an adaptive pathway project. This would require a WTW at the SESRO site but it may never be built, therefore, it is not part of the current SESRO Project. The potential future SWOX WTW would have a similar footprint to that of the T2ST WTW and so the two indicative preferred locations from the T2ST WTW option appraisal provide sufficient information for consideration of reserving space for SWOX, if required.

Preliminary output of options studies: Interim Master Plan

3.3.22 As set out in paragraph 3.3.3, in accordance with Step 8, the outputs of the various studies were brought together to develop the Interim Master Plan for non-statutory public consultation in summer 2024. This seeks to integrate all of the elements of SESRO within the seven broad zones illustrated on the Zoning Plan on Figure 2.1 into a holistic design. A fully annotated Interim Master Plan is provided on Figure 3.8. This has been prepared on an illustrative basis showing the current preferred configuration of the infrastructure elements, as determined through option appraisal as explained above and will continue to be developed on an iterative basis as the Project progresses in line with survey findings, environmental assessments (such as the EIA, BNG calculations, WFD assessment), design development and to take into account consultation and engagement. The design, including embedded environmental mitigation is, therefore, subject to change and further exploration of alternatives.

3.3.23 Design alternatives will continue to be considered as the project progresses. The Interim Master Plan will be updated at key milestones in the design development as the Project progresses towards the DCO application submission.

Approach to master planning

3.3.24 A landscape and environment led approach has been taken to the development of the Interim Master Plan design. This is based upon good contextual design and collaboration between key design disciplines, such as landscape architects, planners, engineers, architects and a wider multidisciplinary team, and consultation with stakeholders, to ensure that the design is sensitive to the surrounding context, well integrated into the landscape and contributes to the delivery of potential benefits for landscape, nature and people.

3.3.25 The design development has been informed by the Design Vision and Draft Design Principles for SESRO, as set out in document J696-AA-ZZZZ-ZZZZ-RP-ZD-100001 (Thames Water, 2024), and engagement with key stakeholders at local authorities (Oxfordshire County Council (OCC), South Oxfordshire District Council (SODC) and Vale of White Horse District Council (VoWHDC)) and North

Wessex Downs NL, Natural England and the Environment Agency. The National Policy Statement for Water Resources Infrastructure (April 2023) has also been considered.

3.3.26 This approach will continue to be adopted as alternatives are considered as part of the iterative development of the Master Plan.

Initial environmental proposals, including access, recreation, landscape and habitat creation

3.3.27 The Interim Master Plan on Figure 3.8 provides an indication of access, recreation, landscape and habitat creation, based on the current preferred configuration of infrastructure features determined through option appraisal. As noted in paragraph 3.3.22 above, all aspects remain subject to change, including to take into account consultation and engagement.

Access, recreation and education

3.3.28 The Interim Master Plan on Figure 3.8 incorporates access for visitors, including the local community, to new green space associated with the reservoir, via an indicative network of PRoW, permissive paths/nature trails and active travel routes, to include access for walkers/wheelers, cyclists and horse-riders. Alternatives for recreational and educational facilities, including a visitor centre, cafés, a water sports centre and an education centre are indicated within Zones 3 and 6 (refer to Figure 2.1). Both the reservoir itself and adjacent recreational lakes could provide visitors with opportunities for a range of recreational non-motorised water-based recreational activities (supported by a small number of electric motorised craft for access and safety). Alternatives for some recreational facilities are indicated and further work is required to determine the preferred options for these.

Landscape, habitats and watercourses

3.3.29 Where practicable, existing hedgerows, tree belts and woodland are proposed to be retained around the proposed reservoir. Extensive habitat creation and enhancement is proposed to mitigate for loss of existing habitats, improve the terrestrial and aquatic habitat available for wildlife locally and deliver BNG. The distribution of habitats has been informed by the local landscape character and will continue to be refined as further baseline studies and assessments are developed.

3.3.30 As illustrated on the cross sections on Figure 3.9, the indicative reservoir embankment earthworks have varied and slackened slopes, with landscape fill above the structural and stability fill to enable planting of woodland belts, copses and hedgerows around areas of pasture for sheep grazing. The planting on the embankments would help to integrate the reservoir into the surrounding landscape and to mitigate for loss of existing habitats. The toe drain at the base of the embankment would incorporate a range of emergent, submerged and floating-leaved plants, as well as aquatic marginal vegetation which would provide habitat and visually soften the drain.

3.3.31 Permanent environmental bunding with planting is indicated on the Interim Master Plan on Figure 3.8 in key locations along the Steventon to East Hanney road diversion to provide noise and visual screening for sensitive receptors. In addition, environmental bunding is illustrated west of the A34 to provide noise and visual screening of SESRO from traffic associated with the A34; and to the north-west of Steventon to help to create some visual separation between the recreational areas and the adjacent electrical sub-station and associated pylons and overhead lines near Steventon. The main visitor car parking is indicated close to the north-eastern base of the reservoir embankment in order for the embankment and associated woodland planting to help screen the car parking in views from the south, including the North Wessex Downs NL.

3.3.32 Within the reservoir, options are being considered to improve its biodiversity value, contribute to its visual amenity, and to visually soften the appearance of the reservoir edges without impacting the water storage volume. The Interim Master Plan on Figure 3.8 proposes wetland lagoons with marginal habitat and wet woodland to the west and would be designed to retain water even when the reservoir water levels drop during drier periods. Floating islands are illustrated on the Interim Master Plan on Figure 3.8 along the southern, south-western and north-western sides of the reservoir waterbody, where the wind and associated wave action is anticipated to be reduced compared with other parts of the reservoir, based on the prevailing wind direction. The islands would be planted with a range of different native aquatic species which would also provide further habitat for (nesting) birdlife.

3.3.33 Watercourse diversions and associated wetlands and replacement floodplain storage areas are proposed to the west and east of the reservoir to manage flood risk, contribute to biodiversity net gain and ensure WFD compliance. No substantively different locations for these watercourses have been identified, however, design details will continue to develop. The Interim Master Plan on Figure 3.8 proposes the western watercourse diversion with an extensive area of wetlands, and the eastern watercourse diversion with a smaller area of wetlands near the River Ock. Elsewhere, the eastern watercourse diversion would incorporate a riparian buffer for the new channel to flood into, allowing the watercourse to function more naturally. The wetlands would comprise habitat mosaic with reeds, species rich wet grassland and floodplain marsh, with localised areas of wet woodland along the sinuous lines of the watercourse diversions. Planting and strategic placement of wet features like ditches would help to reduce disturbance to wildlife by visitors with dogs to the wetlands.

3.3.34 An extensive network of hedgerows and woodland blocks are illustrated on the Interim Master Plan on Figure 3.8 around the reservoir to help mitigate for loss of existing hedgerows and woodland. Amongst others, this includes a large area of woodland with glades to the west of the road past the existing Steventon Community Woodland, as well as extensive woodland with glades alongside the Great Western Main Line railway. This would increase the area of woodland habitat in the vicinity of The Cuttings and Hutchins Copse LWS.

3.3.35 A series of wildlife ponds, scrapes and pools are indicated on the Interim Master Plan on Figure 3.8 to the north, east and south of the reservoir. In addition, GCN habitat ponds are proposed to provide compensation for the loss of existing ponds and would generally be located away from PRoW and permissive paths, to reduce potential disturbance. Whilst extensive areas of species rich grassland are illustrated, some parcels of land may also be reinstated and returned to agriculture in Zones 1, 2 and 4.

3.3.36 In the vicinity of the proposed intake/outfall structure along the River Thames, intermittent trees and shrubs are illustrated on the Interim Master Plan on Figure 3.8 to reflect the character of existing riparian vegetation along the River Thames. This is to help to conserve the relative sense of tranquillity and remoteness along the river which forms part of the visual amenity of the Thames Path National Trail to the east of the river.

3.4 References

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4 Consultation and Engagement

4.1 Introduction

4.1.1 This chapter sets out the approach to consultation and engagement with statutory authorities and other relevant stakeholders primarily in relation to EIA Scoping. Consultation is a formal process seeking formal feedback on the Project, whereas engagement is a more informal provision of information and informal discussion. A summary of consultation and engagement already undertaken is outlined with respect to potential environmental effects of the Project and assessment methods, whilst further detail is provided in each technical topic chapter (Chapters 6 to 20).

4.1.2 Thames Water is currently undertaking a 12 week non-statutory consultation on the interim masterplan, design options and design principles. The consultation materials include a public consultation brochure and associated summary; a questionnaire, the interim master plan, options appraisal reports, various factsheets (including one associated with the EIA process), maps, design principles and a legacy brochure. A continual dialogue will be maintained following the consultation, to ensure information exchange and knowledge sharing between stakeholders and the Project team.

4.1.3 Statutory consultation is also planned for summer / autumn 2025, to include the Preliminary Environmental Information (PEI) Report. Ahead of statutory consultation the Applicant will produce a Statement of Community Consultation (SoCC).

4.1.4 Specifically in relation to this EIA Scoping Report, PINS will undertake statutory consultation with the relevant organisations to inform their scoping opinion.

4.2 Consultation Process for the SESRO project

4.2.1 To date, the majority of consultation and engagement has related to the needs case, through the Water Resources South East (WRSE) regional plan and the revised draft Water Resources Management Plan (rdWRMP24) processes, and through the Regulators' Alliance for Progressing Infrastructure Development (RAPID)[8] gated report submissions to Ofwat, the Environment Agency and the Drinking Water Inspectorate.

4.2.2 Consultation and engagement with a range of stakeholders and the public has been carried out since RAPID Gate 1 (2020) and the SESRO Project is now at

[8] *Ofwat established the Regulators' Alliance for Progressing Infrastructure Development (RAPID) to ensure a smooth regulatory path for strategic water infrastructure like joint reservoir projects and inter-regional water transfers.*

Gate 3. Public consultation on Thames Water's rdWRMP24 was undertaken from 13 December 2022 for 14 weeks to 21 March 2024. The consultation included the identification of SESRO as one of the preferred options to meet the water resources need, amongst a range of other solutions and policies. This identified the size of the SESRO Project in water resources planning terms and its proposed location, but no assessment was undertaken, or decisions made, on the preferred configuration of SESRO or the master plan as part of the rdWRMP24.

4.2.3 Specifically in relation to the environment, regular engagement with statutory (and some non-statutory) bodies has been carried out through Technical Liaison Groups (TLGs) covering the following environmental topic areas:

- Water Resources and Aquatic Ecology TLG – with the Environment Agency and Natural England
- Landscape TLG – with Natural England, Oxfordshire County Council (OCC), Vale of White Horse District Council (VoWHDC) and North Wessex Downs National Landscape (NL)
- Terrestrial Ecology TLG – with Natural England and OCC
- Historic Environment TLG – with Historic England (HE) and OCC

4.2.4 Discussions up to March 2024 focussed on design aspects and progress updates, with particular emphasis on landscape led design with the Landscape TLG. Such discussions were generally held on a quarterly basis with additional meetings arranged to discuss specific issues, where appropriate.

4.3 Engagement Regarding EIA Scoping

4.3.1 From March 2024 the attention of the TLGs focussed on EIA Scoping and baseline surveys and new TLGs were set up to encompass further EIA topics.

4.3.2 Additional organisations were also added to the existing TLGs, where appropriate. Table 4-1 sets out when EIA scoping discussions were held with those TLGs, the organisations invited, and those that attended along with a brief summary of the topics discussed.

4.3.3 The outcome of the TLGs in terms of amendments arising to the scope of each assessment are set out in each respective aspect chapter, where the main points raised and how they have influenced the assessment scope, with justifications, are provided.

4.3.4 During the TLG meetings presentations on the proposed EIA methods and scope were presented by the Applicant and, where appropriate, further information given.

Table 4-1 EIA Scoping TLGs

Environmental Topic	Date	Invitees	Attendees	Specific issues discussed relevant to EIA scoping
Aquatic ecology and water resources	13/03/24	National Appraisal Unit (NAU), Natural England, Environment Agency	All	Introduction to methodology and timescales of EIA
Landscape and visual	17/04/2024	Natural England - Landscape + Ecology Environment Agency North Wessex Downs NL VoWHDC - Landscape + Planning OCC – Landscape + Planning	Natural England Environment Agency VoWHDC OCC	Viewpoint locations, Landscape and Visual Impact Assessment (LVIA) criteria, Landscape Character Areas, assessment years, viewer groups, mitigation
Terrestrial ecology – ecological survey scoping	06/12/2023	Natural England Environment Agency	All	Survey methods for UK Habs, Preliminary Ecological Appraisal (PEA) and protected species and use of Habitat Suitability Modelling
	26/02/2024	Natural England Environment Agency Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) OCC - Ecology	All	
	06/06/2024	Natural England Environment Agency	All	Bat survey method

Environmental Topic	Date	Invitees	Attendees	Specific issues discussed relevant to EIA scoping
Terrestrial ecology – EIA scoping	29/04/2024	Natural England Environment Agency	All	Scoping and assessment methodology. No specific issues raised
	26/06/24	OCC BBOWT	All	
Historic environment	27/03/2024 + 29/05/2024	OCC - Archaeology OCC - Planning Historic England - Inspector of Ancient Monuments	All	Survey and mitigation timescales, geophysical survey, use of both Institute of Environmental Management and Assessment (IEMA) and Design Manual for Roads and Bridges (DMRB) guidance on assessment methods, asset valuation criteria, approach to provision of Written Schemes of Investigation (WSI) for archaeological surveys, use of LiDAR data and study areas, historic building setting, geoarchaeology, iterative process between surveys, EIA and design
Soils and geology	10/04/2024	Natural England - Soils and Ecology teams	All	Agricultural Land Classification (ALC) surveys, soil survey densities, available

Environmental Topic	Date	Invitees	Attendees	Specific issues discussed relevant to EIA scoping
		VoWHDC – Environmental Health (contaminated land)		contamination data, soil storage, landfill presence, soil reuse criteria
Materials and waste	15/03/2024 14/05/2024	OCC - Planning VoWHDC – Planning OCC - Minerals and waste planning	OCC – Planning VOWHDC – Planning 15/03. All 14/05	Availability of information on construction details; material quantities / provenance; and waste quantities / management routes, consideration of the future Minerals and Waste Local Plan, Minerals safeguarding, demolition, re-use of solar panels
Carbon and climate	15/03/2024 14/05/2024	OCC - Planning VoWHDC – Planning VoWHDC – Carbon team	All	Soil carbon, land-use change, tree planting, removal of existing solar farms, net zero, existing local policy, use of local and national carbon budgets, cumulative effects
Communities and health	25/03/2024	OCC - Planning VoWHDC – Planning	All	Employment and education commitments, use of a health chapter in the EIA vs a standalone Health Impact Assessment (HIA) and crossover between benefits and health assessment,

Environmental Topic	Date	Invitees	Attendees	Specific issues discussed relevant to EIA scoping
				Equality Impact Assessment, Wiltshire and Berkshire Canal, Environmental Net Gain
Air quality, noise and vibration	25/03/2024	OCC - Planning VoWHDC – Planning VoWHDC - Environmental Health	All	Traffic noise and vehicle routing / management, working hours, noise control hierarchy, baseline noise monitoring locations, noise mitigation, Exclusion of odour and pollutant emissions from the operational WTW and baseline air quality monitoring, use of pre-pandemic air quality monitoring data, emissions from rail sidings
Traffic and movement	25/03/2024	OCC – Planning OCC - Highways VoHWDC - Planning	All	Rail sidings, validity of existing traffic data and further survey requirements
Arboriculture	14/05/2024	OCC – Tree team OCC - Planning VoWHDC – Planning	All	Tree survey methods and, specifically, ancient and veteran tree survey methods and mitigation

Environmental Topic	Date	Invitees	Attendees	Specific issues discussed relevant to EIA scoping
Major accidents and disasters	Ongoing discussions with the EA 12/06/24	N/A National Highways OCC Highways Network Rail	N/A All	Embankment failure and associated flooding Microclimate / traffic assessment re: potential for changes to incidences of fog and ice and associated road/rail safety risks
Cumulative effects	15/03/2024	OCC - Planning VoWHDC – Planning	All	Requirement for a long list of potential cumulative developments, effects of SESRO lead in times, consideration of NSIP, County and District level developments, status of proposed development of Dalton Barracks nearby

4.4 Next Steps and Statutory Consultation Process

4.4.1 Engagement will continue with the stakeholders and local community as the Project develops. Local authorities, other stakeholders and the public will be consulted on the Project and alternatives considered.

4.4.2 PINS will seek advice from statutory consultees in relation to preparing its Scoping Opinion based upon this EIA Scoping Report. Throughout the EIA process the Applicant will continue to engage with statutory and non-statutory consultees on the progress of the EIA and its findings. Matters of detail on the scope of the EIA will continue to evolve as surveys and assessments are undertaken, which may identify new issues or information suggesting that certain effects are unlikely to be significant and can be scoped out. Any changes arising to the scope of the EIA will be agreed with PINS and the relevant statutory consultees. The publication of the Preliminary Environmental Information (PEI) Report, expected in 2025, will also be consulted on.

4.5 References

Thames Water, (2024). *Revised draft Water Resources Management Plan*. [Online]. Available at: https://www.thameswater.co.uk/about-us/regulation/water-resources#wrmp19 [Accessed 17 July 2024].

Thames Water, (2024). *South East Strategic Reservoir Option (SESRO) Public Consultation (Summer 2024) Document Library*. [Online]. Available at: https://thames-wrmp.co.uk/news/documents/ [Accessed 14 August 2024].

5 EIA Methodology

5.1 Introduction

5.1.1 The purpose of Environmental Impact Assessment (EIA) is to protect the environment by ensuring that decision makers, when deciding whether to grant consent for a project which is likely to have significant effects on the environment, do so in the full knowledge of the likely effects and take this into account in the decision-making process (Department for Levelling Up, Housing and Communities (DULHC), 2020).

5.1.2 The EIA process is defined as 'a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects' (Sadler & Fuller, 2002). There are three main EIA documents produced as part the pre-application process for developments requiring development consent under the Planning Act 2008 (as amended). These are:

- Scoping Report: The Scoping Report sets out the likely significant effects from a project (scope). It also presents the data to be collected and the proposed assessment methodology and approach that would be used during the EIA. The Scoping Report is issued by the Planning Inspectorate (PINS) to consultees for comment on the scope and methodology proposed
- Preliminary Environmental Information (PEI) Report: The PEI Report sets out the information that 'is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development' (PINS, 2020). The PEI Report is used by consultees to inform their consultation responses during the Statutory Consultation and,
- Environmental Statement (ES): The ES presents the results of the EIA undertaken for a project. It identifies the likely significant effects that would result if the project was implemented, and any proposed mitigation to reduce those significant effects. The ES is submitted as part of the application for development consent and is taken into account during the decision-making process

5.1.3 This chapter presents the key themes of EIA scoping that have been used to inform the production of this EIA Scoping Report. An overview is provided as to how the following have been defined and assessed:

- Regulatory requirements
- The EIA process including accounting for design flexibility and spatial / temporal scope
- Assessment of effects and determination of significance
- Approach to mitigation
- Residual and cumulative effects and,

- Monitoring

5.1.4 Each aspect chapter will clearly define its approach to the evaluation of effect significance. This section provides details of the overarching methodology proposed for the EIA process. This will be used to inform the approach to assessment for each environmental aspect, except where aspect-specific guidance or usual practice for that aspect indicates otherwise. The overarching approach proposed takes into account both the sensitivity of receptors affected and the magnitude of the likely impact in determining the significance of the effect. In all cases, the evaluation of significance will be underpinned by a narrative approach and professional judgement.

5.2 Regulatory Context and EIA Requirements

5.2.1 SESRO is defined as a Nationally Significant Infrastructure Project (NSIP) for which development consent is required by the Secretary of State for the Environment, Food and Rural Affairs. This means an application for development consent (the DCO Application) will be made to the Secretary of State for determination in accordance with the Planning Act 2008. In accordance with Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (APFP Regulations), the DCO Application will be accompanied by an ES pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations').

5.2.2 Paragraphs 2 and 3 of Regulation 5 of the EIA Regulations state that:

(2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors–

a) population and human health;

b) biodiversity, with particular attention to species and habitats protected under any law that implemented Directive 92/43/EEC and Directive 2009/147/EC;

c) land, soil, water, air and climate;

d) material assets, cultural heritage and landscape; and,

e) the interaction between the factors referred to in sub-paragraphs (a) to (d).'

(3) The effects referred to in paragraph (2) on the factors set out in that paragraph must include the operational effects of the proposed

development, where the proposed development will have operational effects.'

5.2.3 These are considered within the aspect specific chapters (Chapters 6 to 20) of this report.

5.2.4 Regulation 5(4) of the EIA Regulations state that the EIA should include, where relevant, *'the expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development'*. This aspect is considered within Chapter 19 of this report.

5.2.5 Schedule 4, paragraph 5(e) of the EIA Regulations states that a description should be included, of the likely significant effects arising from the 'the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'. This requirement is addressed within Chapter 20 of this report.

5.2.6 Regulation 32 of the EIA Regulations requires the consideration of any likely significant effects on the environment of another European Economic Area State. Given its location (in the centre of England), scale and nature (with limited atmospheric emissions) the Project is unlikely to have a significant effect either alone or cumulatively on the environment in another European Economic Area State. On this basis transboundary effects have been scoped out.

5.2.7 The requirements set out in the EIA Regulations are further explained in PINS Advice Notes including:

- Advice Note Three: EIA Notification and consultation (UK Government, 2024)
- Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (UK Government, 2020)
- Advice Note Nine: Rochdale Envelope (UK Government, 2018)
- Advice Note Twelve: Transboundary impacts and process (UK Government, 2015a)
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (UK Government, 2015b)

5.2.8 Other Advice Notes relate to particular environmental aspects and these are referred to elsewhere in this EIA Scoping Report.

5.2.9 Should any revisions or changes occur in environmental legislation such as for example, the EIA Regulations, these will be accounted for in the PEI Report and / or ES, as appropriate. Should there be any revisions to the Advice Notes or other guidance relied upon in the EIA and issued between scoping and reporting of the EIA, they will also be adopted, if appropriate.

5.3 Relationship with Other Regulatory Regimes and Assessments

5.3.1 Alongside the EIA process, a number of other assessments will be undertaken and included as part of the application for development consent. Some of these assessments will form separate reports, either corresponding to separate legislative or good practice requirements, whilst others will be integrated in the EIA process.

5.3.2 Where the assessments form separate reports, the authors will work alongside each other to ensure consistency of data use and allow the findings of assessment to inform the others as appropriate.

5.3.3 These other assessments and their proposed location as part of the documentation submitted with the application for development consent include:

- The Habitats Regulation Assessment, to comply with the Conservation of Habitats and Species Regulations 2017, will be provided as a separate appendix to the ES and referenced in the EIA
- A Water Framework Directive assessment report, will be provided as a separate appendix to the ES and referenced in the EIA
- A Flood Risk Assessment, will be provided as a separate appendix to the ES and referenced in the EIA
- An Equality Impact Assessment (EqIA), which will provide information in terms of groups with protected characteristics under the Equality Act 2010 and social inequalities, will be relevant for consideration of vulnerable groups and health inequalities. Equality effects will be considered in a separate EqIA which will be submitted as part of the DCO application if significant impacts are identified at the screening stage

5.4 The EIA Process

5.4.1 The EIA process is designed to be capable of including and enabling changes that occur as a result of design development or consultation responses, including any mitigation measures that are incorporated during the EIA.

5.4.2 This is important to note for this EIA, as the design and proposed construction approach of the Project is still being refined and is likely to evolve further following submission of this EIA Scoping Report.

5.4.3 Figure 5.1 sets out the principal elements of the EIA process.

Figure 5.1 EIA process

Screening

Determine whether a proposed Project needs an EIA, either due to its nature, or because it is likely to have a significant effect on the environment. Where EIA Screening is likely to confirm that statutory EIA is required, it is often appropriate to combine EIA Screening and Scoping and undertake these at the same time.

Scoping (this report)

Identifying the issues to be considered within the ES and seeking confirmation from the statutory environmental consultees on the scope of EIA required. The Applicant produces a Scoping Report to describe the scope and methodology of the technical studies being produced to provide an assessment of any likely significant effects that the Project may have, including any suitable mitigation measures for the construction and operation of the Project. It also describes which topics are proposed to be scoped out of the EIA Process including a justification as to why. The Scoping Report is submitted to the Planning Inspectorate who in turn will produce a Scoping Opinion based on their views and that of the statutory consultees who are consulted on the Scoping Report.

Preliminary Environmental Information (PEI) Report

This will form part of the formal statutory consultation required under the Planning Act 2008. The preliminary findings of the EIA Process will be set out within the PEI Report. The consultation responses on the PEI Report will be used to inform the DCO application and accompanying ES.

Environmental Statement (ES)

The main stage of the EIA process. The ES will accompany the application for development consent to the Planning Inspectorate. This will include all the information required to assess the effects of the Project. This will, where relevant and practical, take into consideration the comments received during the consultation with the community, statutory bodies and stakeholders on the PEI Report as well as the ongoing dialogue with stakeholders.

The Examination

If accepted by the Planning Inspectorate, an Examining Authority will be appointed to examine the application for development consent including the ES. The examination will be led by the Examining Authority, and all parties, including statutory bodies, stakeholders and the community, will have the opportunity to raise questions and comments on the information presented within the ES. The Applicant then has the right to reply. This is both a written and oral process.

Decision

Following the Examination, the Examining Authority has three months to send a recommendation report to the Secretary of State (in this case DEFRA). The Secretary of State then has three months to make a decision as to whether to grant the development consent.

General Approach

5.4.4 In accordance with the EIA Regulations, the assessments undertaken will evaluate and identify the likely significant environmental effects arising from the proposed construction and operational phases of the Project. This information will be presented in an ES.

5.4.5 Each environmental aspect chapter within this EIA Scoping Report includes a description of the proposed methodology for determining the significance of effects. The EIA will also be supported by narrative from the technical specialist authors to justify the final judgements on significance.

5.4.6 In general, the EIA will follow a receptor-based assessment approach. Receptors are those features of the environment which may be sensitive to change as a result of the Project. When deciding which receptors to include within the EIA Scoping Report, consideration was given to Regulation 5(2) and Schedule 4 paragraph 4 of the EIA Regulations.

5.4.7 The recent Supreme Court judgment on the *Finch* case (*Finch v Surrey County Council* [2024] UKSC 20) has been considered in the preparation of this EIA Scoping Report and the proposed scope and methodology for each aspect, with particular attention to potential upstream and downstream[9] direct and indirect effects where practicable and appropriate.

5.4.8 As stated at paragraph 2.4.3 of Chapter 2 (Project Description), SESRO interacts both directly and indirectly with a variety of other potential water infrastructure projects (some of which may not come forward) that are yet to be assessed and proceed through their own consenting processes. As much of the baseline environmental information for these projects is not yet known, it has not been possible to assess any of the upstream and downstream interactions that SESRO may have with these projects at this stage – any such assessment would only ever be speculative at best. Any such effects, to the extent a meaningful assessment can be undertaken, will be captured where appropriate in the ES for SESRO, for example as part of the cumulative assessment, in accordance with the EIA Regulations 2017.

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[9] *In this context, the terms 'upstream' and 'downstream' refer respectively to effects arising from activities that are required to facilitate the development of the Project and activities that are consequential to the Project (i.e. inputs to and outputs from the Project). In this Scoping Report, certain aspects, such as water and aquatic ecology consider downstream impacts from a water flow perspective, for example, impacts from releases of water from SESRO, with downstream meaning down from the River Thames discharge point as the river flows. However, here we refer to upstream and downstream effects in the general sense.*

5.4.9 The following sections of this chapter set out further detail on key aspects of the assessment methodology that will be applied in the EIA. The methodology set out in this chapter provides an overview of the generalised approach and principles behind the assessment of impacts and likely significant effects. Specific guidance on impact assessment has developed for many environmental aspects, which can vary from the generalised approach set out in this chapter. Consequently, each chapter sets out the aspect and matter specific methodologies to impact assessment that will be adopted in the EIA. Known assumptions, limitations and uncertainties are provided in each individual technical chapter (Chapters 6 to 20).

Establishing baseline conditions

5.4.10 In order to assess the potential impacts of the Project, the ‘current baseline’ environmental conditions (i.e. without the Project) that currently exist within the EIA Scoping Boundary and in the surrounding area are defined in the context of each environmental aspect. The baseline conditions form the basis of assessment and enable the likely significant effects to be identified by comparison of the baseline conditions with the predicted conditions with the Project.

5.4.11 Baseline conditions can be described as the current baseline (the conditions currently identified by survey etc.) or the future baseline (the predicted baseline in the future if the Project were not to go ahead). This allows the consideration of a ‘do nothing’ scenario, to allow, where relevant, the assessments to compare the scale of environmental changes both with and without the Project. Different topic chapters use different years as appropriate to topic specific guidance. For example, landscape and visual effects are assessed during construction, on the first year of operation and 15 years into operation to account for the maturation of landscape planting. Conversely, the Air Quality Assessment uses the current baseline conditions as a worst case assuming that air quality will improve in the future as technology, such as vehicle electrification, will reduce emissions over time.

5.4.12 The EIA will take into account other developments that are likely to come forward during the construction of the Project and, where appropriate, these will be factored into the definition of the baseline or identified as receptors. Further details on the approach to approved developments are provided in Chapter 20 – Cumulative Effects.

5.4.13 Environmental data to inform the EIA Scoping Report has been obtained primarily through desktop studies and some site surveys. Further studies, field surveys, public consultation and engagement with relevant stakeholders and statutory bodies will build upon and refine the baseline information reported in this EIA Scoping Report and will be reported in the ES. Further details of the baseline conditions are set out in the environmental aspect chapters (Chapters 6 to 20) and include reference to specific guidance and the approach to data collection, including desk-based study, site surveys and modelling.

5.5 Scope of the Assessment

5.5.1 The scope of the EIA will consider the following parameters:

- Technical requirements
- Spatial scope
- Temporal scope

Technical requirements

5.5.2 This Scoping Report describes the environmental aspects that should be addressed by an EIA, in line with the requirements of the EIA Regulations, in particular Schedule 4. Schedule 4 sets out that an ES must include a description of the aspects of the environment which are likely to be significantly affected by a Project.

5.5.3 This requirement and the broad categories set out in Schedule 4, along with others which are considered to have the potential to lead to significant environmental effects, have been interpreted and applied in the context of the SESRO Project. Table 5-1 sets out where these EIA Regulations aspects are covered within this EIA Scoping Report.

Table 5-1 Environmental aspects considered in the EIA Scoping Report

EIA Regulations Aspect	Location within this report
Population	Chapter 11 – Transport and Movement Chapter 17 – Communities Chapter 18 – Human Health Chapter 19 – Major Accidents and Disasters
Human Health	Chapter 12 – Noise and Vibration Chapter 13 – Air Quality Chapter 18 – Human Health Chapter 19 – Major Accidents and Disasters
Biodiversity	Chapter 7 – Aquatic Ecology Chapter 8 – Terrestrial Ecology
Land	Chapter 14 – Geology and Soils
Soil	Chapter14 – Geology and Soils

EIA Regulations Aspect	Location within this report
Water	Chapter 6 – Water Environment
Air	Chapter 13 – Air Quality
Climate	Chapter 16 – Carbon and Climate Change
Material Assets	Chapter 14 – Geology and Soils Chapter 15 – Materials and Waste
Cultural Heritage	Chapter 10 – Historic Environment
Landscape/ Townscape	Chapter 9 – Landscape and Visual Effects
The Risk of Major Accidents and / or Disasters	Chapter 19 – Major Accidents and Disasters
The inter-relationship between the above aspects	Chapter 20 – Cumulative Effects

5.5.4 For each technical discipline, there are matter-specific specialist methodologies and good practice guidelines which will be drawn upon and which will define the approach to the assessments. These are detailed within Chapters 6 to 20.

Spatial scope

5.5.5 The maximum area of land to build and operate the Project will be defined by the Order Limits proposed with the application for development consent. The Order Limits will include the working width to install all surface and below ground structures including the reservoir, associated buildings, landscape and habitat creation, roads, underground pipelines, the intake and outfall structures, the construction compounds, internal construction roads and temporary rail sidings.

5.5.6 The spatial extent ('Zone of Influence') of each of the technical assessments will vary in accordance with the relevant guidance for the assessment of that topic. In some instances, the environmental effects will extend no further than the Order Limits (for example, archaeology,) and in other cases (for example, landscape and visual effects) the assessment will extend to a buffer considerably beyond the Order Limits. i.e. from where the Project is visible.

5.5.7 Appropriate study areas have been defined by the specialists undertaking the assessment in each of the aspect chapters and vary between aspects and matters depending on the nature of the effects. They may also vary within an aspect chapter between the construction and operational phases. For example, direct physical impacts on watercourses would only occur within the construction footprint whereas impacts on water quality related to a discharge or abstraction would extend downstream. The aspect and matter specific study areas have been / will be discussed and agreed with the relevant stakeholders and each technical chapter includes a commentary on how the study area has been defined.

5.5.8 The spatial scope of the EIA will be considered in the ES in terms of the following:

- Physical extent of the proposed works (whether temporary or permanent) as defined by the Order Limits proposed within the application for development consent
- Nature of the existing baseline environment (including sensitive receptors or designations) as defined in the aspect chapters
- Geographical extent of impacts beyond the Order Limits and,
- Relevant geographical boundaries of administrative organisations and authorities which provide the relevant planning and policy context of the Project

Temporal scope

5.5.9 The temporal scope of the EIA will be considered in the ES in terms of the following principal stages of development:

- Existing conditions of the proposed site and the surrounding areas (the existing baseline)
- Future conditions without development (the future baseline or 'do-nothing' scenario)
- Proposed Construction Phase (c. 2030 to 2040)
- Operation (opening year assumed in c. 2040, with maintenance in perpetuity)
- No future decommissioning (operated indefinitely)

5.5.10 The Project is proposed to form a long-term solution to ensure a secure and sustainable future water supply for the south-east. Although some elements of the Project would have a defined design life, it is proposed that all elements would be subject to continued maintenance / replacement in line with the management of the reservoir as a whole. Therefore, the Project, once operational, would form part of a permanent reservoir and no activities are proposed that would require decommissioning or associated decommissioning plans. It is, therefore, proposed to scope decommissioning out of the assessment.

5.5.11 The temporal scope of the assessment generally refers to the time periods over which impacts may be experienced i.e. permanent, temporary, long term, medium term or short term compared to the Project timescales and assessment years used. This has been established for each aspect chapter in accordance with aspect specific guidance and, where appropriate, through discussion with the relevant statutory consultees. Terms used to qualify the duration of an impact or effects are specific to the aspect / matter being considered.

5.5.12 For the purposes of assessment, the following definitions are applied unless otherwise defined in the specific aspect chapter:

- Existing baseline (without the Project): the baseline is the reference level of the environmental conditions without implementation of the Project, against which the potential effects of the project are to be assessed
- Future baseline (without the Project): the future baseline conditions are not necessarily the same as those that exist at the current time; they are the conditions that would exist in the future in the absence of the Project. When describing the future baseline scenario for each environmental aspect / matter (i.e. the future conditions without the Project in place) within the respective aspect chapters, the current baseline will be extrapolated to take account of predicted or anticipated change factors including, but not limited to, changes caused by changing climatic conditions, policy, legislation and by other planned projects, to provide a description of the likely changes to the baseline environment over an appropriate timescale that can be supported by appropriate datasets and modelling
- Construction phase: Effects likely to begin and end with the construction phase which do not continue following completion of construction – e.g. construction dust, noise and vibration. Some construction effects are related to specific activities or phases and deemed short term compared to the whole construction phase i.e. construction compound set up. Some construction impacts are temporary and reversible (such as noise) except where associated with land clearance (such as permanent loss of habitats, removal of archaeological assets and agricultural land)
- Operational phase: Effects that may potentially occur as a result of the presence, operation and / or maintenance of the Project. These may be effects which start during construction and continue during operation, for example, the removal of habitats during construction

5.5.13 The approach to assessment will incorporate the use of identified assessment years to allow for evaluation of the likely effects during the phased construction process and during operation of the Project. At this stage, the following assessment years are under consideration:

- Construction phase: currently anticipated to occur during the period 2030 to 2040
- Opening year (reservoir first full year of opening): currently anticipated to be 2040

5.5.14 For some of these assessment scenarios, construction and operational activities will overlap and this will be taken into account in the assessments. Each aspect chapter may also identify additional years to be included in the assessment work, in accordance with aspect-specific good practice guidance.

5.5.15 Environmental effects will be classified as either permanent or temporary, as appropriate. Permanent changes are those which are irreversible (e.g. permanent land take) or will last for the foreseeable future (e.g. emissions from generated road traffic).

5.5.16 The duration of temporary environmental effects will be defined as short, medium or long term based on the likely durations of the construction and operational phases of the development. These definitions will be considered within the assessment of the likely significant effects and will be set out in the ES. For the purposes of assessment, the following definitions are applied unless otherwise defined in the specific aspect chapter:

- Short term: i.e. this is assumed to describe effects with a duration that extends for up to 12 months
- Medium term i.e. this is assumed to describe effects with a duration that extends longer than 1 and less than 5 years
- Long term: i.e. this is assumed to describe effects with a duration that extends longer than 5 years

5.5.17 The temporal nature of effects may extend longer than the phase in which the effects originally occur. For example, effects as a result of vegetation clearance during construction may be experienced for a number of years after construction has been completed, until any replanted habitats have matured. For the purposes of the EIA, the effects are described under the phase within which the impact arises, (i.e. in the above example, vegetation loss would be assessed for the construction phase).

5.6 Assessment of Effects and Determination of Significance

Impacts and effects

5.6.1 The EIA process requires the identification of the likely significant effects of a proposed development, as required by the EIA Regulations. This includes consideration of the likely significant effects during the construction and operational phases of the Project.

5.6.2 Impacts are defined as changes to aspects of the baseline environment that would be brought about by the development proposals. Effects are defined as the reasonably foreseeable consequences of the identified change in the context of value, importance or sensitivity to change of the receptor or environment.

5.6.3 Impacts and effects are differentiated for the purpose of EIA, as not all changes in baseline resulting from the Project will necessarily have a significant consequence on the environment. Impacts and effects are only considered material where there is a clear source > pathway > receptor linkage.

5.6.4 Types and characteristics of potential impacts are set out in Schedule 3 Paragraph 3 of the EIA Regulations as follows:

‘(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected)

(b) the nature of the impact

(c) the transboundary nature of the impact

(d) the intensity and complexity of the impact

(e) the probability of the impact

(f) the expected onset, duration, frequency and reversibility of the impact

(g) the cumulation of the impact with the impact of other existing and/or approved development

(h) the possibility of effectively reducing the impact’

5.6.5 Types of potential effects are set out in Schedule 4 Paragraph 5 of the EIA Regulations as follows:

‘A description of the likely significant effects of the development on the environment resulting from, inter alia—

(a) the construction and existence of the development, including, where relevant, demolition works;

(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems

relating to areas of particular environmental importance likely to be affected or the use of natural resources;

(f) the impact of the Project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the Project to climate change;

(g) the technologies and the substances used.

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union level (as they had effect immediately before exit day) or United Kingdom level which are relevant to the Project, including in particular those established under the law of any part of the United Kingdom that implemented Council Directive 92/43/EEC(1) and Directive 2009/147/EC(2)'.

Determination of significance

5.6.6 Regulation 14(2) of the EIA Regulations requires that the ES must include at least '*(b) a description of the likely significant effects of the Project on the environment*…'.

5.6.7 The impact assessment is undertaken on an environmental aspect basis and involves characterising potential impacts, and then assessing the potential for likely significant effects.

5.6.8 The assessment of the significance of effects for the majority of topics will be based on a three-step process, as set out in the following paragraphs.

5.6.9 The first step assigns sensitivity or inherent value to a receptor or resource. Sensitivity is how easily the receptor is affected by change and value is a measure of its inherent worth.

5.6.10 provides broad definitions of sensitivity or value which have been adapted from good practice assessment guidance from Design Manual for Roads and Bridges (DMRB) LA 104 (Standards for Highways, 2020). Each aspect chapter defines the sensitivity or value of receptors specific to that aspect, where scoped into the assessment.

Table 5-2 Value and sensitivity criteria

Value / sensitivity	General criteria
High	High or very high importance and rarity, international or national scale and limited potential for substitution
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution
Low	Low or medium importance and rarity, local scale
Neutral	Very low importance and rarity, local scale

Source: Based on Table 3.2N in DMRB LA 104 (Standards for Highways, 2020)

5.6.11 The second step of the assessment determines the likely magnitude of the potential impact. This is the scale of the change caused to the baseline conditions, considering both the degree of change and the duration and/or reversibility of the effect. The assessment of magnitude takes into consideration all embedded measures and good practice measures as described from paragraph 5.6.20.

5.6.12 Table 5-3 provides broad definitions of magnitude which have been adapted from good practice assessment guidance. Each aspect chapter defines the magnitude criteria of impacts specific to that aspect, where scoped into the assessment.

Table 5-3 Magnitude criteria

Magnitude	General criteria
Large	Adverse: Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements Beneficial: Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality
Medium	Adverse: Loss of resource, but not adversely affecting integrity; partial loss of/damage to key characteristics, features or elements Beneficial: Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Small	Adverse: Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements Beneficial: Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring

Magnitude	General criteria
Neutral	Adverse: Very minor or no loss or detrimental alteration to one or more characteristics, features or elements Beneficial: Very minor or no benefit to or positive addition of one or more characteristics, features or elements

Source: Based on Table 3.4N in DMRB LA 104 (Standards for Highways, 2020)..

5.6.13 The third step is where consideration is given to the likely significance of effect. This is considered as a function of the sensitivity or value of the receptor and the magnitude of the potential impact on it.

5.6.14 The approach to assessing and assigning significance to an environmental effect has regard to factors such as legislative requirements, guidelines, standards and codes of practice, consideration of the EIA Regulations, the advice and views of statutory consultees and other interested parties and competent expert judgement.

5.6.15 Figure 5.2 helps to illustrate the basis for assigning significance to an effect. The approach illustrated in Figure 5.2 uses merging bands to reflect the role of professional judgement when allocating significance categories. This is of particular relevance where the assessment is based on a qualitative approach and the significance of effect is a matter of judgement rather than a quantified outcome. Explanatory text will be provided in each aspect assessment to explain how professional judgement, where used, has determined the significance category assigned. An effect of moderate or greater significance is generally considered 'significant' in terms of the EIA Regulations. Where effects are scored minor or neutral, these effects are not significant in the context of the EIA Regulations and, as such, will not be reported in detail in the ES and will not require specific mitigation. The exception to this is where the combination of multiple minor (not significant) effects has the potential to lead to a significant (i.e. moderate or greater) cumulative effect.

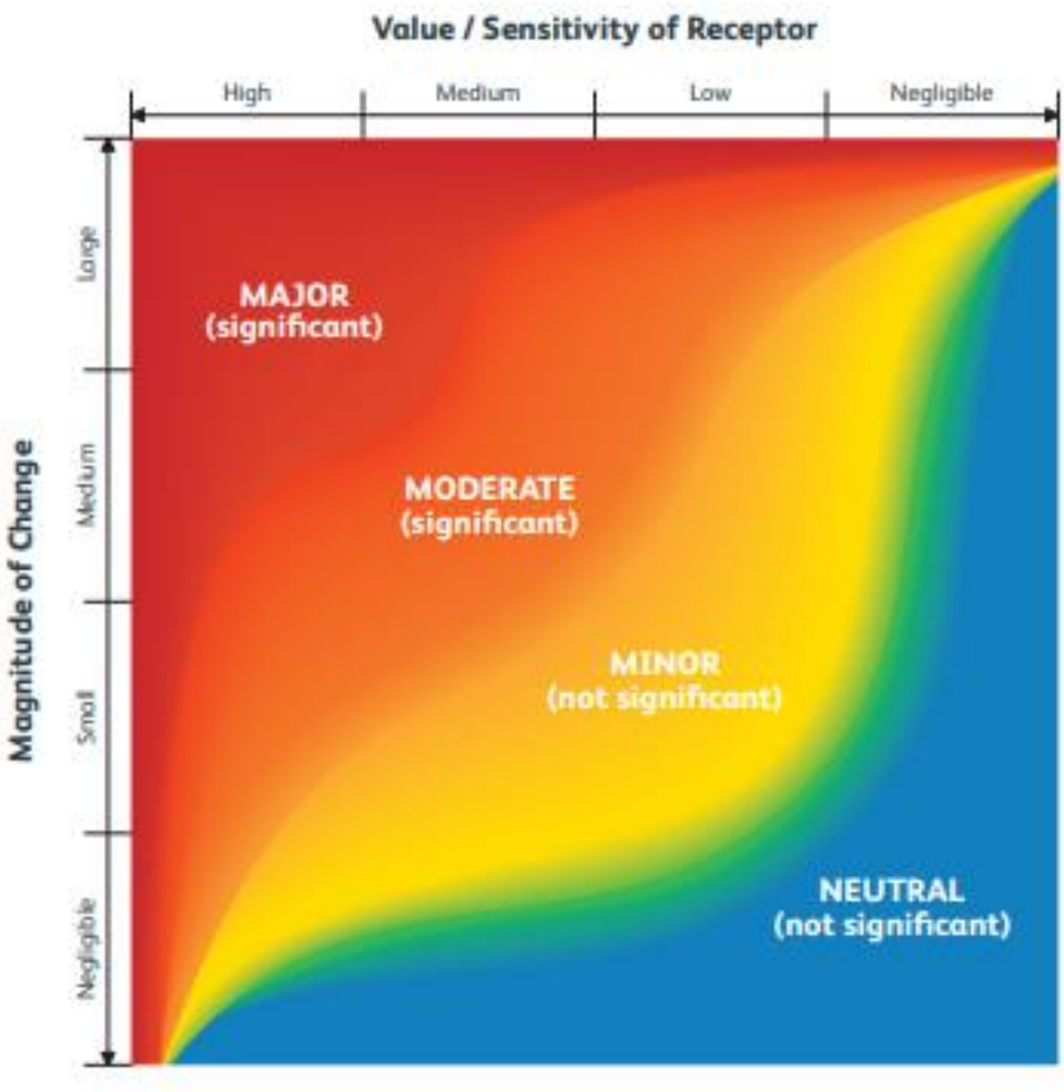
5.6.16 Whilst Table 5-2 and Table 5.3 and Figure 5.2 illustrate the principles around the approach to assessment of significant environmental effects, not all the environmental aspects or topics will directly follow these criteria or approach. For example, some aspects use numerical values to identify impacts (e.g. noise and vibration) and some aspects do not have agreed methods of assessment or scales of measurement for either value or sensitivity (e.g. geology and soils).

5.6.17 In addition, many topics have specific relevant assessment guidance that makes use of more rigid matrices to determine the significance of effects. The specific approach and methodologies adopted by each aspect are set out in the aspect chapters (Chapters 6 to 20).

5.6.18 The influence of impact duration on the overall significance of effect will also be considered as part of the determination of magnitude and sensitivity to change.

5.6.19 As an illustration, a high sensitivity receptor subject to a large magnitude of impact would experience a major effect that would be of significance, and a low sensitivity receptor subject to a small magnitude of impact would experience a minor or neutral effect, which is not significant.

Figure 5.2 Matrix of significance



Source: Based on National Grid, May 2021, Bramford to Twinstead.

Mitigation

5.6.20 Regulation 14(2)(c) of the EIA Regulations requires that an ES must include at least:

'(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;'

5.6.21 After initial consideration of the effects of the Project and their potential significance, consideration will be given to how those significant effects could be avoided, prevented or reduced. This is referred to as mitigation. Each aspect chapter of the ES, where relevant, will identify proposed mitigation measures that may be required to avoid or reduce the potential significant adverse effects of the Project.

5.6.22 In broad terms, the EIA and design shall incorporate mitigation measures following a hierarchical system as follows:

- Avoidance and prevention: design and mitigation measures to prevent the effect (e.g. alternative design options or avoidance of environmentally sensitive sites)
- Reduction: where avoidance is not possible, then mitigation is used to lessen the magnitude of impact or significance of effects

5.6.23 For the purposes of the EIA, mitigation has been defined using guidance taken from the Institute of Environmental Management and Assessment (IEMA, 2024) with mitigation falling into three categories:

- Primary (inherent/embedded) mitigation - being measures that form an intrinsic part of the Project design for the purpose of avoiding, preventing or minimising likely significant adverse environmental effects. For example, reducing the height of a development to reduce visual impact. Where adverse effects can be reduced to acceptable levels through evolution of the Project design (primary mitigation), this will be identified within the ES. In the case of SESRO this would include such measures as, for example, the Master Plan including landscape led design, the watercourse diversions and emergency discharge arrangements
- Secondary (foreseeable) mitigation – encompasses further activities or measures in order to reduce likely significant adverse environmental effects. These measures will be identified during the EIA process to further prevent, reduce and, where possible, offset any adverse effects on the environment and will be described in the relevant aspect chapters. In the case of SESRO this may, for example, include identification of construction noise impacts, through the EIA, requiring screening with noise bunds or fences

- Tertiary (inexorable/good practice) mitigation – such measures to reduce reasonably foreseeable impacts will be required regardless of any EIA assessment, as they are imposed, for example, as a result of legislative requirements and/or standard good practices. For example, legislation, permits and guidance related to the management of protected species, flood prevention, pollution control and the provision of Biodiversity Net Gain (BNG). These measures will be captured in the relevant project documents such as the Code of Construction Practice (CoCP) and associated environmental management plans

5.6.24 Where it is not possible to avoid, prevent or reduce an adverse effect then a project will consider the following:

- Compensation: This could include the provision of replacement open space / habitat to replace that lost to a project
- Offsetting: Where it is not possible to compensate or replace a loss, an alternative provision may be provided. This may be located outside of the development site. An example of this is contributing to a third party creation or management regime for habitat. This acknowledges there is an impact which cannot be avoided and compensation would not be appropriate

5.6.25 In addition, enhancement measures may be proposed. These are deliberate attempts included in the design of a project to ensure the success of a wider range of direct and indirect positive outcomes to the environment. These will be agreed by the Applicant in advance of submission, to improve the environment in the area affected by the Project but not implemented to mitigate for a specific significant effect.

5.6.26 The mitigation, compensation, offsetting and any enhancement measures would be detailed within the relevant ES chapters but would be secured though a series of 'control documents' submitted alongside the ES. A Projects Control Plan will provide the framework on how mitigation, monitoring and controls work together and are secured in the DCO application. The series of control and management documents will be included within a Code of Construction Practice (CoCP) which will contain various specific environmental management plans presenting the mitigation identified in the application that must be implemented during the design, construction and operation of the Project to reduce adverse impacts.

Residual effects

5.6.27 Once mitigation has been identified, further consideration of the significance of the residual effect will be carried out to assess the residual or remaining effects on the environmental receptors.

Cumulative effects

5.6.28 The requirement for cumulative effects assessment is contained in the EIA Regulations Schedule 4 paragraph 5 which requires: *'A description of the likely significant effects of the development on the environment resulting from, inter alia: […] (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'*.

5.6.29 The scope of the EIA cumulative effects chapter will be to address inter-relationships and cumulative effects with developments in the immediate locality of the infrastructure components (where relevant) including:

- The inter-relationships that occur between the individual environmental effects of the Project and the way that these effects have the potential to combine together to cause cumulative effects with one another at particular sensitive receptors and lead to significant effects (Intra Project effects), and/or
- The potential for effects of the Project to combine with effects from other developments in the vicinity and lead to significant effects (Inter project effects)

5.6.30 For these inter project effects, PINS has set out in Advice Note 17 on cumulative effects (UK Government, 2015b) a four staged approach to assessing potential cumulative effects. The four stages comprise:

- Stage 1 - Identifying a long list of potential other developments
- Stage 2 - shortlisting this long list to identify relevant other developments requiring further assessment
- Stage 3 - gathering information on these shortlisted other developments
- Stage 4 - undertaking the assessment and reporting these finding in the ES chapter

5.6.31 The assessment will be based on the best available data from other proposed and committed developments and associated information which is currently in the public domain or has been provided to the Project. The assessment will assume that publicly available information is accurate. The assessment is also reliant on collaboration with a range of statutory consultees, neighbouring authorities and other developers to identify changes in information which may be pertinent to the assessment. Where there are specific limitations associated with data, these will be highlighted as the assessment progresses.

5.6.32 The approach to the assessment of cumulative effects is set out in detail in Chapter 20 of this EIA Scoping Report.

Monitoring

5.6.33 The requirement to include information on any proposed monitoring is contained in the EIA Regulations Schedule 4 paragraph 7, which requires: '*A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases*'.

5.6.34 The ES will set out clear and proportionate objectives for monitoring, where required, along with a timescale for implementation, identification of the party responsible, together with an outline of remedial actions to be undertaken should monitoring results identify a need.

5.7 The EIA Team

5.7.1 Regulation 14(4) of the EIA Regulations places a specific requirement on the Applicant to ensure that those preparing the ES are 'competent experts'. In addition, there is a requirement that the ES must be accompanied by a statement outlining the relevant expertise or qualifications of such experts. No definition of competent expertise is provided in the EIA regulations, however, individuals preparing the ES will comply with the IEMA position statement on competent expertise (IEMA, 2016).

5.7.2 A competency statement will be included in the ES and will provide details of the author or reviewer of each technical chapter, and those responsible for overall coordination of the ES.

The current EIA team (scoping)

5.7.3 This Scoping Report has been produced by qualified and experienced Jacobs consultants, with input from consultants at Atkins Realis in relation to effects on the water environment and aquatic ecology and from Savills in relation to EIA approach, project description and Rochdale envelope. Information on design and engineering has been provided by Mott McDonald. All four firms are registered to IEMA's EIA Quality Mark which is a voluntary scheme that allows organisations that lead the co-ordination of statutory EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. There are seven associated commitments to EIA management, team capabilities, regulatory compliance, EIA context and influence, content, presentation and improving EIA practice. EIA and consenting experts at Thames Water have also contributed, particularly in relation to the Project Description and other introductory chapters.

Future EIA team

5.7.4 Following EIA Scoping the EIA will be taken forward by Thames Water's new technical partners Arup / Binnies. The new technical partners have contributed to this EIA Scoping Report both in terms of review and in terms of the proposed scope for certain topics.

5.8 References

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6 Water Environment

6.1 Introduction

6.1.1 This Chapter discusses the proposed scope of the water environment assessment which would be undertaken for the SESRO Project. It describes the baseline water environment with respect to flood risk, fluvial geomorphology, hydrology, surface water quality and hydrogeology characteristics, as they are understood at present. It also identifies potential environmental effects that could arise from the construction and operation of the Project and identifies mitigation measures likely to be required to reduce impacts to the water environment.

6.1.2 The chapter also provides an opportunity to identify where matters can be scoped out from further assessment.

6.1.3 Associated effects on aquatic ecology are considered in Environmental Impact Assessment (EIA) Scoping Report Chapter 7 - Aquatic Ecology, although ecological proxy indicators of water quality are considered in this Water Environment Chapter.

6.1.4 Effects on ground conditions and water quality arising from existing land contamination are considered in EIA Scoping Report Chapter 14 – Geology and Soils.

6.1.5 Hazard events assessed and addressed later within this chapter are detailed in EIA Scoping Report Chapter 19 – Major Accidents and Disasters.

6.2 Legislation, Policy, Standards and Guidance Context

6.2.1 The assessment of potential effects will be undertaken in accordance with relevant and applicable legislation, policies and technical standards including:

Table 6-1 Relevant legislation, policy standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Environment Act 2021
The Water Resources Act 1991 as amended by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (EU Exit Regulations)
The Water Act 2003 and Water Act 2014 as amended by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (EU Exit Regulations)
The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019

Relevant legislation, policy, standards and guidance
The Environment (Amendment etc.) (EU Exit) Regulations 2019
The Water Supply (Water Quality) Regulations 2018
Conservation of Habitats and Species Regulations 2017
The Water Abstraction and Impounding (Exemptions) Regulations 2017
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
The Groundwater (Water Framework Directive) (England) Directive 2016
The Water Framework Directive (Standards and Classification) Directives (England and Wales) 2015
Environmental Damage (Prevention and Remediation) Regulations (England) 2015
The Nitrate Pollution Prevention Regulations 2015
Water Act 2003 and Water Act 2014
Flood and Water Management Act 2010
Water Resources Act 1991 (Amendment) (England and Wales) and Regulations (2009)
Flood Risk Regulations 2009 Amended SI2011/2880 transpose directive 2007/60/EC
The Water Resources (Abstraction and Impounding) Regulations 2006
Control of Pollution (Oil Storage) (England) Regulations 2001
Anti-Pollution Works Regulations 1999
Environment Act 1995
The Land Drainage Act 1991
Water Industry Act 1991
Environmental Protection Act 1990
Highways Act 1980
Reservoirs Act 1975 (as amended)
National policy
National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023)

Relevant legislation, policy, standards and guidance
National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government (MHCLG, 2023)
National Planning Practice Guidance (NPPG) (Department for Communities and Local Government (DCLG), 2023)
A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)
Catchment Flood Management Plans (CFMPs) (Environment Agency, 2009a)
Local policy
Vale of White Horse District Council Local Plan 2031 (Vale of White Horse District Council, 2016)
Vale of White Horse and South Oxfordshire Joint Local Plan 2041 (Vale of White Horse District Council, n.d.)
Oxford Local Plan 2036 (Oxford City Council, n.d.)
Local Nature Recovery Strategy – Oxfordshire (in consultation) (Oxfordshire County Council, n.d.)
Thames Catchment Flood Management Plan (Environment Agency, 2009b)
Standards and Guidance
Guidance for Pollution Prevention (GPP) documents (NetRegs, n.d.)
Design and best practice guidance for managing pollution risks, as published by the Construction Industry Research and Information Association (CIRIA) (CIRIA, 2024)
Environment Agency's approach to Groundwater Protection (previously known as GP3) (Environment Agency, 2018)
Sustainable drainage systems, non-statutory technical standards (Defra, 2015)
Climate change allowances (Environment Agency and Defra, 2022)
Design Manual for Roads and Bridges (DMRB) LA 113 - Road drainage and the water environment Rev 1 (National Highways, 2020)
River modelling: technical standards and assessment (Environment Agency and Defra, 2021)
CIRIA Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) (CIRIA, 2001)
CIRIA Environmental Good Practice on Site (C692) (CIRIA, 2010)
Water Resources Planning Guideline (Environment Agency, 2023)

Relevant legislation, policy, standards and guidance
Mustow, S.E. Burgess, P.F. and Walker, N. (2007) Practical Methodology for Determining the Significance of Impacts on the Water Environment

6.2.2 In general, the legislation, policies, standards and guidance listed above aim to conserve, protect, enhance and manage the water environment for the benefit of current and future generations through flood management, protection of water quality and groundwater and permitting.

6.3 Engagement

6.3.1 Regulator Technical Liaison Group (TLG) meetings covering the water environment have been held with the Environment Agency and Natural England since 2020, through to 2024. EIA Scoping specific TLGs are underway and will also include the EA's National Infrastructure Team (NIT) as the SESRO Project progresses to EIA, see Table 6-2 below.

Table 6-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
National Appraisal Unit (NAU), Natural England, Environment Agency	Water Environment and Aquatic Biodiversity EIA Scoping – introduction of methodology and timescales (no comments)	Arrange date to meet with NIT

6.4 Study Areas

6.4.1 SESRO is located within the River Ock hydrological catchment, which forms part of the River Thames river basin. The River Ock and its tributaries flow into the River Thames at Abingdon.

6.4.2 A description of the EIA Scoping Boundary and surroundings is provided in Chapter 1 – Introduction.

6.4.3 The study area associated with the water environment includes all watercourses within the indicative location for SESRO as well as those in hydrological connection where flows may change due to the presence of the reservoir, abstraction or discharges.

6.4.4 The study area has been sub-divided into a number of study reaches as outlined below Table 6-3 and shown spatially in Figure 6.1. This includes the following main areas:

- Reaches 1 and 2 of the study area are limited to the lengths of watercourse (i.e. rivers, streams, ponds, brooks and/or ditches) and associated floodplains where a significant change to the water environment has the potential to occur due to the presence of SESRO. Hydraulic modelling being undertaken will confirm the extent of this area
- Some of the main watercourses currently included in Reaches 1 & 2 are the Sandford Brook, Cow Common Brook, East Hanney Ditch and Mere Dyke. The Childrey Brook is included from the A338 to the River Thames confluence. The River Ock is included from the confluence with the Childrey Brook to the River Thames
- The vast majority (>99%) of the Mill Brook and Ginge Brook catchments (Reach 3) is outside of the EIA Scoping Boundary and no to negligible changes to these catchments are currently predicted
- The extent of the River Thames study area is between the River Ock confluence up to the Culham (Lock) Cut, which is the reach mostly upstream of the future intake/outfall location (Reach 4). Reaches 5-13 comprise the River Thames between Culham and Teddington Weir, which forms the tidal limit and at which point additional flows released from SESRO will have been re-abstracted

6.4.5 The current WFD status of all surface water bodies is described in Table 6-3. This includes non-statutory Water Framework (WFD) Directive water bodies which are located in the catchments of the WFD water bodies. Groundwater bodies are detailed in paragraph 6.5.55. A separate WFD Assessment is being developed to assess WFD compliance of the SESRO Project.

6.4.6 The fluvial and surface water hydraulic modelling being undertaken will confirm the study area for assessing flood risk impacts, i.e. areas where a significant change in flood risk is predicted.

6.4.7 There are a series of ponds across the SESRO EIA Scoping Boundary. The water quality and hydrology of these could be impacted by the development and are discussed in this chapter. The current baseline of these ponds is currently unknown. The implications of potential changes on receptors and protected species (Great Crested Newt *Triturus cristatus*) are included in Chapter 8 – Terrestrial Ecology.

6.4.8 The groundwater study area is bounded by the River Ock and the edge of the Chalk escarpment to the south, and extending from the Letcombe Brook in the west and Abingdon in the east. This study area has been selected as it covers the spatial extent of the shallow aquifers and is considered sufficiently broad to identify any impacts from the Project on groundwater. The groundwater study area is shown in Figure 6.3.

Table 6-3 SESRO study reaches with description and corresponding linked WFD water body

Reach	Sub-reach	Watercourse	WFD water body	Description
1	1.1	Cow Common Brook Portobello Ditch Landmead Ditch Mere Dyke Unnamed waterbodies / tributaries	Cow Common Brook and Portobello Ditch (GB106039023360)	Watercourses within the SESRO EIA Scoping boundary within the River Ock catchment, including both named watercourses and unnamed tributaries e.g. ditches
		Oday Ditches	Thames (Evenlode to Thame) (GB106039030334)	
	1.2	Childrey Brook (lower) East Hanney Ditch Unnamed water bodies / tributaries	Childrey Brook and Norbrook at Common Barn (GB106039023380)	
2**	2.1	River Ock (lower)	Ock and tributaries (Land Brook confluence to Thames) (GB106039023430)	Watercourses between the reservoir and access road footprint *Watercourses adjacent to and upstream of the reservoir within the Ock catchment included for additional context and reference sites
	2.5	Letcombe Brook*	Letcombe Brook (GB106039023350)	
	2.6	Marcham Brook*	Frilford and Marcham Brook (GB106039023420)	
	2.7	Sandford Brook	Sandford Brook (source to Ock) (GB106039023410)	
3	3	Ginge Brook Mill Brook	Ginge Brook and Mill Brook (GB106039023660)	Watercourses east of the A34, joining the River Thames at Sutton Courtenay and picking up flows from the Oday Ditch system just before joining the River Thames. Whilst mainly outside of EIA Scoping Boundary, some of the headwaters or tributaries could be affected
4	4	River Thames	Thames (Evenlode to Thame) (GB106039030334)	River Thames reach upstream of SESRO (Farmoor to Culham)
5	5	River Thames	Thames (Evenlode to Thame) (GB106039030334)	River Thames immediately downstream of SESRO combined intake/outfall structure at Culham up to the confluence with the River Thame. This reach contains three weir pools at Culham (Sutton Pools), Clifton Hampden and Day's Lock
6	6	River Thames	Thames (Wallingford to Caversham) (GB106039030331) Thames (Reading to Cookham) (GB106039023233) Thames (Cookham to Egham) (GB106039023231)	River Thames from the confluence with the River Thame to the Thames Water Datchet intake
7	7	River Thames	Thames (Cookham to Egham) (GB106039023231)	River Thames between Thames Water Datchet intake and the Affinity Water Sunnymeads intake
8	8	River Thames	Thames (Cookham to Egham) (GB106039023231)	River Thames between Affinity Water Sunnymeads and Affinity Water Egham intake
9	9	River Thames	Thames (Cookham to Egham) (GB106039023231) Thames (Egham to Teddington) (GB106039023232)	River Thames between the Affinity Water Egham and Affinity Water Chertsey intake
10	10	River Thames	Thames (Egham to Teddington) (GB106039023232)	River Thames between Affinity Water Chertsey intake and Affinity Water Walton (Desborough Island) intake
11	11	River Thames	Thames (Egham to Teddington) (GB106039023232)	River Thames between Affinity Water Walton and Thames Water Walton intake
12	12	River Thames	Thames (Egham to Teddington) (GB106039023232)	River Thames between Thames Water Walton and Thames Water Hampton intake
13	13	River Thames	Thames (Egham to Teddington) (GB106039023232)	River Thames between Thames Water Hampton intake and Teddington Weir (tidal limit)

Table 6-4 WFD summary of included watercourses

Reach	Watercourse	Year*	Ecological status	Biological quality Elements	Physico-chemical quality elements	Hydro-morphological Supporting Elements	Chemical (2019**)	Priority Substances (2019**)	Other Pollutants
1.1	Cow Common Brook and Portobello Ditch*	2019 (C2)	Poor	Poor	Moderate	Supports Good	Fail	Good	N/A
1.2	Childrey Brook and Norbrook at Common Barn**	2022 (C3)	Poor	Poor	Moderate	Supports Good	Fail	Fail	N/A
2.1	Ock and tributaries (Land Brook confluence to Thames)	2022 (C3)	Poor	Poor	Moderate	Supports Good	Fail	Good	N/A
2.2	Ock (to Cherbury Brook)	2022 (C3)	Moderate	Good	Moderate	Supports Good	Fail	Good	N/A
2.3	Stutfield Brook (Source to Ock)	2022 (C3)	Moderate	Moderate	Moderate	Supports Good	Fail	Good	N/A
2.4	Childrey and Woodhill Brooks	2022 (C3)	Moderate	Moderate	Moderate	Supports Good	Fail	Good	N/A
2.5	Letcombe Brook	2019 (C2)	Poor	Poor	Good	Supports Good	Fail	Fail	N/A
2.6	Frilford and Marcham Brook	2022 (C3)	Moderate	Good	Moderate	Supports good	Fail	Fail	N/A
2.7	Sandford Brook (source to Ock)*	2019 (C2)	Poor	Poor	High	Supports Good	Fail	Good	N/A
3	Ginge Brook and Mill Brook	2022 (C3)	Moderate	Moderate	High	Supports Good	Fail	Good	N/A
4	Thames (Evenlode to Thame)	2022 (C3)	Poor	Poor	Moderate	Supports Good	Fail	Good	N/A
5									
6	Thames Wallingford to Caversham	2022 (C3)	Moderate	High	Moderate	Supports Good	Fail	Fail	Good
	Thames (Reading to Cookham)	2022 (C3)	Moderate	Good	Moderate	Supports Good	Fail	Good	N/A
	Thames (Cookham to Egham)	2022 (C3)	Moderate	Good	Moderate	N/A***	Fail	Good	Good
7	Thames (Cookham to Egham)	2022 (C3)	Moderate	Good	Moderate	N/A***	Fail	Good	Good
8		2022 (C3)					Fail		

Reach	Watercourse	Year*	Ecological status	Biological quality Elements	Physico-chemical quality elements	Hydro-morphological Supporting Elements	Chemical (2019**)	Priority Substances (2019**)	Other Pollutants
9	Thames (Cookham to Egham)	2022 (C3)	Moderate	Good	Moderate	N/A***	Fail	Good	Good
	Thames (Egham to Teddington)	2022 (C3)	Poor	Poor	Moderate	N/A***	Fail	Fail	N/A
10 11 12 13	Thames (Egham to Teddington)	2022 (C3)	Poor	Poor	Moderate	N/A***	Fail	Fail	N/A

Notes:

*Please note some WFD water bodies do not have a Cycle 3 (C3) 2022 update on Catchment Data Explorer. These have been highlighted as '2019 C2', with C2 referring to WFD Cycle 2.

**For the 2019 assessment of chemical status the Environment Agency changed some methods and increased the number of chemical compounds that contributed to chemical status. Due to these changes, all water bodies now fail chemical status and this assessment is not comparable to previous years assessments. In 2022, the Environment Agency did not repeat some of the 2019 assessments and most determinands are flagged in the 2022 update as 'does not require assessment'. The 2019 assessments have more assessments reported than 2022 and have been retained for this column.

*** Not applicable for Heavily Modified Water Bodies.

Source: Environment Agency Catchment Data Explorer for River Basin Management Cycle (2024).

6.5 Existing Environment and Baseline Conditions

6.5.1 The existing environment and baseline conditions have been established through a desk-based review of available data, as well as targeted surveys that have been completed so far as part of a monitoring programme for the Project, agreed with the Environment Agency since 2020. At the time of writing, baseline surveys are ongoing and data sets are insufficiently complete to inform, in detail, this EIA Scoping Report. In addition, supplementary historical data and reports were made available to the project team by Thames Water from previous investigations supporting the development of the SESRO Project.

Flood risk

6.5.2 Flood risk considers the potential impacts of the flow of water during extreme events on receptors. This considers fluvial, pluvial, coastal, existing infrastructure failure, drainage and groundwater. Groundwater flooding is considered under hydrogeology below and, due to location, coastal flooding is scoped out and is not considered further.

Baseline datasets reviewed

6.5.3 The following datasets were reviewed during the baseline desk top studies:

- Hydraulic model of the River Ock, Environment Agency (2020) updated with latest LiDAR data and designs of SESRO based on Indicative Design
- Hydraulic model of the River Thames, Environment Agency (2022), updated with latest LiDAR data and designs of SESRO based on Indicative Design
- River Thames hydraulic model report, Environment Agency (2017a)
- River Ock hydraulic model report, Environment Agency (2017b)
- Flood Map for Planning, Environment Agency (2024c)

Baseline surveys

6.5.4 A topographic survey to check the suitability of cross-sections used in the existing hydraulic model is ongoing and will be used to inform the baseline hydraulic models. At the time of writing, baseline surveys are ongoing and data sets are insufficiently complete to inform, in detail, this EIA Scoping Report.

Existing baseline

6.5.5 There is a history of flooding in the River Ock and River Thames catchments, with significant events in 2007, 2014, 2023 and 2024.

6.5.6 Predicted flood risk areas have been identified using existing Environment Agency 1D/2D hydraulic models, updated with new LiDAR and the Environment Agency Flood Map for Planning.

6.5.7 The SESRO main access road from the A415 and the access road to the intake/outfall structure, located by the River Thames near Culham, are located within Flood Zone 3, as shown in Figure 6.2. Portions of the proposed access road to the north-east of the main reservoir boundary also lie within the Flood Zone 3.

6.5.8 The existing hydraulic model predicts no coastal flood risk to the SESRO site as the Thames is not tidal at Abingdon.

Hydrology

6.5.9 Hydrological assessments are focussed on a review of the flow regime of surface water catchments. This has comprised an assessment of the baseline hydrological character of the relevant catchments from available data considering potential changes to the hydrological regime of watercourses as a result of the SESRO Project during both construction and operation.

Baseline datasets reviewed#

6.5.10 The following datasets were reviewed during the baseline desk top studies:

- Hydrology Data Explorer, River Thames at Sutton Courtenay (Environment Agency, 2024d)
- National Flow River Archive (NRFA), 39046 - River Thames at Sutton Courtenay gauge daily flows (1973-2019)
- NRFA, 39018 – Ock at Abingdon gauge daily flows (1962-1979)
- NRFA, 39081 – Ock at Abingdon gauge daily flows (1979-present)
- NRFA, 39061 – Letcombe Brook at Letcombe Bassett (1971-present)
- NRFA, 39112 – Letcombe Brook at Arabellas Lake (1992-present)
- NRFA, 39113 – Manor Farm Brook at Letcombe Regis (1992-present)
- Historic spot flow data collected by the EA and its predecessors at secondary gauging sites within the Ock Catchment covering spot gauging at some locations as far back as 1950. Some locations only contain a single spot gauge
- Ordnance Survey historic maps available via the National Library of Scotland (OS, n.d.)
- Google Earth imagery
- Light Detection and Ranging (LiDAR) data
- Environment Agency Catchment Data Explorer (Environment Agency and Defra, 2023)

Baseline surveys

6.5.11 Hydrology baseline surveys have been proposed within the River Ock catchment for 2024. These are likely to extend into 2025 due to access constraints. Specifications were issued to the Environment Agency for its review. The Environment Agency confirmed its approval regarding the proposed hydrometric surveys. Reconnaissance visits to refine the scope of these surveys were conducted during December 2023 and May 2024 from public rights of way (PRoW) and areas where site access had been granted. Due to access constraints, only a limited amount of baseline data have been collected to date. At the time of writing, baseline surveys are ongoing and data sets are insufficiently complete to inform, in detail, this EIA Scoping Report.

6.5.12 To quantitatively assess the extent to which SESRO may affect the flow regime in the River Thames at sensitive reaches, targeted surveys were completed in 2022/2023. These surveys provided data that supported the development of the 1D hydraulic model for three weir pool reaches between the intake/outfall and the River Thame at Culham (Sutton Pools), Clifton Hampden and Day's Lock. These three weir pools were selected to inform engagement with the EA as they contain important fisheries habitats within a reach (Reach 5) that would potentially experience the greatest hydrological changes due to SESRO.

Existing baseline

6.5.13 In relation to hydrology, there are no gauging stations in the upper catchment or tributaries of the River Ock within the EIA Scoping Boundary. There are three stations in the adjacent Letcombe Brook, but these channels are not being diverted as a result of SESRO.

6.5.14 Historical spot flow measurements have been collated and provided by the EA, although they are largely independent of each other i.e. not part of a wider targeted gauging strategy and, therefore, provide limited information on the overall character of the catchments to the same hydrological events. The record of River Ock flow measured at Abingdon provides the most complete record of the baseline hydrological characteristics of the Ock in its entirety and its contribution to flow in the Thames. The River Ock accounts for approximately 5% to 8% of the flow in the Thames as measured at the gauge at Sutton Courtenay.

6.5.15 The River Thames is well-covered by river gauges, many of which hold long term records. All gauging stations have been considered for the build of the hydrological and hydraulic models.

6.5.16 Table 6-5 below provides selected flow statistics at Abingdon between 1962 – 2022 and River Thames at Sutton Courtenay between 1973 – 2022.

Table 6-5 Selected flow statistics for the River Ock at Abingdon

Flow exceedance percentile	Historical Gauged flows at Sutton Courtenay on River Thames (NFRA station 39046) – Ml/d	Historical gauged flows on River Ock (NFRA station 39081) – Ml/d
Q Mean	2,260.7	136.4

Flow exceedance percentile	Historical Gauged flows at Sutton Courtenay on River Thames (NFRA station 39046) – Ml/d	Historical gauged flows on River Ock (NFRA station 39081) – Ml/d
Q95	158.1	29.2*
Q70	610.0	49.2
Q50	1,304.6	79.1
Q10	5,676.5	311.0
Q5	8,026.6	454.6
Note *NRFA highlights inaccuracies at low flows but otherwise reasonably accurate.		

Source: NFRA (n.d.).

Fluvial Geomorphology

6.5.17 Fluvial geomorphology is the study of water and sediment movement in rivers and their catchments and the physical forms that are developed as a result of these processes. Critical to this understanding is how patterns of erosion and deposition develop within these systems and how these processes interact with the river and floodplain that combine to form a complex range of habitats.

Baseline datasets reviewed

- Fluvial Geomorphology of the Ock Catchment: Catchment Baseline Survey and Fluvial Audit (Thames Water Utilities Limited, 2005)
- Ordnance Survey historic maps available via the National Library of Scotland (OS, n.d.)
- Google Earth imagery
- LiDAR data
- Environment Agency Catchment Data Explorer (Environment Agency and Defra, 2023)

Baseline surveys

6.5.18 Fluvial geomorphological walkover surveys were conducted over two days in November 2021 within the EIA Scoping Boundary in the Ock catchment from PRoW only. Further surveys were undertaken in June 2024 where land access had been granted. A similar survey was undertaken around Sutton Pools on the River Thames. Modular River Physical (MoRPh) surveys were undertaken across the indicative location for SESRO. in May 2024. An interdisciplinary walkover survey was carried out on the River Thames in June 2023 from the proposed area of the intake/outfall structure down to the River Thames confluence, again along PRoW. At the time of writing, baseline surveys are ongoing and data sets are insufficiently complete to inform, in detail, this EIA Scoping Report.

Existing baseline

6.5.19 In relation to fluvial geomorphology, within the Ock catchment there are watercourses designated as Main River and Ordinary Watercourses, that sit within the SESRO EIA Scoping Boundary. Much of the riverine habitat within the indicative location for SESRO has been artificially modified, historically straightened and, along with adjacent ditches, has been over deepened to aid land drainage. The channels are classified as being of 'Poor' Ecological status (Environment Agency, 2024a), with varying amounts of riparian vegetation and little to no flow during the summer months. There are only a few locations that are the exception, where a more natural and varied planform is observed, for example, in the upper reaches of Cow Common Brook.

6.5.20 The Childrey Brook and the River Ock flow in a broadly easterly direction to the north of SESRO and are less modified. Sandford Brook flows into the floodplain of the Ock near the proposed access road and, like other channels within the SESRO EIA Scoping Boundary, is highly modified in this area. Overall, many of the watercourses are typical of a lowland system that is managed for agricultural purposes with slow to moderate flowing watercourses.

6.5.21 In the vicinity of the intake/outfall structure, the River Thames has been historically modified for navigation and flood alleviation, for example the Culham Cut immediately downstream. However, it retains habitat heterogeneity in many places, through the provision of a range of habitats such as Sutton Pools and Harwell Lasher. Further downstream, the River Thames meanders across the floodplain past the Wittenham Clumps and to the confluence with the River Thame. In this reach there are other weirs and cuts, such as Clifton Cut, that split flows maintaining a straighter channel for navigation. Floodplain improvements have been undertaken in this reach through schemes such as the 'Rivers of Life' project led by the Environment Agency.

6.5.22 Under the WFD 2022 Cycle 3 River Basin Management Plan (RBMP3) (Environment Agency, 2022), Reaches 1.1 to 6 (see Table 6-2 and Table 6-3) achieved the 'Supports Good Status' for hydromorphological supporting elements classification. Reaches of the River Thames downstream of the River Thame confluence (Reaches 6 to 13) were not assessed for this classification due to their Heavily Modified Water Body (HMWB) classification.

Surface water quality

6.5.23 This section provides a summary of the condition of the baseline surface water quality of reaches in the River Thames and River Ock that may be affected by the SESRO Project. Information is provided on the water quality data used and WFD status of the key reaches.

Baseline datasets reviewed

6.5.24 The following datasets were reviewed during the baseline desk top studies:

- Environment Agency WFD Ecological status for the 2015, 2019 and 2022 cycles (Environment Agency, 2024a)
- Observed water quality data from the Environment Agency Water Quality Archive (referred to as WIMS) for the period 2013 to 2020
- Observed water quality data from Thames Water (i.e., at their intakes) for the period 2015 to 2023
- Observed water quality data collected for the Project in the River Thames (December 2020 to present)
- The Environment Agency's calibrated Source Apportionment GIS (SAGIS) -Simulations of Catchment (SIMCAT) model (applied in Water Industry National Environment Programme (WINEP) for Asset Management Plan (AMP) 8)
- Baseline model outputs from the main channel of the River Thames simulated in a water quality model run using the model software Infoworks ICM (Integrated Catchment Modelling)
- Baseline model outputs from an SAGIS–SIMCAT water quality model for the River Ock catchment

Baseline surveys

6.5.25 Water quality data is collected along the River Thames reaches on a monthly basis by Thames Water. Current monitored reaches are:

- Reach 4 - River Thames at Culham
- Reach 6 - River Thames at Thames Water's Datchet intake
- Reach 7 - River Thames at Affinity Water's Sunnymeads intake
- Reach 8 - River Thames at Bell Weir (Egham)
- Reach 12 - River Thames at Thames Water's Hampton intake
- Reach 13 - River Thames at Teddington Weir

6.5.26 At the time of writing, baseline surveys are ongoing and data sets are limited to inform, in detail, this EIA Scoping Report.

Existing baseline

River Ock reaches

6.5.27 There are limited baseline water quality data for the watercourses within the Ock catchment; only three Environment Agency monitoring locations with recent records are available for Reaches 1.1, 1.2 and 2.1. The available data for these locations are summarised in Table 6-6. A summary of the observed water quality data is presented in Table 6-7. Colour coding indicates equivalent indicative WFD Status for this dataset, noting only the Environment Agency can undertake WFD classifications.

Table 6-6 Summary of available recent Environment Agency water quality data for the Ock catchment

Reach	Environment Agency sample ID	Location	Date range	Number of samples
Reach 1.1 – Cow Common Brook	POCR0070	445980,195200 Near Marcham Mill	2000-2017	51
Reach 1.2 – Childrey Brook	POCR0077	445647,195318 At Mill Road Marcham	2000 -2020	115
Reach 2.1 – Ock above Thames	POCR0013	449611,196748 Ock above Thames	2000-2024	195

Source: Environment Agency (2024b).

Table 6-7 Summary of observed baseline water quality from 2000 to 2024 (Environment Agency, 2024b) (statistics based on entire long-term dataset as detailed in Table 6-6)

Determinand	Metric	Cow Common Brook (POCR007)	Childrey Brook (POCR001)	River Ock (POCR013)
Ammoniacal Nitrogen	90^{th} %ile	0.14 mg/l N	0.16 mg/l N	0.07 mg/l N
Dissolved Oxygen	10^{th} %ile	31% sat	68% sat	75% sat
Orthophosphate	Mean	0.39 mg/l	0.22 mg/l	0.25 mg/l

Determinand	Metric	Cow Common Brook (POCR007)	Childrey Brook (POCR001)	River Ock (POCR013)
Nitrate	Mean	6.13 mg/l	9.2 mg/l	6.6 mg/l
pH	Mean	7.9	8.02	8.04
Temperature	Mean	10.7 $°C$	10.98 $°C$	10.9 $°C$

Source: Values presented have been compared to the Water Framework Directive (Standards and Classification) (England and Wales) Directions 2015 and have been scored indicatively as 'high' (blue), 'good' (green), 'moderate' (yellow), 'amber' (orange) and 'bad' (red).

6.5.28 The Environment Agency data (also referred to as WIMS datasets (section 6)) show, that for Reach 1.1 (Cow Common Brook), there were seasonal variations in ammonia, orthophosphate, dissolved oxygen and nitrate concentrations indicative of poorer water quality during summer. This is likely due to the clay nature of the catchment that results in low base flow inputs. As the channels are over widened, this results in very shallow water during low flows and little dilution of pollutant inputs. Reach 1.1 had the poorest water quality of the three reaches due to very low dissolved oxygen saturations and high average orthophosphate concentrations.

6.5.29 For Reach 1.2 (Childrey Brook), ammoniacal nitrogen concentrations were generally low with peaks tending to occur in winter. Orthophosphate and nitrate concentrations were high throughout, ranging from 0.1 to 0.3 mg/l P and 8 to 12 mg/l N.

6.5.30 For Reach 2.1 (Ock above Thames), ammoniacal nitrogen concentrations were low throughout the record and dissolved oxygen % saturation levels remained high. Similarly to the other monitored Ock reaches, orthophosphate and nitrate concentrations were high.

6.5.31 The latest draft Thames River Basin Management Plan (dRBMP3) WFD status classification indicates that the physico-chemical quality elements for the WFD water bodies within the Ock catchment are mostly of 'Moderate' condition, with only one WFD water body in 'Good' condition and two WFD water bodies with 'High' condition (Environment Agency, 2022). Water bodies classed as 'Moderate' condition are classed as a result of high orthophosphate concentrations.

6.5.32 In terms of WFD RBMP3 Chemical Status, where data were available, mercury, polybrominated diphenyl ethers (PBDE) and perfluoro octane sulfonic acid (PFOS) all exceeded the WFD threshold at many of the monitoring locations (Environment Agency, 2022).

River Thames reaches

6.5.33 Observed water quality data collected along the River Thames from SESRO to Teddington Lock indicate ammoniacal nitrogen concentrations well below the upper boundary for 'High' WFD Status. Ninetieth percentile concentrations (90^{th} % ile) for ammoniacal nitrogen was also all well below the upper boundary for High 'WFD' status. There was an increase in ammoniacal nitrogen concentrations towards Teddington Lock which may be related to inputs from the River Wey and urban areas of west London. Ammoniacal nitrogen was classified as 'High' status in the dRBMP3 in all the River Thames reaches (Environment Agency, 2022).

6.5.34 There were limited data available for Biochemical Oxygen Demand (BOD) to make a meaningful assessment. However, it is noted that BOD does not contribute to WFD water body classification.

6.5.35 At all locations, dissolved oxygen saturation levels corresponded to WFD 'High' status although at the lower end of the river reach considered here, dissolved oxygen levels were close to the WFD 'High' / 'Good' tenth percentile (10^{th} % ile) status threshold. Dissolved oxygen WFD status was 'High' except for two reaches which attained 'Good' (i.e. Reading to Cookham and Egham to Teddington) (Environment Agency, 2022). A slight reduction in dissolved oxygen at low river flows is evident, with dissolved oxygen saturation levels falling below 70% saturation under lower flow conditions whilst remaining above 60% saturation (equivalent to 'Good' status).

6.5.36 Orthophosphate concentrations decreased along the River Thames between Culham and the Wey tributary but increased again toward Teddington Lock. Observed mean orthophosphate concentrations mostly corresponded to 'Moderate' WFD status, with two locations corresponding to 'Poor' WFD status along the Thames downstream of the River Ock (Reaches 4 and 5). The WFD RBMP3 (Environment Agency, 2022) status for orthophosphate was 'Moderate' across all River Thames reaches.

6.5.37 Mean nitrate concentrations were stable over the length of the River Thames with concentrations of 7–8 mg N/l, well within the drinking water standard of 11.2 mg N/l (there are no WFD standards for nitrate). Temperature and pH show little variation along the length of the Thames.

6.5.38 In terms of WFD dRBMP3 Chemical Status, where data were available, fluoranthene, mercury and PFOS all exceeded the WFD threshold at many of the monitoring locations (Environment Agency, 2022).

Hydrogeology

6.5.39 The SESRO Project may impact the hydrogeological environment in terms of groundwater levels and flows, groundwater quality, licenced abstractions, groundwater dependent terrestrial ecosystems (GWDTEs), springs and groundwater-surface water interaction. Relevant hydrogeological baseline information is provided below.

Baseline datasets reviewed

- Environment Agency Catchment Data Explorer (Environment Agency and Defra, 2023)
- British Geological Society (BGS) GeoIndex Onshore: 1:50,000 geology (BGS, 2024)
- Groundwater model of the Corallian aquifer, created in 2003 and updated in 2008 by Environmental Simulations Incorporated (ESI) (ESI Ltd., 2006)
- Preliminary groundwater modelling of superficial deposits by Mott McDonald (2022)
- ESI Geology and Hydraulic properties of Formations report, 2006. Containing borehole data for the study area (ESI Ltd., 2006)

Baseline surveys

6.5.40 At the time of writing, baseline surveys are ongoing and data sets are insufficiently complete to inform, in detail, this EIA Scoping Report.

6.5.41 Surveys completed and ongoing are set out below:

- Phase 1 preliminary Ground Investigation (GI) spot groundwater levels
- Ongoing GI surveys within the River Ock catchment that commenced in March 2024

Existing baseline

Bedrock aquifers

6.5.42 The geology of the area is described in Chapter 14 - Geology and Soils. A table of the geological sequence underlying the groundwater study area and the aquifer classification for each identified formation is set out in Table 6-8 and Figure 6.3 shows the mapped outcrop of the bedrock units.

6.5.43 The bedrock strata dip towards the south-east and, therefore, the age of the sub-cropping bedrock units decreases in age towards the south-east (Figure 6.4). The dominant formations at sub-crop (i.e. beneath the superficial deposits) are the Ampthill Clay Formation and Kimmeridge Clay Formation, and the Gault Clay formation. These units are non-water bearing and regarded to be aquitards. Thin, nodular cementstone bands occur within the Kimmeridge Clay but are not considered potential groundwater pathways due to their discontinuous nature.

6.5.44 A thin band of water-bearing Lower Greensand Group extends east-west across much of the central study area separating the Gault and Kimmeridge clay units. Data compiled from borehole records suggests that the Lower Greensand is not laterally continuous from east to west, tapering out just south of Drayton. It also suggests that its thickness in the far western study area is very low in places, below 1m. The Corallian Group limestone and sandstone aquifer underlies the Ampthill Clay Kimmeridge Clay formations.

Table 6-8 Geology and aquifer classification within study area

Parent Group	Geological Formation	Formation description	Aquifer classification
Superficial deposits			
-	Alluvium	Clay, silt, sand and gravel	Secondary A
-	Head	Clay, silt, sand and gravel	Secondary A
River Terrace Deposits	Northmoor Sand and Gravel Member	Sand and gravel	Secondary A
	Summertown-Radley Sand and Gravel Member	Sand and Gravel	Secondary A
	Wolvercote Sand and Gravel Member	Sand and Gravel	Secondary A
Bedrock (youngest to oldest)			
Selborne Group	Upper Greensand	Sandstone and Siltstone	Principal
	Gault Formation	Mudstone	Unproductive
-	Lower Greensand	Sandstone	Secondary A
Ancholme Group	Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated)	Mudstone	Unproductive
Corallian Group	Stanford Formation	Limestone	Secondary A
	Kingston Formation	Sandstone	
	Hazelbury Bryan Formation	Sandstone, Siltstone and Mudstone	

Parent Group	Geological Formation	Formation description	Aquifer classification
Ancholme Group	Oxford Clay Formation		Unproductive

6.5.45 The thin Lower Greensand Formation is hydraulically isolated from the Upper Greensand by the Gault clay aquitard.

6.5.46 Groundwater level monitoring in the Upper Greensand shows that groundwater flow is generally to the north towards the edge of the outcrop and flows into numerous watercourses (such as Letcombe Brook, Lockinge Brook, Ginge Brook).

6.5.47 In general, there is relatively little reliable groundwater level monitoring in the Lower Greensand. Where the Lower Greensand is at subcrop beneath the superficial deposits only (i.e. not confined by the Gault Formation), conceptually there may be a hydraulic connection between the two formations. However, insufficient monitoring data is currently available to verify potential connectivity or the direction of flow between the superficial deposits and the Lower Greensand. An absence of springs that align with the Lower Greensand subcrop suggests that there is unlikely to be significant upwards flow (Institute of Geological Sciences, 1978). Additionally, limited piezometry suggests that flow is away from the thin, unconfined, northern boundary of the Lower Greensand southwards towards the confined aquifer. Hence, the head gradient is assumed to be downwards from the superficial deposits into the Lower Greensand.

6.5.48 Groundwater flow in the unconfined part of the Corallian Group aquifer in the north is generally south / south-east towards the River Ock. As groundwater passes into the confined aquifer beneath the Ampthill Clay Formation and Kimmeridge Clay Formation, groundwater flow shifts eastwards.

6.5.49 The Corallian aquifer is recharged from rainfall where the aquifer outcrops to the north of the River Ock and on the higher ground to the west of the study area. Recharge to the Lower Greensand aquifer is likely to occur where it outcrops to the west of EIA Scoping Boundary through superficial deposits.

Superficial aquifers

6.5.50 Superficial deposits overlie the bedrock sequence across most of the EIA Scoping Boundary. Their distribution and type are shown in Figure 6.5. They consist mostly of River Terrace Deposits and Alluvium and are highly variable in thickness and lithology. In the west and around the southern part of the EIA Scoping Boundary area, the superficial deposits are thin (1 to 2m) but are indicated by the BGS superficial thickness model to be thicker in the north and east close to the main rivers (8 to 10m).

6.5.51 The alluvium, sand and gravel superficial deposits are permeable and water-bearing. They are designated as Secondary A aquifers while the Head deposits are categorised as secondary (undifferentiated) aquifers. These can generally be classified as minor aquifers with a shallow near-surface water table that interacts with the numerous streams and drains in the area and support small scale local water supply.

6.5.52 Recent drilling data derived from an initial set of 13 investigation and monitoring boreholes (March 2024) indicate that the superficial deposits around the south and south-eastern edge of the reservoir site are between 1.2m and 2.8m thick, with the median thickness being 1.8m.

6.5.53 The hydraulic conductivity in the superficial deposits measured from falling head tests range over two orders of magnitude between 1.2×10^{-8} to 7.4×10^{-6} m/day reflecting the highly heterogenous nature of these sediments.

6.5.54 Groundwater flow in the superficial deposits generally mirrors the topography, flowing from south to north-east, with local flow patterns influenced by numerous surface watercourses. Groundwater levels recorded at recent shallow monitoring piezometers in the superficial deposits around the southern and south-eastern sides of the SESRO were between about 0.3 and 0.6m below ground level in early April 2024. Groundwater levels in the River Terrace deposits were estimated from water strike information from borehole construction logs to be between 0 to 2.5m below ground level. These levels suggest that the Rivers Ock and Thames may be gaining water from groundwater locally, although clay layers in thicker alluvial deposits may limit groundwater – surface water interactions in some areas. The near-surface water table also indicated that groundwater flooding risk may be an issue in some areas.

WFD groundwater bodies

6.5.55 There are no designated bedrock WFD groundwater bodies (GWBs) aquifers within the SESRO EIA Scoping Boundary. The closest GWB is the Shrivenham Corallian water body, located less than 1km away to the north, which had ‘Good’ overall status and ‘Good’ Chemical Status under the WFD RBMP3, 2022. Bordering the study area to the south is the Vale of White Horse Chalk GWB. GWBs are screened out from further WFD assessment as no GWBs immediately underly the SESRO EIA Scoping Boundary.

Groundwater use

6.5.56 There are no public water supply Source Protection Zones (SPZs) within the wider area.. The closest SPZ is associated with a Wantage supply in the Chalk aquifer located about 6km to the south-west of the southern edge of SESRO. Data on other licensed or unlicensed abstractions are not available at the time of reporting, this data will be requested and included in the assessment for the EIA.

6.5.57 The superficial deposits in the study area are designated as Secondary A and Secondary (Undifferentiated) aquifers (minor value water bearing strata which have various lithological characteristics). These deposits can support minor local water supplies and also provide baseflow to streams.

Groundwater dependent terrestrial ecosystems (GWDTEs) and springs

6.5.58 The EA data shows no designated GWDTEs within the EIA Scoping Boundary. Any potential groundwater dependent habitats identified from site surveys (such as Local Wildlife Sites (LWS)) will be included in the EIA.

6.5.59 To the south of the EIA Scoping Boundary (>4.5km away) a spring line is shown on BGS hydrogeological maps, largely rising in the West Melbury Chalk Formation at its boundary with the Upper Greensand, with some rising solely within the latter (Figure 6.6). These springs feed numerous minor watercourses in the area, as well as the Letcombe Brook and Ginge Brook. These are far removed from the EIA Scoping Boundary and should not experience any effects.

6.5.60 Approximately 6.5km to the north-east of SESRO two springs are identified on mapping rising in the Corallian Limestone, close to its boundary with the Kimmeridge clay. These feed tributaries of the River Ock.

6.5.61 Approximately 1km north of the reservoir embankments at Marcham Mill (north of the River Ock) is the location of Marcham Salt Water Spring LWS. This spring manifests at the surface as a damp corner of a field supporting the growth of wild celery. The springs are possibly related to the discharge of saline groundwater from the Corallian aquifer (Jacobs, 2022).

Groundwater-surface water interaction

6.5.62 Surface water flow monitoring is currently insufficient to characterise the interaction between surface water and groundwater within the EIA Scoping Boundary. The spot flow data made available to date has been sporadic, so it has not been possible to develop / obtain flow accretion profiles to assess actual flow gain / loss in the watercourses. GI works in 2024 aims to provide further information.

6.5.63 Conceptually, it is expected that groundwater will flow in the superficial deposits towards the River Ock and River Thames and discharge into those watercourses. Locally, there may be discharge from groundwater into the smaller watercourses that flow across the study area, including the Ginge Brook, Letcombe Brook, and Cow Common Brook and Portobello ditch. There may also be some loss from the superficial deposits into the Lower Greensand, dependent on the relative head levels.

6.5.64 This conceptualisation is confirmed by preliminary groundwater modelling which indicates that watercourses in the study area interact with shallow groundwater and, in particular, gain water from superficial deposits.

Hydrogeological modelling

6.5.65 A preliminary groundwater model of the superficial aquifer was developed in 2022 to assess whether the SESRO Project would result in a groundwater flooding risk and how it may impact local watercourses. This work indicated that:

- Baseline groundwater levels in the superficial deposits are controlled by surface and artificial sub-surface (agricultural) drainage
- Introduction of the reservoir may lead to an increase in groundwater levels across the study area, with areas to the east affected more
- Groundwater levels are reduced by the presence of the proposed toe drain, flood storage area and watercourse diversions
- Further localised reductions in groundwater levels are simulated to occur through inclusion of a groundwater drain
- With the planned toe drain, flood storage area and watercourse diversions, the increased risk of groundwater flooding was assessed as low; this could be further mitigated with a groundwater drain

Further desk study and surveys

6.5.66 At the time of writing, baseline surveys are ongoing and data sets are insufficiently complete to inform, in detail, this EIA Scoping Report. Therefore, further surveys are required to update the understanding of the baseline and the sensitivity of the watercourses across all aspects of the water environment. Surveys are continuing and will do so into 2025. The following section details further surveys, desk studies and modelling requirements through to the EIA stage.

Hydrological modelling

6.5.67 The process of testing / using the hydraulic models identified further refinements that could be made to the framework of models assessing flow, level, velocity and water quality. These were converted to a list of recommended updates which are currently ongoing and will continue to support the EIA. These amendments have been presented to the EA through monthly TLG's.

- Amendments to the Probability Distributed Model (PDM) and InfoWorks ICM models to update the hydrological inputs and simulated outputs including water quality, hydraulics and operation of the River Thames control structures during periods of abstraction and augmentation

- Updates to the representation of SESRO in the water resources model (simulated using Python Water Resource (Pywr) software) to reflect the latest Water Resource Management Plan (WRMP) 24 assumptions
- Inclusion of dissolved oxygen and ammonia in the reservoir algal model (PROTECH), or another approach to ground truthing is to be considered, such as comparison with observed data from other reservoirs to reduce uncertainty regarding these chemicals
- Improving model interaction with orthophosphate and total phosphorus in water quality models to improve the reservoir and River Thames model linkages
- Further testing of dissolved oxygen through explicit reservoir modelling of dissolved oxygen in relation to the engineering options (e.g. artificial mixing)
- Ground truthing of flow and chemical inputs for the SAGIS-SIMCAT modelling and continued development of a 1D hydrodynamic model for the River Ock to better characterise changes in flow and water quality
- Further data review of within reservoir ammoniacal nitrogen concentrations compared to concentrations at the reservoir intakes to determine if releases from the reservoir is likely to increase or decrease downstream river concentrations
- Identify reference data for BOD in reservoirs
- Further hydraulic understanding of the watercourses within the SESRO EIA Scoping Boundary such that in channel velocities can be ascertained more accurately
- Updates to hydraulic flood models using additional survey data to represent current conditions and the latest SESRO Master Plan
- The hydrometric surveys undertaken to support the development of the 1D hydraulic model were not completed within all flow conditions considered representative of when SESRO augmentation would occur. Additional hydrometric surveys are planned in 2024 at Culham (Sutton Pools), Clifton Hampden and Day's Lock and at the proposed intake/outfall location to further support the 1D modelling
- Additional topographic and cross-sectional surveys have been recommended across the River Ock catchment to update the flood model, in addition to cross sectional surveys and potential bathymetry at the intake/outfall structure

Hydrogeological modelling

6.5.68 A groundwater model has been developed using the GI data available at the time of reporting. This model will be refined and updated using on-going groundwater monitoring data from the GI to verify potential impacts of the reservoir on the groundwater environment (superficial aquifer and Lower

Greensand aquifer) and to assist in the design of groundwater level control mitigation. This work has commenced and will be progressed through to EIA as GI data become available. Specific recommended model updates will include:

- An updated hydrogeological conceptualisation as a basis for refining the model build and incorporation of the Lower Greensand Aquifer
- Incorporation of new GI and on-going monitoring data; such as hydraulic conductivity, aquifer thickness, groundwater levels, surface water levels and flows to assist calibration and sensitivity testing. Particular focus will be on the superficial aquifer and surface water connectivity
- Characterisation of the connectivity between the superficial deposits and the Lower Greensand aquifers and potential impact of the reservoir on this aquifer
- Verify and refine understanding of the potential impact of the reservoir on the groundwater environment, including groundwater flood risk and impacts on diverted waterways
- Simulation of groundwater flooding mitigation options
- Understand model uncertainty through sensitivity testing

Monitoring, field surveys and data collection

6.5.69 The following surveys and monitoring activities have been scheduled in the River Ock catchment[10]. Due to access issues, the surveys below have been started in 2024 and will continue through 2025 to support the EIA, so are included here for completeness:

- Site walkovers of all the watercourses within the EIA Scoping Boundary
- MoRPh surveys for 20% of watercourses within the EIA Scoping Boundary
- Continuous groundwater/surface water interaction monitoring via in-situ piezometers
- Water quality monitoring within the Ock and Thames catchments
- Ditch water level monitoring within the Ock catchment
- The ground investigation programme to support hydrogeological site characterisation and provide continuous groundwater level monitoring data is partially complete and will continue through to 2025. This programme has been designed largely to support groundwater modelling activities. To date, 17 standpipe piezometers have been installed mostly within Lower Greensand and superficial aquifers across EIA Scoping Boundary. Of these, three piezometers have been installed in the Gault or Kimmeridge Clay units. A further 18 piezometers are scheduled for installation during the second half of 2024 and it is planned that 16 old groundwater monitoring sites will be recommissioned. Continuous water

[10] *Surveys are dependent upon access being agreed.*

level loggers will be installed in all piezometers and downloaded monthly until the end of 2024. Falling or rising head permeability tests will also be undertaken at each of the new GI sites. The GI sites will also facilitate at least one round of groundwater sampling for water quality analysis scheduled for August/September 2024

- Additional data collection on licensed and unlicensed abstractions from the Environment Agency and local authorities respectively

6.6 Sensitive Receptors and Potential Environmental Effects

Future baseline

6.6.1 The River Thames is managed through numerous structures for navigation. It is expected that it would be continue to be a level-controlled system in the future.

6.6.2 The WINEP for water companies during AMP7 and previous AMPs included the introduction of measures to reduce phosphate inputs (e.g. improvement in treatment processes and increased storm tank capacity). Many abstractions for public water supply have also been subject to sustainability reductions and will continue to see further reductions to ensure environmental protection and enhancement. These changes are expected to benefit the aquatic communities, potentially resulting in an increase in the distribution and abundance of pollution and flow sensitive species.

6.6.3 Climate projections generally indicate wetter, milder winters, a shorter sharper groundwater recharge season, higher temperatures, potential increased evaporation and drier soils. During extended drought periods it is expected that the wetter winters would not offset the impact of dryer summers. As a result, summer flows in the River Thames may be lower in the future meaning augmentation from the SESRO Project has the potential to provide beneficial effects during certain low flow periods.

6.6.4 Land use within the Ock Catchment is not expected to change. However, climate change may also see changes in agricultural practices (e.g. changes in crop types and changes in the use of fertilizers and pesticides) which could change the water quality and watercourse habitat within both the Ock and the Thames catchment in the future.

6.6.5 Detailed quantitative modelling will underpin the assessments of changes in river water quality and hydrology / hydraulic conditions, as key characteristics that dictate the distribution, diversity and abundance of aquatic habitats and species throughout the study area. This quantitative modelling includes predicted future baseline changes in water quality and hydrological conditions, incorporating both climate change and changes in water company abstraction and discharge operations, such that it will be possible to understand the potential environmental effects of the SESRO Project against this future baseline.

Potential environmental effects

6.6.6 Potential environmental effects identified are summarised in Table 6-13.

6.6.7 An appraisal of the potential effects due to construction and operation of SESRO has been undertaken to determine the scope of the Water Chapter of the Environmental Statement, as set out below. This has considered all aspects of the water environment, legislative protections, sensitivity of the potential receptors and type of effects to either scope in or out of the EIA. Justification for scoping aspects both in and out of the EIA is provided.

6.6.8 Potential construction and operational effects are presented below, considered in the absence of mitigation measures.

Flood risk

6.6.9 Preliminary flood modelling (undertaken in July 2022) shows that SESRO has the potential to affect flood risk. Existing properties are currently at risk of flooding, but preliminary hydraulic flood modelling has indicated that the properties remaining following the construction of SESRO will have no significant increase in flood levels.

6.6.10 The hydraulic model requires updating and the effects noted as a result of preliminary modelling work are only indicative. Flood risk, therefore, remains scoped into the EIA.

6.6.11 Flood risk from tidal / coastal flooding is scoped out as the Thames is not tidal at the intake/outfall location.

6.6.12 Some minor changes to flood extent are expected and additional land will be flooded along the diversion channels and replacement floodplain storage areas.

6.6.13 Floodplain storage will be displaced and replacement floodplain storage is proposed to offset this.

6.6.14 SESRO is bounded by the WWD, EWD and the River Ock. Rainfall runoff from the reservoir is included in the conveyance assessment for these watercourses.

6.6.15 Once constructed, SESRO would capture rainfall that would otherwise contribute to River Ock catchment flows, notably in the diverted watercourses. This means that the overall contributing catchment to the diverted watercourses is reduced which may result in changes to a change in flow routing in some reaches of the Childrey Brook and lower River Ock. Preliminary modelling has shown that the reduction in catchment area results in an overall effect on flow in the lower River Ock that is very small and, hence, the effect on flows in the River Thames is negligible.

6.6.16 The River Thames floodplain will be impacted by the intake/outfall structure.

6.6.17 Operation of emergency drawdown also has potential to impact receptors in the River Thames floodplain (see Chapter 19 – Major Accidents and Disasters).

6.6.18 Preliminary groundwater modelling (currently in development) suggests the introduction of SESRO could lead to an increase in groundwater levels. Groundwater flood risk is, therefore, also scoped in.

6.6.19 Any construction activities undertaken within flood zones could, in the absence of mitigation, exacerbate flood risk.

6.6.20 Dewatering activities within the EIA Scoping Boundary could result in temporary increases in flows within the associated watercourses.

6.6.21 Flood risk from reservoir embankment failure has been scoped out (see the Chapter 19 - Major Accidents and Disasters). The Impact of Emergency Drawdown on River Thames Flooding is scoped into the EIA and will be considered in the Flood Risk Assessment (FRA) but reported in the Major Accidents and Disasters assessment.

Hydrology

6.6.22 Dewatering activities within the EIA Scoping Boundary could result in temporary increases in flows within the associated watercourses.

6.6.23 A framework of models has been used to simulate the operation of SESRO and its interaction with the River Thames. These identified that the hydrological regime would change with augmentation of the lowest flows occurring when SESRO is active; and a reduction in the mid to high flows as a result of abstraction. The potential impact of the change in the hydrological regime and associated change to velocity and level management are, therefore, included in the scope for the EIA.

6.6.24 The SESRO EIA Scoping Boundary contains approximately 100km of watercourses (including rivers, ditches and culverts), a large proportion of which will be diverted and realigned within the Ock catchment. This will result in changes to watercourse lengths, planforms and cross sections. No geomorphological alterations to the River Thames are expected during construction, except for small bankside changes to accommodate the proposed intake/outfall structure. Geomorphological changes as a result of the operation of SESRO are still being assessed and are thus scoped in.

6.6.25 It should be noted that preliminary assessments also considered a continuous release from SESRO of up to 321 Ml/d as the basis for the assessments. This is considerably higher than the ‘typical’ expected augmentation rates as confirmed by the water resources modelling for the latest Regional Plan (noting that releases of up to 321 Ml/d would still be required). As such, the assessment will need to consider the potential impacts / benefits of smaller releases, but also more frequent abstraction to fill the reservoir.

6.6.26 The operation of SESRO will result in flow changes in the River Thames. These changes relate to the abstraction of raw water from the River Thames to fill the reservoir and augmentation of the River Thames from the reservoir to supply London. In addition, a sweetening flow or periodic dewatering will be undertaken to avoid stagnant water accumulating in the augmentation pipeline.

6.6.27 The augmentation of low flows in the River Thames from SESRO for abstraction in the lower River Thames could potentially provide a benefit during periods of low flows and during severe droughts.

6.6.28 The augmentation of flows in the River Thames during 'normal' or higher flows could occur at the end of a severe, less frequent, drought where storage will still be refilling as the low flow period ends and flows within the river begin to rise and could be increasing towards the 'normal' range of flows. The discharge from SESRO will support the recovery of reservoir storage within the London Water Resource Zone which is the primary Water Resource Zone SESRO will support. This may have a negative effect on the flow regime in the River Thames, especially in flow sensitive habitats such as weir pool habitats.

6.6.29 Augmentation to support abstraction in the lower reaches of the River Thames (in London) will also result in a change in the abstraction regime at intervening licensed abstraction points as a result of the net increase in river flow.

6.6.30 Changes in flow related to abstraction or augmentation could also affect the existing river level management protocol for the River Thames.

6.6.31 SESRO, once constructed, would capture rainfall that would otherwise contribute to catchment flows, notably in the diverted watercourses. This means that the overall contributing catchment to the diverted watercourses is slightly reduced. In addition, diverted watercourses would change some of the flow routing in some reaches of the Childrey Brook and lower River Ock. Preliminary modelling has shown that the reduction in catchment area results in an overall effect on flow in the lower River Ock that is very small and, therefore, the effect on the hydrology of the River Thames is negligible. However, this remains scoped in to review against currently ongoing modelling updates.

Surface water quality

6.6.32 SESRO will reduce the catchment area of some watercourses in the Ock catchment. Preliminary model outputs from an Infoworks ICM water quality model for the main channel of the River Thames and model outputs from an SAGIS–SIMCAT water quality model for the River Ock catchment were used to assess potential surface water quality impacts. Identified effects include changes in concentrations of water quality determinands due to differing dilution effects (Atkins, 2022a).

6.6.33 During construction contaminants (such as fuels and oils) could be released into the watercourses within the Ock catchment as well as the River Thames through poor maintenance of construction plant and accidental spills and releases.

6.6.34 There is also potential for the release of suspended sediments into the River Ock and its tributaries as well as the River Thames from disturbed soils, clay and material stockpiles as well as temporary and/or permanent watercourse crossings such as haulage roads and access roads.

6.6.35 Temporary changes in physico-chemical processes could also be observed until the biological and geomorphological processes associated with the watercourse diversions are established. This could result in temporary changes in water quality in the associated watercourse (downstream). However, water quality is expected to improve overall due to better channel design and some removal of agricultural topsoils.

6.6.36 The effects of SESRO augmentation on water quality in the River Thames is, however, expected to be largely positive, improving or making no substantive change to river pollutant concentrations compared to the WFD thresholds. This is due to the retention time within the reservoir and natural biological processes improving the water quality of the water abstracted from the River Thames to the reservoir. SESRO augmentation will also provide additional dilution for the River Thames downstream of the augmentation point.

6.6.37 Based on the preliminary ICM river modelling, a slight increase in ammoniacal nitrogen and BOD may be observed immediately downstream of the reservoir because reservoir concentrations may be greater than river concentrations. The River Thames would remain at ‘high’ WFD status for ammoniacal nitrogen. BOD, which does not contribute to a water body’s overall WFD status, also remains indicative of a ‘high’ WFD standard. Dissolved oxygen, which does contribute to WFD status, is unaffected.

6.6.38 Preliminary modelling also suggests an increase in both ammoniacal nitrogen concentrations and orthophosphate concentrations in the lowermost Childrey Brook (Atkins, 2022a). This is as a result of the expected hydrological changes (loss of flow from the catchment and routing of rainfall and local watercourse flows to the River Ock downstream of Marcham Mill) resulting in reduced dilution of point source inputs (coming from upstream and of further inputs downstream).

Fluvial geomorphology

6.6.39 To accommodate the reservoir and associated infrastructure, ditches would be lost (initial calculations suggest this would be a total of 43 km) and approximately 13 km of river will be diverted. A net total of approximately 47 km of watercourses (rivers and ditches) (Atkins, 2022c) would be enhanced or created as part of SESRO, which is considered a positive effect. The exact lengths will need to be confirmed in the Preliminary Environmental Information (PEI) Report / Environmental Statement.

6.6.40 The watercourse diversions will result in a permanent, but overall positive, change in geomorphological form and function of the affected watercourses as they will be constructed using naturalised channel designs (Atkins, 2022c).

6.6.41 Watercourses will need to be crossed. These crossings relate to haulage roads, access roads and ancillary infrastructure. The potential effect of the crossings will depend on the type of the structure used. Crossing structures could affect continuity and flow (sedimentation / obstruction) and lead to scouring of the watercourse beds and erosion of the banks.

6.6.42 If additional bed or bank protections were required on the River Thames as a result of the intake/outfall structure then there could be some localised impact on the geomorphology of the channel.

6.6.43 Once constructed, the proposed watercourse diversions will incorporate natural channel design principles that would enable improved morphological (and thereby habitat) heterogeneity. As such, there is likely to be a beneficial effect for the diverted East Hanney Ditch, Western Watercourse Diversion and Eastern Watercourse Diversion.

6.6.44 The abstraction and augmentation activities of SESRO could have a localised effect on the fluvial geomorphology of the River Thames through scouring of the bed and opposite bank by flows from the outfall structure.

Hydrogeology

6.6.45 SESRO is not associated with a defined WFD groundwater body. The SESRO WFD assessment undertaken during previous project stages concluded no potential WFD compliance issues for groundwater bodies (and the designated sites they support) (Atkins, 2022b).

6.6.46 The reservoir construction (and operation) will induce a minor increase in discharge of groundwater from the Corallian Limestone due to additional leakage via the Kimmeridge and Ampthill Clay Formations. However, this increased volumetric discharge is less than circa 1% of existing discharge and is, therefore, expected to be negligible (AtkinsRéalis, 2023).

6.6.47 Saline discharges are known to occur in proximity to Marcham Mill and the Marcham Salt Water Spring LWS to the north-east of the EIA Scoping Boundary. Preliminary groundwater modelling of the saline groundwater body within the Corallian Limestones indicate some slight spatial variation in the fringes of the saline groundwater body but these are considered to have very limited impact on saltwater discharges in proximity to Marcham Mill and the Marcham Salt Water Spring LWS.

6.6.48 Construction of the reservoir embankment and reservoir will likely increase the stresses on the Corallian Group but this increase in stress is unlikely to affect the permeability of the Kimmeridge Clay Formation (due to depth and low permeability). Therefore, additional saline water is unlikely to be forced out of the Corallian Group aquifer into surface water receptors, as a result of compaction (AtkinsRéalis, 2023).

6.6.49 During construction, contaminants (such as fuels, oils and drilling fluids) could be released into groundwater, either through losses to ground (e.g. spillages) or through the tunnelling activities (covered within this Water Resources Chapter). Contamination is also possible through disturbance of existing ground contamination, in particular agricultural contaminants and historical and contemporary landfills which occupy areas at the eastern end of the intake/outfall pipeline route (see Chapter 14 – Geology and Soils for further details).

6.6.50 Further pollution could enter the groundwater through poor maintenance of construction kit and accidental spills and releases.

6.6.51 In terms of groundwater flows and levels, the predicted increase or mounding of superficial aquifer groundwater levels in some areas will potentially result in both positive and negative impacts. Raised groundwater levels during periods of low flow may provide a positive contribution to watercourse baseflows. This may in turn improve surface water quality and the range and health of aquatic habitats. There many also be negative impacts of raised groundwater levels, such as increased or new flooding risks to surrounding receptors (described under Flood Risk (paragraphs 6.5.5 to 6.5.7 above).

6.6.52 No groundwater quality risks are envisaged.

6.7 Assessment Methodology

Introduction

6.7.1 The water environment assessment will consider the impact of SESRO on flood risk, hydrology, fluvial geomorphology, water quality and hydrogeology. The assessment will assess the potential impacts of SESRO during both construction and operation on the identified water environment receptors. A number of stand-alone assessments, which will sit alongside the EIA chapter, will also be required (FRA, WFD). The approach to the assessment is set out below.

6.7.2 Further desk studies, surveys and modelling requirements to support the assessment have been set out from paragraph 6.5.66.

Characterising impacts and effects

6.7.3 The impacts and effects from SESRO on the water environment will be characterised and will consider those occurring during both the construction and operation phases across the range of water environment receptors within the identified area of influence (see Reaches description in Table 6-3. Where impacts are identified, details will be provided within the assessment to characterise these in terms of:

- Impact type – direct or indirect, positive or negative
- Extent of impact – the area over which the impact will be felt
- Duration of impact – how long it will occur
- Timing of impact – when it will occur, taking particular note of seasonality
- Frequency of impact – how often it will occur (it is noted that construction is considered a single event which is not repeated and, therefore, frequency of impact is not considered further)
- Reversibility of impact – a reversible impact is one from which spontaneous / natural recovery is possible; or for which effective mitigation is both possible and an enforceable commitment to this can, in theory, be made

6.7.4 Hydraulic modelling is based on a number of assumptions and instabilities within the model means that there is uncertainty in the predicted flood levels. Typically, a 0.5m allowance gets included on predicted levels to allow for uncertainties, known as freeboard. The sensitivity of parameters and assumptions in the hydraulic model are tested, but due to uncertainties in the modelling a significance of effect is considered appropriate to be applied. There is no specific Environment Agency guidance on significance of water level changes and flood risk. In DMRB LA 113, specific tables offer guidance on water environment features and impact magnitudes. These tables are not definitive but serve as a guide for professional judgement, and have been used to provide a framework for assessment. The flood risk criteria will be reviewed and agreed upon with the Environment Agency.

Determining the sensitivity of receptors

6.7.5 The sensitivity of each identified receptor will be assessed based on the criteria set out below in Table 6-9for water quality, hydrology, fluvial geomorphology, flood risk and groundwater.

Table 6-9 Environmental value (sensitivity) and descriptions

Value / sensitivity	Typical Description	Water Quality	Hydrology/ Fluvial geomorphology / WFD	Flood Risk	Hydrogeology
Very high	Very high importance and rarity, international scale and very limited potential for substitution	• WFD water body with 'High' status for water quality related classification elements (e.g. Physico-chemical quality elements) • Water quality supports habitats protected / designated under EU habitat legislation (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA)) • Watercourse is already used for public potable water supply	Hydrology • Hydrology supports habitats protected / designated under EU habitat legislation Fluvial geomorphology • Conforms most closely to a natural, unaltered state and will often exhibit signs of free meandering and possess well-developed bedforms (point bars and pool-riffle sequences) and abundant bank side vegetation: Morph Survey Conservation Status score of 8-10 (High) WFD • WFD hydromorphological designation 'not designated artificial or heavily modified' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'High'	• Floodplain or defence protecting more than 100 residential properties from flooding • Areas which are highly vulnerable. These can include essential infrastructure, emergency services and basement dwellings	• Principal aquifer providing a regionally important resource and/or supporting a site protected under European Commission (EC) and UK legislation for ecology and nature conservation • Public water supply - Groundwater Source Protection Zone (SPZ1) • Water feeding GWDTEs with a high or moderate groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs
High	High importance and rarity, national scale and limited potential for substitution	• WFD water body with 'Good' status for water quality related classification elements (e.g. Physico-chemical quality elements) • Water quality supports habitats protected / designated under UK habitat legislation (e.g. Site of Special Scientific Interest (SSSI), Local Nature Reserve (LNR) • Water body is already used for non-potable water supply	Hydrology • Hydrology supports habitats protected / designated under UK habitat legislation Fluvial geomorphology • Shows signs of previous alteration but still retains many natural features or may be recovering towards conditions indicative of the higher category: Morph Survey Conservation Status score of 5-7 (Moderate) WFD • WFD hydromorphological designation can either be 'not designated artificial or heavily modified' or 'heavily modified' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Supports Good'	• Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding • Areas which are more vulnerable. These can include hospitals, residential units, educational facilities and waste management sites	• Secondary A aquifers and other secondary aquifers providing a locally important resource or supporting a river ecosystem • Public water supply - Groundwater Source Protection Zone (SPZ2) • Private abstractions for potable use • Water feeding GWDTEs of low groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly or moderately GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority
Medium	Medium or high importance and rarity, regional scale, limited	• WFD water body with 'Moderate' status for water quality related classification elements (e.g. Physico-chemical quality elements)	Hydrology • Hydrology supports habitats with regional interest Fluvial geomorphology	• Floodplain or defence protecting 10 or fewer industrial properties from flooding	• Aquifer providing water for agricultural or industrial use with limited connection to surface water

Value / sensitivity	Typical Description	Water Quality	Hydrology/ Fluvial geomorphology / WFD	Flood Risk	Hydrogeology
	potential for substitution		• Substantially modified by previous engineering works and likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation: Morph Survey Conservation Status score of 2-4 (Low) WFD • WFD hydromorphological designation 'heavily modified' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Supports Good'	• Areas which are less vulnerable. These can include retail, commercial and general industrial units, agricultural / forestry sites and water / sewage treatment plants	• Public water supply - Groundwater Source Protection Zone (SPZ3) • Industrial agricultural abstractions • Water feeding GWDTEs of low groundwater dependence with a national non-statutory UK BAP priority; or water feeding highly or moderately groundwater-dependent GWDTE sites with no conservation designation
Low	Low or medium importance and rarity, local scale	• WFD water body with Poor status for water quality related classification elements (e.g. Physico-chemical quality elements)	Hydrology • Hydrology supports habitats with local interest Fluvial geomorphology • Channelised (reaches whose bed and banks are mostly covered by hard protection (e.g. concrete walls or sheet piling): Morph Survey Conservation Status score of 1 • Culverted (i.e. totally enclosed by hard protection): Conservation Status score of 1 WFD • WFD hydromorphological designation 'heavily modified' or 'artificial' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Does Not Support Good' • N/A (navigable)	• Floodplain with limited existing development • Water compatible development	• Unproductive strata • Water feeding GWDTEs of low groundwater dependence with no designation or groundwater that supports a wetland not classified as a GWDTE, although may receive some minor contribution from groundwater
Negligible	Very low importance and rarity, local scale	• Non-WFD water body or WFD water body with Bad status for water quality related classification elements (e.g. Physico-chemical quality elements)	Hydrology • Hydrological regime means that the stream is dry for most of the year. Fluvial geomorphology • Reach entirely covered by hard protection; and/or completely culverted.	No flood risk receptors	No groundwater present

Source: Based on Table 3.70, DMRB LA 113 (National Highways, 2020), flood risk from WebTAG (Department for Transport, 2023) and fluvial geomorphology from 'Guidebook of applied geomorphology' (Sear, Newson and Thorne, 2009).

Determining magnitude

6.7.6 The magnitude of impacts will be assessed based on the criteria set out below in Table 6-10.

Table 6-10 Criteria for defining magnitude of impacts on water environment receptors

Magnitude	Criteria	Examples
Major	Results in loss / improvement of attribute and/or quality and integrity of the attribute	**Adverse** • Loss of, or extensive change to, an aquifer / groundwater supported habitats • Potential high risk of pollution to groundwater • Negative change to the environmental status / classification of a water feature, including water quality classification • Permanent / irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource • Changes to site resulting in an increase in augmentation / runoff of >75% with flood/sewerage exceedance potential • Increase in peak flood level (1% annual exceedance probability event) > 100 mm, including climate change allowance (26%) • Loss of flood storage areas • Extensive change to the hydrological regimes of rivers and catchments • Extensive change to the geomorphological form and functioning of rivers and catchments **Beneficial** • Augmentation could reduce / dilute existing pollutants • Recharge of an aquifer • Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource • Positive change to the environmental status / classification of a water feature, including water quality classification • Changes to site resulting in a decrease in augmentation / runoff of >75% • Alleviation of low flow / drought flow conditions • Reduction in peak flood level (1% annual exceedance probability event) >100 mm
Moderate	Affects integrity of attribute, or loss / improvement of part of attribute	**Adverse** • Partial loss or change to an aquifer / groundwater supported habitats • Potential medium risk of pollution to groundwater • Permanent /irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource • Pollution of a receiving water body, but insufficient to change the environmental status / classification, including water quality classification • Changes to site resulting in an increase in augmentation / runoff of >50% with flood / sewerage exceedance potential • Increase in peak flood level (1% annual exceedance probability event) >50 mm • Moderate changes to the hydrological regime and associated catchments • Moderate changes to the geomorphological form and functioning of rivers and associated catchments **Beneficial** • Reduced pollution of a receiving water body, but insufficient to change the environmental status / classification, including water quality classification • Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource • Changes to site resulting in a decrease in augmentation / runoff >50%

Magnitude	Criteria	Examples
		• Reduction in peak flood level (1% annual exceedance probability event) >50 mm • Alleviation of low flow / drought flow conditions
Minor	Results in some measurable change in attribute's quality or vulnerability	**Adverse** • Minor change to an aquifer/groundwater supported habitats • Potential low risk of some pollution to a surface water or groundwater body, but insufficient to cause loss in quality, fishery productivity or biodiversity • Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource • Changes to site resulting in an increase in augmentation/runoff of >25% with flood / sewerage exceedance potential • Increase in peak flood level (1% annual probability event) >10 mm • Minor changes to the hydrological regime and associated catchments • Minor changes to the geomorphological form and functioning of rivers and associated catchments **Beneficial** • Negligible change in peak flood level (1% annual exceedance probability event) <10 mm • Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource • Potential reduction in existing pollution risk to groundwater • Alleviation of low flow conditions
Negligible	Affects attribute, but of insufficient magnitude to affect the use or integrity	**Adverse** • No measurable affect on the integrity of the water environment • Temporary / reversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource • No measurable impact upon an aquifer and very low risk of pollution to groundwater • Negligible change in peak flood level (1% annual probability event) <10 mm • Negligible change to the hydrological regime and associated catchments • Negligible changes to the geomorphological form and functioning of rivers and associated catchments **Beneficial** • The project may beneficially affect the integrity of the water environment, but this is not considered measurable • No measurable impact upon an aquifer • Temporary addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource
No change	Results in no change to the receptor	• No predicted adverse or beneficial impact to the receptor

Source: Based on DMRB LA113 Table 3.71 (National Highways, 2020).

Determining significance

6.7.7 Once the sensitivity of receptors and magnitude of impacts (beneficial or adverse) have been defined, the overall significance of effects (beneficial or adverse) will be assessed using the matrix below Table 6-11.

Table 6-11 Matrix to assess the significance of effect on water receptors

Sensitivity / value		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: Based on DMRB, Table 3.4N, LA104 (National Highways, 2020).

6.7.8 Effects of Moderate or higher significance are considered to be significant effects.

Assessment of residual effects

6.7.9 Mitigation measures to reduce and, wherever possible avoid, identified adverse effects will be explored and assessed as part of the EIA process. Any residual effects remaining after the inclusion of mitigation measures will be identified.

Assessment of cumulative effects

6.7.10 Inter-development cumulative effects result from other proposed developments within the study area which may have effects on the water environment additional to SESRO. The effects of the Project in conjunction with other development projects will be undertaken as set out in Chapter 20 – Cumulative Effects. Cumulative effects may arise from proposed non-Strategic Resource Option (SRO) WRMP options which may abstract and/or augment the River Thames. Whilst there are no other SRO projects that may result in cumulative impacts with SESRO, the Severn to Thames Transfer (STT) would need to be assessed if this was reconsidered in a future WRMP.

6.7.11 Intra-development effects arise from interaction between different impacts from the same project on the same receptor. For example, in relation to the water environment effect interactions may arise from mobilisation of existing soil contamination along with spillages and planned discharges. Effects on the water environment from SESRO may also interact with other impacts to affect a non-water receptor, for example, water and air quality affecting health. Such interactions will be assessed within the various technical chapters of the ES.

Assumptions, limitations and uncertainties

6.7.12 Any assumptions, limitations or uncertainties for the EIA assessment will be reported within the Environmental Statement. The following assumptions have been made with regards to the potential construction and operational effects of the SESRO project:

- The assessments assume the diversion of approximately 58 km of watercourse
- While further surveys are planned for 2024, there is a risk that access may not allow for these surveys to be undertaken and they extend into 2025
- It has been assumed that a Hands off Flow (HoF) expected to be aligned with a Q50 flow at Sutton Courtenay and Kingston will limit the timing and volumes of abstraction from the River Thames

6.7.13 It is assumed the maximum augmentation to the River Thames will be 321Ml/d.

6.8 Mitigation and Environmental Net Gain

Construction phase mitigation

6.8.1 The table below provides a summary of potential mitigation measures for construction that have been considered for the purposes of this EIA Scoping Report. Further mitigation measures will be considered and developed throughout the EIA process.

Table 6-12 Summary of potential mitigation measures applicable during the construction of SESRO

Mitigation	Hydrology	Geomorphology	Flood risk	Surface water quality	Hydrogeology
Primary					
The replacement floodplain storage areas, the Western and Eastern Diversion Channels will be constructed prior to the construction of the reservoir to remove the reservoir from the functional floodplain. These will be protected from subsequent construction activities to allow habitats to develop and ecological features (plants, fish, invertebrates) to colonise and establish. New crossings and discharges into the new watercourses will be avoided The same approach will be taken for River Thames replacement floodplain storage and flood level mitigation structures associated with the inlet / outlet structure	✓	✓	✓		
Location of the intake structure and Abingdon STW outfall to be optimised to reduce water quality risks				✓	
Watercourse crossing and culvert design to consider good practice guidance on design and operation	✓	✓	✓	✓	
The embankment toe drain and groundwater drain will be constructed alongside the construction of the reservoir embankment to ensure mitigation is in place as construction progresses			✓		✓
Secondary					
Following excavation and connection of water to newly created ditches, additional mitigation such as selective planting would be undertaken to prompt stabilisation of river banks and improve water quality	✓	✓		✓	
Reduce the impacts of construction on surface water quality through a Water Quality Management Plan, which would cover, construction activities such as dewatering, earthworks, access roads and haulage roads This would be achieved through provision of sediment retaining features like sediment bunds as well as appropriate site drainage that would prevent sediments from entering the environment The site drainage could include ditches, settlement ponds and appropriately designed treatment systems which would also manage off-site flows	✓		✓	✓	
Documents presenting the approach for mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. Examples of good practice and essential mitigation relevant flood risk include incorporation of a flood risk management plan within a Construction Code of Practice (CoCP), setting out requirements in construction areas to: Reduce impacts to the construction works from flooding Prevent any significant effects on the existing flood risk in the surrounding area (including safeguarding existing defences) such as intercepting site runoff and attenuating to greenfield run off rates and,			✓	✓	

Mitigation	Hydrology	Geomorphology	Flood risk	Surface water quality	Hydrogeology
Protect temporary worksites and people (including the workforce) from flood risk					
Reducing the impact of construction on groundwater quality including (but not limited to) dewatering / discharges to ground, earthworks and tunnelling work through a Groundwater Quality Plan Tunnelling work will also be kept within or above impermeable clays to prevent creating new preferential pathways to underlying deposits. Ground investigations will be undertaken to better understand local geology					✓
Tertiary					
The CoCP will include a Water Quality Management Plan and a Groundwater Quality Plan with strict adherence to appropriate guidance, such as the Guidance for Pollution Prevention (GPP, 2024) and documents produced by the CIRIA					✓
Watercourse diversions and realignments would be constructed in the dry to keep existing habitat functioning throughout the overall construction period. Flow would be diverted from the current watercourses into the newly created habitats once construction is completed	✓	✓			
Construction work activities within flood zones will be managed so that they will not increase flood risk elsewhere by reducing plant and materials within flood zones and removing potential obstructions in the event of an adverse weather warning			✓		
Environmental permits for discharges to ground will need to be applied for, discharge limits and environmental monitoring requirements agreed					✓

Operational phase mitigation

6.8.2 The table below provides a summary of potential mitigation measures for operation that have been considered for the purposes of this EIA Scoping Report. Further mitigation measures will be considered and developed throughout the EIA process.

Table 6-13 Summary of potential mitigation measures applicable during operation of SESRO

Mitigation	Hydrology	Geomorphology	Flood risk	Surface water quality	Hydrogeology
Primary					
The Western and Eastern Watercourse Diversions and other watercourse realignments are to be created at the start of the construction programme to mitigate for the watercourses to be lost to the new reservoir. The watercourses diversions and realignments would provide improved geomorphological and habitat heterogeneity, and would be of higher value than the existing watercourses found on site. The watercourse diversions will alleviate potential increases in groundwater levels due to the reservoir structure (they may perform same function as, or complement, the proposed groundwater drain)			✓		
Within the Western and Eastern Watercourse Diversions, creation of interconnected 'wetland' ditches would mitigate for lost ditch length. This would provide improved structure and complexity to the riparian zone					
The toe drain would take embankment surface water flows and transfer them to the River Ock and would provide additional ditch length					

Mitigation	Hydrology	Geomorphology	Flood risk	Surface water quality	Hydrogeology
Diversion channels would maintain the flow of water around the reservoir site and capture pluvial runoff		✓			
Replacement floodplain storage is included in the design to offset floodplain displaced as part of the proposed project where watercourses originate outside the SESRO EIA Scoping Boundary. Watercourses originating within the EIA Scoping Boundary will be integral to the Project design					
Modifications to the River Thames floodplain are included in the design to mitigate changes in flood levels caused by the intake/outfall structure					
A groundwater drain would be included surrounding the reservoir embankments to maintain the flow of groundwater around the reservoir					
There would be mixing / aeration of reservoir water to avoid stratification				✓	
Secondary					
A Hands-off Flow (HoF) would be applied to limit abstraction at mid to low flows within the River Thames. Preliminary work has suggested this would be set at the equivalent of a Q50 at Sutton Courtenay (local control) and Q50 at Kingston (catchment control)					
Development of an abstraction and release regime with incremental increases or decreases in flows as SESRO is triggered to manage flow velocities					
Changes in water levels along the River Thames during periods of augmentation and abstraction would be mitigated through operation of existing level management structures					
Potential mitigation options for BOD concentrations in the River Reservoir and downstream Thames could include mixing / aeration and the use of alternative draw off depths within the reservoir					
Off-site catchment or point source measures could be developed to offset any residual effects on water quality within the Ock Catchment (e.g. the lowermost Childrey Brook). This may include changes in land use, modifications to agricultural practices, changes to point source loads and/or development of nature based solutions for pollution mitigation (e.g. reed beds)				✓	
Specific operational rules may need to be considered to protect the River Thames during very low flow periods, particularly during more sensitive hydro-ecological seasons (when fish larvae are present)	✓	✓			
If there is a need to provide additional velocity mitigation in the River Thames, then habitat improvements could be considered for the river to mitigate any potential changes in flow and resultant habitat quality as a result of these flow changes	✓	✓			
Tertiary					
Operational rules may need to consider augmentation to support the ecology of the River Thames in extreme low flows when there are no water resource requirements (i.e. for environmental flow purposes only)	✓				
Additional rules to manage within day flow fluctuations and increased level management requirement	✓	✓			

Potential for environmental net gain

6.8.3 The following potential for environmental benefits have been identified for the water environment:

- Flood flows will be reduced in the downstream reaches of the River Ock, potentially reducing the flood risk to Abingdon. This will be confirmed in the FRA
- The creation of a new WFD lake water body including 'perched' wetlands / lagoons within the embankment of SESRO and floating islands
- Diversion of existing watercourses around SESRO, including creation of new river habitats, wet woodland, wetland. The new watercourses would increase the heterogeneity of in-channel geomorphology compared to the existing watercourses
- Potential improvements to water quality for new watercourse diversions, including as a result of topsoil removal which would contain nutrients
- A potential improvement to WFD status for the diverted Cow Common Brook and Mere Dyke water bodies created across the Project. This will be confirmed in the WFD assessment
- Lower flows in the River Thames avoided due to the operation of the reservoir
- General water quality improvements in the River Thames associated with increased river flows in the summer (offering more dilution of point source pollutant inputs)

6.9 Summary of Scope for the EIA

EIA scope for the preferred option

6.9.1 The scope of the EIA will cover the assessment of changes to flood risk, geomorphology, hydrology, surface water quality and groundwater during both the construction and operation phases.

6.9.2 The table below provides a high level summary of those aspects scoped in and out of further assessment.

Table 6-14 Summary of environmental matters scoped in and out of further assessment

Feature	Scoped in/out	Rationale
Construction		
Flood Risk	IN	Any construction activities undertaken within flood zones could, in the absence of mitigation, exacerbate flood risk
Hydrology	IN	Dewatering activities within the EIA Scoping Boundary could result in temporary increases in flows within the associated watercourses Watercourse diversions will result in different flow routing within the Ock catchment Some rainfall local would be retained in the reservoir that would have otherwise flowed into Ock watercourses
Fluvial Geomorphology	IN	To accommodate the reservoir and associated infrastructure, rivers and ditches would be diverted and some ponds would be lost Watercourses would need to be crossed, which could affect continuity and flow, as well as lead to scour Bank / bed protections for River Thames for the construction of the outfall/intake
Surface Water Quality	IN	Contaminants could be released into the watercourses (rivers, ditches, ponds) within the Ock catchment as well as the River Thames. Potential for the release of suspended solids from disturbed soils, clay and material stockpiles as well as temporary and/or permanent watercourse crossings Temporary changes in physico-chemical processes could occur until the biological and geomorphological processes associated with the watercourse diversions are established. This could result in temporary changes in water quality in the associated watercourse (downstream)
Hydrogeology	IN	SESRO is not associated with a defined WFD groundwater body. The SESRO WFD assessment undertaken during previous project stages concluded no potential WFD compliance issues for groundwater bodies Contaminants (such as fuels, oils and drilling fluids) could be released into groundwater, either through losses to ground (e.g. spillages) or through tunnelling activities Contamination is possible through disturbance of existing ground contamination, (agricultural contaminants and landfills which occupy areas at the eastern end of the intake/outfall pipeline route) Preliminary work has demonstrated that there is no risk of changes to the Marcham Salt Water Spring LWS which have, therefore, been scoped out
Operation		
Flood Risk	IN	Preliminary flood modelling shows that SESRO has the potential to affect flood risk. Existing properties are currently at risk of flooding, but properties remaining following the construction of SESRO will have no significant increase in flood levels SESRO would capture rainfall that would otherwise contribute to River Ock catchment flows, notably in the diverted watercourses. This may result in changes in flow routing in some reaches The hydraulic model requires updating and the effects noted as a resultof preliminary modelling work are only indicative. Flood risk, therefore, remains scoped into the EIA The River Thames floodplain will be impacted by the intake / outfall structure The introduction of SESRO could, in absence of mitigation, lead to an increase in groundwater levels Flood risk from tidal / coastal flooding is scoped out as the River Thames is not tidal in the relevant reaches
Hydrology	IN	The operation of SESRO will result in flow changes in the River Thames Augmentation of low flows in the River Thames from SESRO for abstraction in the lower River Thames could potentially provide a benefit during periods of low flows

Feature	Scoped in/out	Rationale
		The discharge from SESRO will support the recovery of reservoir storage within the London Water Resource Zone. This may have a negative effect on the flow regime in the River Thames (in flow sensitive habitats such as weir pool habitats) Augmentation to support abstraction will result in a change in the abstraction regime of intervening licensed abstraction points Changes in flow related to abstraction or augmentation could affect the existing river level management protocol for the River Thames
Fluvial Geomorphology	IN	The proposed watercourse diversions will incorporate natural channel design principles that would enable improved morphological heterogeneity The abstraction and augmentation activities of SESRO could have a localised effect on the fluvial geomorphology of the River Thames (scouring of the bed and opposite bank by flows from the outfall structure)
Surface Water Quality	IN	The effects of SESRO augmentation on water quality in the River Thames is, expected to be largely positive, improving or making no substantive change in river pollutant concentrations compared to the WFD thresholds A slight increase in ammoniacal nitrogen and BOD may be observed immediately downstream of the reservoir because reservoir concentrations may be greater than river concentrations A potential increase in both ammoniacal nitrogen concentrations and orthophosphate concentrations in the lowermost Childrey Brook (as a result of the expected hydrological changes resulting in reduced dilution of point source inputs)
Hydrogeology	IN	Raised groundwater levels during periods of low flow may provide a positive contribution to watercourse baseflows. This may in turn improve surface water quality. There may also be negative impacts of raised groundwater levels such as increased or new flooding risks to surrounding receptors (described under Flood Risk above) Preliminary work has demonstrated there is no risk of any operational effects on Marcham Salt Water Spring LWS

Potential changes to scope and methods associated with other options

6.9.3 Following consultation, the preferred options for various aspects of the SESRO project may potentially change. Whilst the EIA scope would be similar in terms of methodology, other options, might require slight alterations to the geographic scope of the assessment potentially, for example, resulting in the inclusion of different stretches of watercourses and the exclusion of others.

6.9.4 The water environment TLG will continue to be consulted regarding any changes to the scope, models and methodological approaches for the EIA.

6.10 Next Steps

6.10.1 Further hydrology, fluvial geomorphology (including MoRPh), water quality and topographic surveys have been identified to update the understanding of the baseline and the sensitivity of the watercourses and reaches. These surveys will be continued once land access is agreed, and the outcomes considered when completing the EIA.

6.10.2 Further modelling will also be required to inform the magnitude of any effects on flows (flow velocity, depth/level) as well as water quality to assess the significance of the operational effects on the watercourses.

6.10.3 Flood risk activities for both fluvial, pluvial and groundwater flood risk assessment include:

- Continued site data collection to inform model updates and calibration
- Use modelling to inform design development and refinement

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7 Aquatic Ecology

7.1 Introduction

7.1.1 This chapter sets out the proposed scope of the Environmental Impact Assessment (EIA) in relation to aquatic ecology and outlines all anticipated impact pathways associated with SESRO to features of aquatic ecological value.

7.1.2 It describes the baseline aquatic ecological features, as they are understood at present. The chapter also identifies the potential aquatic ecological effects that could arise from the construction and operation of the SESRO Project and identifies any mitigation measures likely to be required, following the 'mitigation hierarchy', to reduce harm to aquatic ecology. The potential ecological effects have been identified in view of the baseline at present and in the future. It also identifies where aquatic ecological features/matters can be scoped out from further assessment, and the justification for doing so.

7.1.3 This scoping process has been undertaken with reference to guidance provided in the Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal (EcIA) (CIEEM, 2018).

7.1.4 The findings in this chapter draw on the findings of other chapters, in particular Chapter 6 - Water Environment and Chapter 8 – Terrestrial Ecology.

7.2 Legislation, Policy, Standards and Guidance Context

7.2.1 Key policy relevant to aquatic ecology set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) includes:

- Paragraph 4.3.5 requires the applicant to clearly set out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity
- Paragraph 4.3.6 requires the applicant to show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests
- Paragraph 4.3.7 states that the applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured
- Paragraph 4.3.11 notes that (subject to specific policies), the development should avoid significant harm to biodiversity and geological conservation interests and provide net gains for biodiversity

- Paragraph 4.3.13 notes that the highest level of biodiversity protection is afforded to sites identified through international conventions and that habitats may be qualifying features of sites designated under the Habitats Regulations and international conventions including Ramsar
- Paragraph 4.3.15 notes that where an adverse effect on a Site of Special Scientific Interest (SSSI) is likely, that a development consent should only be granted where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs
- Paragraph 4.3.17 notes that due consideration should be given to regional or local designations to ensure that these sites are safeguarded, however, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent where harm cannot be avoided or adequately mitigated
- Paragraph 4.3.19 requires that applicants take measures to ensure species and habitat that have been identified as being of principal importance for the conservation of biodiversity in England and Wales are protected from adverse effects
- Paragraph 4.3.21 states that the applications for development consent should set out how opportunities for on-site delivery of biodiversity net gain have been considered and, where they are proposed, how they have been incorporated into the project design and that any off site delivery of biodiversity net gain (BNG) should also be set out in the application
- Paragraph 4.3.22 requires when delivering biodiversity net gain off-site, that developments do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity

7.2.2 In addition to the policy set out in the NPS for Water Resources Infrastructure (Defra, 2023), SESRO will also have regard to other relevant legislation, policy, standards and guidance for this aspect, as listed in Table 7-1. A detailed summary of the legislative, policy, standards and guidance framework for this aspect, and how it accords with the SESRO Project, would be provided in the Preliminary Environmental Information (PEI) Report and/or Environmental Statement.

Table 7-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
The Conservation of Habitats and Species Regulations 2017 (as amended)

Relevant legislation, policy, standards and guidance
The Wildlife and Countryside Act (as amended) 1981
The Countryside and Rights of Way Act 2000
The Natural Environment and Rural Communities (NERC) Act 2006
The Environment Act 2021
The Invasive Alien Species (Enforcement and Permitting) Order 2019
Environmental Protection Act 1990
The Water Framework (Standards and Classification) Directions (England and Wales) 2015
Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
The Eels (England and Wales) Regulations 2009
Salmon and Freshwater Fisheries Act 1975
The Thames Conservancy Act 1932
National policy
A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)
NPS for Water Ressources Infrastructure (Defra, 2023): Section 4.3
National Planning Policy Framework (NPPF): Paragraphs 180-188 (Ministry of Housing, Communities and Local Government, 2023)
Regional policy
The Oxford Core Strategy 2026 (Oxford City Council, 2008): Policy CS14
Oxford Local Plan 2036 (Oxford City Council, 2020)
Thames Catchment Flood Management Plan (Environment Agency, 2009)
Local policy
Vale of White Horse District Council Local Plan 2031 (Vale of White Horse District Council, 2016): Core Policies: 42, 44, 45 and 46
Standards and guidance
Guidelines for ecological impact assessment in the UK and Ireland, terrestrial, freshwater and coastal (EcIA) (CIEEM, 2018)
Thames River Basin District Management Plan (Environment Agency, 2022)

Relevant legislation, policy, standards and guidance
Oxfordshire Biodiversity Action Plan (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust, Oxfordshire County Council and Thames Valley Environmental Records Centre (TVERC), 2014)
Aquatic habitat and species-specific scoping and survey guidance – see Appendix B

7.2.3 In general, the legislation in Table 7-1 above and NPS policies aim to conserve, protect, enhance and manage the water environment and aquatic ecology.

7.3 Engagement

7.3.1 Technical Liaison Groups (TLGs) covering the aquatic ecological features of the freshwater ecosystems assessment approach and findings have been held with the Environment Agency and Natural England since 2020.

7.3.2 Ongoing engagement with key stakeholders and statutory advisors is being undertaken throughout the assessment process to identify and address important constraints and enhancement opportunities.

7.3.3 EIA Scoping specific TLGs have been underway during 2024 with the Environment Agency and Natural England, and are to include the Environment Agency National Infrastructure Team (NIT) going forward, see Table 7-2 below.

7.3.4 The need for, and the specifications of, further monitoring discussed in Section 7.5 was also agreed with the EA via a meeting on 13 March 2024.

Table 7-2 Engagement key comments and actions

Consultee	Comment	Response / action taken
National Appraisal Unit (NAU), Natural England, Environment Agency	The Applicant introduced the methodology and timescales for the SESRO Project NAU, Natural England and Environment Agency suggested the Environment Agency NIT is included in engagement going forward.	Arrange date to meet with NIT

7.4 Existing Environment and Baseline Conditions

Study area

7.4.1 SESRO is located within the River Ock hydrological catchment, which forms part of the River Thames river basin. The River Ock and its tributaries flow into the River Thames at Abingdon.

7.4.2 A description of the EIA Scoping Boundary and surroundings is provided in Chapter 1 – Introduction.

7.4.3 For the purpose of the aquatic ecology assessment, the study area associated with aquatic ecological features includes all watercourses and ponds within the SESRO EIA Scoping Boundary as well as those in hydrological connection where flows may change due to the presence of the reservoir, abstraction or discharges.

7.4.4 The study area has been sub-divided into a number of study reaches as outlined in Chapter 6 - Water Environment (see Figure 6.1). This includes the following main areas:

7.4.5 Watercourses and ponds within the Ock catchment including:

- Rivers, ditches and ponds within and adjacent to the SESRO EIA Scoping Boundary, including watercourses upstream of the reservoir that will be diverted (e.g. the Cow Common Brook, East Hanney Ditch and Mere Dyke)
- Rivers, ditches and ponds which may be affected should the final effluent outfall of the Abingdon Sewage Treatment Works (STW) need to be relocated

7.4.6 The River Thames including:

- The reach upstream of the SESRO Project intake/outfall (to which the Ock catchment discharges) from downstream of the Swinford Water Treatment Works (WTWs) to the intake/outfall structure near the Abingdon STW
- The reach downstream of the SESRO Project intake/outfall up to the Teddington Weir (which forms the tidal limit, at which point flows released from the SESRO Project will have been re-abstracted) and where the study area terminates

7.4.7 This chapter does not consider all potential effects on pond ecology. Potential effects on species other than aquatic macrophytes and macroinvertebrates, such as amphibians seasonally inhabiting ponds (including the legally protected great crested newt *Triturus cristatus*), that may be affected by the Project are considered in the Terrestrial Ecology chapter (see Chapter 8 – Terrestrial Ecology).

7.5 Baseline Desk-Based Assessment and Surveys

7.5.1 The existing baseline has been established through a desk-based review of available data as well as targeted surveys completed as part of a monitoring programme for the SESRO Project.

7.5.2 The monitoring programme was initially developed in 2020 and was subsequently amended to include additional features as the understanding of the design and operation of the SESRO Project has developed. This includes, for example, phytoplankton, zooplankton, macrophyte, macroinvertebrate and fish surveys (discussed below).

7.5.3 This monitoring programme applied good practice guidance (see Appendix B) to collect data and was subject to engagement with the relevant regulators. This long-term monitoring programme has been agreed with the Environment Agency and some monitoring sites have been monitored on an ongoing basis since 2020. The monitoring programme has, to date, mostly focussed on the reaches of the River Thames downstream of the proposed intake/outfall structure up to Teddington Weir, due to access limitations in the Ock catchment. Further surveys for the Ock catchment are planned for 2024 and 2025.

7.5.4 Where applicable, the key data sources listed below were consulted to consider the most recent data sets for this EIA Scoping Report:

- The Multi-Agency Geographic Information for the Countryside (MAGIC) Defra website to identify any statutory and non-statutory designated sites (Defra, 2019)
- Ordnance survey (OS) mapping, the Environment Agency Statutory Main Rivers Map and aerial imagery to identify watercourses and standing waterbodies the assessment of aquatic habitats and species (invertebrates, macrophytes and fish) (Environment Agency, 2020)
- The Environment Agency salmonid main rivers map (Environment Agency, 2017)
- Natural England data on chalk rivers (Natural England, 2023)
- Natural England data on priority rivers (Natural England, 2024a and 2024b)
- Environment Agency Ecology and Fish Data Explorer data (Environment Agency 2024a)
- Environment Agency supplementary data requests including Fisheries Classification Scheme 2 (FCS2) data (UK Technical Advisory Group (UKTAG), 2008)
- A peer-reviewed paper on fish populations in the River Thames (Lyons et al., 2021)

- Environment Agency Water Framework Directive (WFD) Ecological status for the 2015, 2019 and 2022 cycles (Environment Agency, 2024b)
- 2020 to 2024 Strategic Reservoir Option (SRO) Monitoring Programme data; including fish, fish habitat, invertebrates, macrophytes, diatoms, plankton/algae, specialist depressed river mussel *Pseudanodonta complanata* surveys in the River Thames; and multi-purpose environmental DNA (eDNA) monitoring[11] and bespoke Invasive Non Native Species (INNS) surveys within the SESRO EIA Scoping Boundary
- Zooplankton and juvenile fish surveys completed on behalf of Thames Water in 2023
- Supplementary data from historical surveys made available by Thames Water including larval and juvenile fish surveys (2007, 2008 and 2009) and plankton (phytoplankton and zooplankton) and periphytic (growing on submerged substrates) diatom surveys completed in 2005, 2006 and 2008
- TVERC data, including species records and non-statutory designated site extents (TVERC, 2022)
- Supplementary data from Thames Water Asset Management Plan cycle 7 (AMP7) Water industry National Environment Programme (WINEP) investigations into INNS

7.5.5 In addition, supplementary historical data and reports were made available by Thames Water from previous investigations supporting the development of the Project, including:

- Aquatic invertebrate surveys for the River Thames (between Sandford to Shillingford in 2005, 2006 and 2008 and selected rivers and ditches in the Ock catchment in 2006 and 2008
- An INNS review completed in 2009 that summarised the baseline for invasive / nuisance animals and plants and for fish diseases in the River Ock catchment and the River Thames (Cricklade to tidal limit)
- Native crayfish surveys completed for the River Ock, Childrey Brook and Ginge Brook in 2006 and Marcham Brook in 2008
- A report completed in 2009 on swarms of chironomids and mosquitos relating to reservoirs
- Rare molluscs and mussel surveys completed in 2006 at five sites in the River Thames and nine sites across the River Ock and Childrey Brook

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[11] eDNA monitoring focussed on watercourses associated with the EIA Scoping Boundary, where access for conventional survey methods was restricted. This was supplemented by INNS eDNA sampling on the River Thames.

7.5.6 Based on the understanding of the ecology and ecological process identified through review of these data, relevant aquatic receptors associated with the SESRO Project are the watercourse habitats within the study area and the phytoplankton, phytobenthos (diatom), zooplankton, macrophyte, invertebrate and fish communities the watercourses support. Several designated and non-designated sites have also been identified within the study area. A description of the baseline for aquatic ecological communities is presented below.

Phytoplankton and Zooplankton communities

7.5.7 Phytoplankton and zooplankton, although not generally monitored for WFD river classification, are important components of the River Thames aquatic ecosystem downstream of the proposed intake/outfall due, in part, to its size and the influence of water level control structures (for navigational purposes) on flows and level. Zooplankton and phytoplankton communities, along with detritus (and to a lesser extent macrophytes), are important food sources for the aquatic communities associated with the River Thames. The watercourses associated with the Project in the Ock catchment are comparatively small, with phytobenthos playing a more important role due to the shallow nature of the watercourses in the Ock catchment. As such, phytoplankton and zooplankton communities are only described with reference to the River Thames.

7.5.8 The data for the River Thames within the study area shows that chlorophyll (a measure of phytoplankton biomass) follows a consistent annual pattern of increasing in the spring, driven by growth of diatoms, peaking from the end of April to early May, with the size of the peak increasing with distance downstream of the study area. Typically, by June, diatoms and nano-chlorophytes have reduced in number and pico-chlorophytes are dominant and continue to be so through to the autumn, before all phytoplankton drop to low numbers throughout the winter. Diatom and chlorophyll concentrations sometimes produce very large peaks in late August to the end of September. Cyanobacteria make up only a small proportion of the total phytoplankton biomass and their blooms tend to be sporadic and short-lived, but are most common in August.

7.5.9 Zooplankton densities recorded suggest that their abundance in the River Thames within the study area is highly seasonal with temporal patterns in zooplankton density tracking phytoplankton growth as discussed below (although there are differences in peak timings).

7.5.10 The available baseline data suggest that the zooplankton communities in the River Thames within the study area are typical of large eutrophic rivers and, although there are differences in zooplankton density between sites, the most abundant species are consistent throughout. The zooplankton communities consist mostly of rotifers, cladocera and copepods. These zooplankton make up the 'animal' component of the plankton communities and are the intermediary species in the food chain, transferring energy from planktonic algae (primary producers) to the larger invertebrate predators and fish who feed on them.

7.5.1 Zooplankton and phytoplankton data were considered limited and further surveys were recommended in 2022. Targeted surveys were subsequently included in the monitoring programme for 2023. In accordance with the Monitoring Programme, surveys for zooplankton and phytoplankton are ongoing. The most recent surveys commenced in April 2024 and will continue until October 2024. Data from these surveys will be included in the PEI Report.

Phytobenthos (diatoms)

7.5.2 Phytobenthos (diatoms) are considered good indicators of water quality conditions. In particular, certain phytobenthos species are known to be numerically dominant in communities where watercourses have been subject to eutrophication (nutrient enrichment).

7.5.3 Across all watercourses included in the study area, the available data suggest that the phytobenthos (diatom) communities are indicative of assemblages that prefer nutrient enriched watercourses. The data also indicates higher nutrient levels in the watercourses associated with the Ock catchment when compared to the reaches of River Thames included in the study area. The available data also suggest an increase in nutrient concentrations in a downstream direction with deteriorating conditions in the lower reaches of the River Thames.

7.5.4 The phytobenthos (diatom) element for the WFD water bodies within the Ock catchment immediately downstream of the SESRO Project (Marcham and Childrey Book) were not assessed in 2022 by the Environment Agency for WFD classification. The lower reaches of the River Thames (Egham to Teddington) were of 'Poor' status in 2022. The WFD status of the macrophyte and phytobenthos element (combined) in the Ock catchment ranged from 'Poor' to 'Good' status. The available data suggest that the Cow Common Brook and Portobello Ditch, as well as the Childrey Brook and Norbrook at Common Barn, waterbodies are subject to eutrophication.

Macrophytes

7.5.5 The data suggests that the macrophyte communities found in the watercourses associated with the SESRO Project in the Ock catchment were reflective of nutrient enriched, slow flowing watercourses with filamentous algal cover generally low. The WFD status of the macrophyte and phytobenthos element (combined) in the Ock catchment ranged from 'Poor' to 'Good' status. The available data suggest that the Cow Common Brook and Portobello Ditch, as well as the Childrey Brook and Norbrook at Common Barn, waterbodies are subject to eutrophication.

7.5.6 Broadly, the macrophyte communities of the River Thames reaches included in the study area are typical of large base-rich, lowland rivers and are indicative of communities which prefer nutrient enriched conditions. The macrophyte communities of the River Thames upstream and downstream of the intake/outfall were not classified in 2022 with the macrophyte element of the remainder of the Thames (up to Teddington Weir) classified as 'High' status.

7.5.7 Further surveys were recommended by Thames Water in both the Ock and Thames catchments as the available data were limited and/or more recent data were required to confirm baseline conditions and assemblage sensitivity. Surveys of the River Thames have been undertaken since 2021. In accordance with the Monitoring Programme, additional surveys for macrophytes in the River Thames and watercourses within the Ock catchment are scheduled in 2024. Data from these surveys will be included in the PEI Report / Environmental Statement.

Macroinvertebrates

7.5.8 The available data on the biological indices for macroinvertebrate communities from watercourses within the Ock catchment, associated with the SESRO Project, are broadly indicative of good water quality. There are exceptions such as Cow Common Brook, upper Childrey Brook and Marcham Brook (see Figure 6.1 in Chapter 6 - Water Environment) where, historically, taxa (i.e. families or species) that are representative of good water quality were present at lower abundance than would be expected under unimpacted reference conditions.

7.5.9 Water quality data suggest that low flows in summer can result in water quality issues (including very low dissolved oxygen). This may be exacerbated where watercourses are artificially widened as this results in slower flows / shallower water and increased water temperatures. The watercourses within the Ock catchment associated with the SESRO Project support communities indicative of sedimented to heavily sedimented bed conditions, with moderate tolerance to reduced flows. There are exceptions; including the upper River Ock, Sandford Brook and Ginge Brook where the available data suggests that the macroinvertebrate communities are considered highly sensitivity to flow reduction. The macroinvertebrate communities of the Cow Common Brook, upper and lower Childrey Brook, Stutfield Brook and Marcham Brook are composed predominantly of species that have a low sensitivity to flow reduction.

7.5.10 Broadly, the macroinvertebrate communities inhabiting the River Thames within the study area are indicative of good water quality, sedimented to heavily sedimented bed conditions with the community composed predominantly of species that have a moderate sensitivity to flow reduction. The exception is the reach of the River Thames upstream of the SESRO Project where the macroinvertebrate community is composed predominantly of species that have a high sensitivity to flow reduction.

7.5.11 The available data indicates that macroinvertebrate communities of the River Thames downstream of the SESRO Project are considered to be of 'Good' to 'High' status. Similarly, the WFD element for many of the watercourses within the Ock catchment associated with the SESRO Project is considered to be of 'Good' to 'High' status. The exceptions include the Cow Common Brook and Portobello Ditch, which were classified as 'Moderate' status in 2019 (the water body was not assessed in 2022), with the Reason for Not Achieving Good (RNAG) identified as land use and physical modification (Environment Agency 2024b). Similarly, the Childrey and Woodhill Brooks and the Letcombe Brook were classified as being of 'Moderate' status in 2022. The RNAG has been identified as diffuse and point source pollution within the Childrey and Woodhill Brooks with no reason identified for the Letcombe Brook (Environment Agency 2024b).

7.5.12 Further surveys were recommended by Thames Water for both the Ock and Thames catchments as the available data were limited and/or more recent data were required to confirm baseline condition and community sensitivity. Access constraints resulted in the macroinvertebrate survey programme for the watercourses in the Ock catchment consisting largely of eDNA surveys to date. Further surveys are planned for the watercourses in the Ock catchment in 2024, as well as in the River Thames, adopting variable sampling methods appropriate to the habitat types. Targeted ditch surveys, adopting the approach developed by Palmer, Drake and Stewart (2013), are also planned. The baseline conditions for macroinvertebrates will be updated in the PEI Report / Environmental Statement, based on these updated surveys.

Fish

7.5.13 The watercourses in the Ock catchment associated with the SESRO Project are broadly characterised by low species richness (one to six species) and abundance. The lower Childrey Brook and lower River Ock are exceptions, with comparatively greater species richness and abundance compared to the rest of the Ock catchment. Fish species recorded at relatively high abundance within the watercourses in the Ock catchment included: three-spined stickleback *Gasterosteus aculeatus*, gudgeon *Gobio gobio*, minnow *Phoxinus phoxinus* and stone loach *Barbatula barbatula* although larger species, such as roach *Rutilus rutilus*, are also abundant. Dace *Leuciscus leuciscus* and bullhead *Cottus gobio* are abundant in the River Ock. Brown/sea trout *Salmo trutta* have been recorded in Mere Dyke, lower Childrey Brook, lower River Ock and Letcombe Brook.

7.5.14 The River Thames within the study area supports a comparatively species-rich fish community in contrast to the watercourses within the Ock catchment. The River Thames reaches support between 18 and 24 different species and there is high commonality between the reaches in terms of species records. The Thames fish community is dominated (both in terms of species and abundance) by coarse fish which predominantly feed on zooplankton as juveniles before switching diets to benthic invertebrates and organic accumulations adhered to substrate. The highest densities apparent from survey data across all reaches are associated with roach and bleak *Alburnus alburnus*. European eel *Anguilla anguilla*, barbel *Barbus barbus*, brook lamprey *Lampetra planeri*, brown/sea trout (including subsp. *fario*) and bullhead have all been recorded in the River Thames in the reaches immediately downstream of the SESRO Project. Some of these species (for example European eel) are migratory and the River Thames represents an important migratory route for fish, which is supported by a number of fish passes at existing structures throughout the study area.

7.5.15 Further surveys were recommended by Thames Water in both the Ock and Thames catchments as the available data were limited and/or more recent data were required to confirm baseline conditions and population sensitivity. Surveys of the River Thames have been undertaken since 2021. In 2023 additional surveys were introduced targeting juvenile fish and larval stages in the River Thames with similar surveys scheduled for 2024. In accordance with the Monitoring Programme, surveys targeting juvenile fish and larval stages in the River Thames are scheduled for 2024. Fish surveys are also scheduled for the Ock catchment in summer 2024. Data from these surveys will be included in the PEI Report / Environmental Statement.

7.5.16 For most WFD water bodies within the study area, the fish element is not currently classified. The River Thames water bodies specifically have relatively few WFD fish data classifications because the survey methodology typically used by the Environment Agency on the River Thames is bespoke (hydroacoustic surveys) and non-compliant with WFD standard methods due to the depth of the watercourse. The survey methodology is considered a standard methodology for lowland watercourses where watercourse widths and depths do not allow for typical WFD methodologies. The River Thames from the Evenlode to Thame confluence has been classified as being of ‘Poor’ status for fish. The Ock and tributaries WFD water body and the Letcombe Brook have also been classified as ‘Poor’ status.

Statutory and non-statutory designated sites

7.5.17 A number of statutory and non-statutory designated sites are present within the Ock and the River Thames study area.

7.5.18 Those sites which are both designated on account of aquatic habitats or species and which, conceptually, may be at risk (either within the SESRO EIA Scoping Boundary or through hydrological linkage), are identified in Table 7-3. This excludes sites within the study area that are not designated on account of aquatic habitats or species; and/or are not dependent on hydrological linkage to watercourses within the study area for the maintenance of their interest features. It also excludes sites considered unlikely to be affected by the SESRO Project, for example because they are outside of the SESRO EIA Scoping Boundary and/or, whilst hydrologically linked, are located upstream of watercourses that may potentially experience changes in water quality or quantity.

7.5.19 Risks to the statutory and non-statutory designated site network shall continue to be reviewed in light of developing. A formal Habitat Regulations Assessment shall be undertaken as part of SESRO Project (see Chapter 8 - Terrestrial Ecology). This will also review the current position that designated Special Area of Conservation (SAC) sites, which may theoretically be hydrologically linked, are unlikely to be at risk - including Cothill Fen SAC and Little Wittenham SAC - due to hydrogeological conceptualisation and hydrological isolation of aquatic interest features respectively.

7.5.20 The available data suggests that the watercourses within the Ock catchment and the River Thames associated with the SESRO Project are not considered priority habitats. With reference to existing national datasets (Natural England, 2024a and Natural England, 2024b), and with reference to qualifying criteria as defined in the river priority habitat definition (Joint Nature Conservation Committee (JNCC), 2011). Priority rivers are listed as habitats of principal importance for the conservation of biological diversity in England published in response to section 41 of the NERC Act 2006.

7.5.21 The watercourses in the Ock catchment associated with the SESRO EIA Scoping Boundary and the River Thames have been identified as salmonid main rivers by the Environment Agency. As such, these watercourses are considered important for either migration routes or spawning and nursery habitat for salmonid fish.

7.5.22 The lower reaches of the Letcombe Brook and the reaches of the Childrey Brook, immediately upstream and downstream of the confluence with the Childrey Brook, are identified as chalk river habitat (Natural England, 2023). Chalk rivers are associated with chalk aquifers with 85% of all chalk rivers found in the UK. These reaches are outside of the SESRO Project study area.

Table 7-3 Statutory and non-statutory designated sites associated with the study area that are conceptually at risk from the SESRO project

Site name	Designation	Aquatic habitats within citation (the specific aquatic habitats and features for which the site is designated)	Conceptually at risk of change (within the SESRO EIA Scoping Boundary or through watercourse effects)
The Cuttings and Hutchins Copse	Oxfordshire Local Wildlife Site (LWS)	Includes the Cuttings which are a series of ponds alongside the railway. There is also a small area of sedge swamp and some wet woodland. The Cow Common Brook flows through the LWS	Yes – within the SESRO EIA Scoping Boundary
Hayward's Eyot	Oxfordshire LWS	Formerly an island, now comprises channels either side of the designated site with springs, ponds and reedbeds. This LWS is located next to the River Thames at Little Wittenham approximately 5.8km downstream of the proposed intake/outfall	Yes – hydrologically connected to the Thames in an area that could, conceptually, experience changes as a result of SESRO
Clifton Hampden Meadows	Oxfordshire LWS	Floodplain meadow with swamp and wet grassland areas. Site is located next to the River Thames near Clifton Hampden approximately 8.5km downstream of the proposed intake/outfall	
Clifton Hampden Wood	Oxfordshire LWS	Includes wet woodland and wetland plants. Site is located next to the River Thames near Clifton Hampden approximately 8.5km downstream of the proposed intake/outfall	
Little Wittenham	SAC* SSSI	Woodland with ponds, streams, calcareous flushes with extensive tufa deposits), and damp hollows fed by springs. Also, a backwater of the River Thames. Site is located next to the River Thames at Little Wittenham,	

Site name	Designation	Aquatic habitats within citation (the specific aquatic habitats and features for which the site is designated)	Conceptually at risk of change (within the SESRO EIA Scoping Boundary or through watercourse effects)
		approximately 11km downstream of the proposed intake/outfall	
Dorchester Meadow	Oxfordshire LWS	Floodplain meadow. Site is located next to the River Thames near Dorchester on Thames approximately 12.2km downstream of the proposed intake/outfall	
Dorchester Gravel Pits (Allen Pit)	Oxfordshire LWS	Former gravel pit which is now standing water habitat. Site is located next to the River Thames near Dorchester on Thames approximately 11.9km downstream of the proposed intake/outfall	
Notes: * this SAC citation is included for completeness but the qualifying feature of the SAC (great crested newt) and the habitats on which they depend, are not functionally linked to the area of the Little Wittenham site (and SSSI features) where potential risks from the Thames have been identified (i.e. the Thames backwater).			

Protected and notable species

7.5.23 The macrophyte, macroinvertebrates and fish communities of watercourses within the study area could include species that are protected by law and/or which are considered notable due to rarity within the study area. The available data suggests that the conservation value of the River Thames is variable within the study area but is typically much higher than the watercourses associated with the SESRO Project within the Ock catchment. As noted above, data for the Ock catchment is limited and further surveys are planned to confirm the presence and distribution of protected and notable species.

7.5.24 The available data indicate the presence of notable macrophyte species in watercourses associated with the SESRO Project within the Ock catchment.

Notable species present include ragged-robin *Lychnis flos-cuculi* and common valerian *Valeriana officinalis*, fringed waterlily *Nymphoides peltata* and marsh speedwell *Veronica scutellate*. In the River Thames reaches downstream of the SESRO Project, several notable species have been recorded, noting that most of these species are not obligate hydrophytes (i.e. are not explicitly associated with the river channel itself). Notable species include, for example, tufted-sedge *Carex elata*, water-violet *Hottonia palustris*, round-fruited rush *Juncus compressus*, summer snowflake *Leucojum aestivum subsp. aestivum*, goldenrod *Solidago virgaure* and strawberry clover *Trifolium fragiferum*.

7.5.25 A few uncommon macroinvertebrate species (e.g. the mayfly *Ephemera lineata*, the caddisflies *Leptocerus lusitanicus* and *Oecetis notata* and the riffle beetles *Macronychus quadrituberculatus* and *Stenelmis canaliculata* are present within the River Thames. The dragonfly *Gomphus vulgatissimus* has also been recorded in the River Thames.

7.5.26 Many of these species are typically associated with large lowland river systems so their rarity, in the context of UK distribution, may be a reflection of the relative scarcity of these types of rivers nationally as well as the lower volume of sampling in such systems.

7.5.27 Fine-lined pea mussel *Pisidium tenuilineatu* has also been recorded within watercourses in both the Ock catchment and the River Thames. Within the EIA Scoping Boundary, fine-lined pea-mussel has only been recorded in the River Ock itself and within the Thames, occurs only very locally and in very low abundance downstream of Oxford with the few specimens recorded. These records are considered likely to represent adventives (arising in abnormal positions) rather than populations (Malacological Services and Cascade Consultancy, 2009).

7.5.28 Several notable fish species have been recorded in the study area including European eel, Atlantic salmon, barbel, brown / sea trout, bullhead and lamprey (including brook lamprey and records of Petromyzonidae that have not been resolved to species level).

Invasive and non-native species

7.5.29 Several INNS have been recorded in the Ock and Thames catchments within the study area. The data suggest that INNS taxa are more prevalent in the River Thames than the Ock catchment. However, this may be because data for the watercourses within the Ock catchment are limited and further surveys are planned.

7.5.30 In the Ock catchment the only macrophyte INNS recorded are Canadian waterweed *Elodea canadensis* and Himalayan balsam *Impatiens glandulifera* and these were only present in a small number of reaches. In the River Thames, INNS are present in every reach, with Nuttall's waterweed *Elodea nuttallii* recorded in all reaches and water fern *Azolla filiculoides,* Himalayan balsam, New Zealand pygmyweed *Crassula helmsii* and Japanese knotweed *Fallopia japonica* also common in/immediately adjacent to, the River Thames.

7.5.31 In the Ock catchment, the most commonly occurring macroinvertebrate INNS is New Zealand mud snail *Potamopyrgus antipodaru*, with American signal crayfish *Pacifastacus leniusculus* and the invasive freshwater shrimp *Crangonyx pseudogracilis/ floridanus* present in some reaches. The Thames supports more INNS, with at least seven INNS recorded in all reaches. Common INNS in the Thames include New Zealand mud snail, zebra *Dreissena polymorpha* and quagga *Dreissena rostriformis bugensis* mussels, Asian clam *Corbicula fluminea*, Caspian mud shrimp *Chelicorophium curvispinum*, *Crangonyx pseudogracilis/floridanus*, demon shrimp *Dikerogammarus haemobaphes* and signal crayfish.

7.5.32 The INNS ruffe *Gymnocephalus cernua* and common carp *Cyprinus* sp. varieties have been recorded in the study area, typically at low abundance. Sunbleak *Leucaspius delineates* and zander *Sander lucioperca* have also been reported in very low numbers, however, the identification of sunbleak is unconfirmed. Ruffe is considered native to many watercourses in the east of England.

Further desk study and survey work

7.5.33 As identified above, further surveys are required to update the understanding of the baseline and the sensitivity of the aquatic ecological features. This includes the continuation of the monitoring programme for the River Thames with targeted surveys also recommended for the watercourses within the Ock catchment (see Appendix B). Survey specifications have been discussed and agreed with the Environment Agency and Natural England and are initially proposed for 2024 and 2025, to include the following survey types:

- ‘Ditch Biodiversity’ surveys which co-locate with several survey sub-types (water quality, hydrometry, ditch condition assessments, macrophytes and macroinvertebrates)
- ‘Pond’ surveys which co-locate with pond related survey sub-types (Predictive SYstem for Multimetrics (PSYM) and eDNA surveys)
- ‘Multidisciplinary’ surveys which co-locate with several survey sub-types (water quality, hydrometry, Modular River Physical (MoRPh), macrophytes, fish, macroinvertebrates and INNS surveys)
- ‘Other’ survey locations which co-locate sites with similar survey sub-types (water quality, hydrometry and the installation of autosamplers)

7.5.34 Further surveys are also required to maintain and/or update the understanding of the baseline sensitivity of the aquatic environment within key reaches of the

River Thames. Surveys commenced in 2023 and are proposed for 2024. These include:

- Targeted macrophyte, fish (electrofishing) and zooplankton surveys
- Juvenile fish surveys (fish trawls and seine netting)

7.5.35 The PEI Report and Environmental Statement will update the baseline, based on these surveys.

7.6 Sensitive Receptors and Potential Environmental Effects

Future baseline

7.6.1 The River Thames is managed through numerous structures for navigation. It is expected that it would be continue to be a level-controlled system in the future.

7.6.2 The WINEP for water companies during AMP7 and previous AMPs included the introduction of measures to reduce phosphate inputs (e.g. improvement in treatment processes and increased storm tank capacity). Many abstractions for public water supply have also been subject to sustainability reductions and will continue to see further reductions to ensure environmental protection and enhancement. These changes are expected to benefit the aquatic communities, potentially resulting in an increase in the distribution and abundance of pollution and flow sensitive species.

7.6.3 Climate projections generally indicate wetter, milder winters, a shorter sharper groundwater recharge season, higher temperatures, potential increased evaporation and drier soils. During extended drought periods it is expected that the wetter winters would not offset the impact of dryer summers. As a result, summer flows in the River Thames may be lower in the future meaning augmentation from the SESRO Project has the potential to provide beneficial effects during certain low flow periods.

7.6.4 Land use within the Ock Catchment is not expected to change. However, climate change may also see changes in agricultural practices (e.g. changes in crop types and changes in the use of fertilizers and pesticides) which could change the water quality and watercourse habitat within both the Ock and the Thames catchment in the future.

7.6.5 Detailed quantitative modelling will underpin the assessments of changes in river water quality and hydrology / hydraulic conditions, as key characteristics that dictate the distribution, diversity and abundance of aquatic habitats and species throughout the study area. This quantitative modelling includes predicted future baseline changes in water quality and hydrological conditions, incorporating both climate change and changes in water company abstraction and discharge operations, such that it will be possible to understand the potential environmental effects of the SESRO Project against this future baseline.

Potential environmental effects

7.6.6 The potential environmental impacts and effects on aquatic ecology during construction and operation of the SESRO Project are outlined below. The impacts and effects have been identified with reference to section 5 of the CIEEM Guidelines for EcIA (CIEEM, 2018) and in consideration of the sensitivity of the baseline biological communities and the proposed construction and operational activities. Some effects associated with the operation of the SESRO Project may provide positive impacts. For example, augmentation from the SESRO Project will supplement river flows, potentially alleviating the adverse effects of very low flow and/or drought conditions.

Construction

Direct habitat loss / gain or severance

7.6.7 Direct habitat loss and severance of habitat could have a negative impact on the distribution and abundance of species within the study area. Along with changes in habitat (e.g. habitat gain or loss) this could also alter the composition of aquatic communities.

7.6.8 To accommodate the reservoir and associated infrastructure, approximately 43km of ditch and approximately 13km of river will be diverted. The creation of new and enhancement of existing watercourse habitat across the site, is considered a beneficial effect. The amount of watercourse diversion, enhancement and creation shall be reviewed as part of the PEI Report / Environmental Statement. The Western and Eastern Watercourse Diversions are embedded in the design of the SESRO Project.

7.6.9 Several ponds are also at risk of loss within the indicative location for SESRO. There will also be habitat fragmentation during the construction of the diversions, although this will be temporary.

7.6.10 Watercourses will also need to be crossed. Road crossings over watercourses may result in the construction of structures in these watercourses. The potential effect of the crossings will depend on the type of structure used. A single, clear span crossing will have a lower impact than a box culvert as set out below.

- A box culvert may disrupt natural hydraulic and sediment transport processes; act as a barrier to the movement of fish and other wildlife; damage the bed and banks of the watercourse during construction; and reduce the extent of the riparian zone
- A clear span bridge would shade the channel and riparian zone, locally reducing primary productivity. Depending on the specific constraints of each individual crossing it may also impact on the morphology and hydrological regime with potential for knock-on effects on aquatic ecology

7.6.11 Main rivers and/or WFD assessed watercourses will require single-span bridges. Box culverts may be considered for smaller watercourses and ditches if the culvert is appropriately designed.

7.6.12 The new intake/outfall structure on the bank of the River Thames would also result in the loss of some riparian habitat and potentially marginal watercourse habitat. If additional bed or bank protections were to be required there would be a localised impact on the morphology of the channel.

7.6.13 Such construction activities affecting watercourses within the indicative location for SESRO could reduce the habitat availability for aquatic communities resulting in a loss of diversity and/or abundance.

Species disturbance, injury or mortality

7.6.14 There is also a risk that aquatic species could be disturbed, injured or killed during the construction phase, particularly during early works to divert and realign watercourses within the indicative location for SESRO.

7.6.15 Disturbance of species could result in a reduction in feeding success, fitness, and breeding success if not appropriately managed, which could result in a loss of abundance and diversity through time.

7.6.16 Further surveys are required to confirm the distribution of aquatic species in the affected watercourses.

7.6.17 Whilst these risks will also require management in the context of localised construction activities associated with the River Thames (intake/outfall location), significant effects on aquatic species within the River Thames are considered unlikely.

Changes in flow level

7.6.18 During construction of watercourse diversions there could be temporary changes in the hydrological function of affected watercourses which could affect aquatic communities.

7.6.19 No significant changes are anticipated for the River Thames.

Changes in water quality

7.6.20 During construction, there is a risk of contaminants (such as fuels and oils) being accidently released into watercourses. During construction there is also potential for the release of suspended sediments, or fine materials into watercourses which could impact aquatic habitats, macroinvertebrates, diatoms, macrophytes and fish (including spawning habitats through smothering of suitable habitats).

7.6.21 In the smaller watercourses (i.e. those within the SESRO EIA Scoping Boundary associated with the Ock catchment), phytobenthos will be an important part of the food-web. Water quality impacts could affect the aquatic communities reliant on phytobenthos as a primary producer.

7.6.22 Phytoplankton and zooplankton are unlikely to be particularly important sources of primary and secondary productivity in watercourses within the SESRO EIA Scoping Boundary, given the shallow nature of these watercourses, associated flow velocities and limited water residence time as compared with, for example, the River Thames, meaning growth conditions for phytoplankton and zooplankton are unfavourable and potential impacts unlikely.

7.6.23 Whilst water quality risks will also require management in the context of localised construction activities associated with the River Thames (intake/outfall location), significant effects on aquatic species within the River Thames are considered unlikely.

Introduction and spread of INNS

7.6.24 Construction activities could also result in the introduction and/or spread of INNS, for example via the transfer of seeds and eggs on construction equipment and the moving of soil and waste material. This could impact aquatic habitats as well as macroinvertebrates, macrophytes and fish communities, especially where INNS out compete native species for resources.

Operation

Direct habitat loss / gain or severance

7.6.25 The SESRO Project will result in the creation of extensive standing water habitat, in addition to new perched wetlands and floating islands with underwater features, such as plant roots, which would provide refuge for juvenile fish within the reservoir.

7.6.26 In addition to the diversion and creation of ditches, the open water and marginal habitats associated with the reservoir and the wetland habitats associated with the watercourse diversions will present new aquatic habitats when compared to baseline conditions. The works will also deliver habitat improvements in the Ock catchment.

7.6.27 The availability of new/altered aquatic habitats could be considered a beneficial effect and could provide a significant positive contribution to the diversity and distribution of aquatic species in the study area as well as terrestrial species with an aquatic life stage / association. Examples include species such as beetles, mayflies, caddisflies, damsel- and dragonflies.

7.6.28 Habitat creation, particularly through construction of ditches, wetlands and open water is likely to provide suitable breeding habitat for non-biting midges species *Chironomidae*. Non-biting midge larvae are an important food source for birds and other animals. However, they can also be associated with amenity disbenefits. Large 'swarms' can form when the non-biting midges hatch to reproduce. As the name suggests, they are non-biting and there are no health effects on humans, other than annoyance.

7.6.29 The potential for such effects is considered in Chapter 17 – Communities.

Changes in flow / level

7.6.30 During operation the flow regime of watercourses within the study area may be affected. This includes permanent changes in the alignment of watercourses within the Ock catchment and the loss of catchment area associated with the indicative location for SESRO which could affect aquatic communities.

7.6.31 The SESRO Project could also result in flow changes in the River Thames relating to the abstraction of raw water from the River Thames to fill the reservoir as well as any potential sweetening flow requirements. Although the release of water from the reservoir to augment raw water abstraction in the lower River Thames could potentially provide a benefit during periods of extreme low flows (e.g. severe droughts), changes in flow / level could also have a direct impact on habitat availability (e.g. nursery habitat) for sensitive features (e.g. juvenile fish) at particular times of year. Changes in flow could also have a direct effect on community structure, e.g. washout of flow sensitive species and/or life stages.

Changes in water quality

7.6.32 There is also a risk of water quality impacts affecting aquatic ecology. These water quality impacts relate to the change in the catchment area for the River Ock as a result of watercourse diversions.

7.6.33 The abstraction and augmentation of raw water could also impact on water quality within the River Thames. Decreased flows could reduce the dilution capacity of the River Thames. Water quality changes could potentially occur during augmentation as the water being released from the SESRO Project could be subject to reservoir processes that could alter water quality (see Chapter 6 – Water Environment). Some of these changes could be beneficial i.e. improving the water quality of the River Thames during augmentation.

Changes to barrier porosity, including function of existing fish passes

7.6.34 Whilst it is not anticipated that the SESRO Project will affect river flows in a way that disrupts fish migration potential within the River Thames or River Ock watercourses within the river channels themselves, the abstraction and augmentation could impact the porosity of existing barriers to fish on the River

Thames (including the functioning of associated fish passes). Changes in flow could affect the minimum flow requirements required for fish passes to operate effectively with lower flows, as a result of abstraction, potentially affecting the passability of barriers. Conversely, augmentation may support the design flows (i.e. flows that enable fish passage) at fish passes for a longer duration than under the baseline, thereby providing a potential benefit.

Fish entrainment / impingement at intake / outfall structures

7.6.35 The new abstraction could also result in an increased risk of fish impingement or entrainment due to the new intake/outfall structure.

7.6.36 Changes in operation of the abstraction points in the lower River Thames (i.e. abstractions that may be able to operate for longer with SESRO in place than without it) could also result in increased risk of impingement and entrainment at existing intakes at other abstraction points.

Changes in community structure / function caused by primary productivity changes

7.6.37 Flow changes could alter primary productivity, both directly through increased or decreased flows (resulting in washout of phytoplankton and zooplankton) or indirectly through changes in flow induced changes in water quality (such as nutrients required for growth). This could affect the food-web and result in a loss of diversity and/or abundance of some species. Conversely, effects may be beneficial in supporting primary productivity during certain periods and mitigating the effects of drought (e.g. through reducing the frequency of cyanobacteria blooms).

Introduction and spread of INNS

7.6.38 As the SESRO Project will be both abstracting from, and releasing water back into, the River Thames, the risk of transferring INNS is considered low. However, the available data suggest that INNS taxa are more prevalent in the River Thames when compared to the Ock catchment (noting surveys in the Ock catchment have been limited to date). As such, there is a risk of recreational users distributing INNS from the SESRO Project into the wider Ock catchment. There is also a risk that recreational use could introduce INNS into the SESRO Project and subsequently into the River Thames during augmentation.

7.7 Assessment Methodology

Introduction

7.7.1 The EIA will be prepared in line with current good practice as set out in the CIEEM Guidelines for Ecological Impact Assessment (CIEEM, 2018).

Determining the value / importance of ecological features

7.7.2 Table 7-4 summarises the ecological feature conservation value and/or sensitivity that will be applied for the assessment. The value and/or sensitivity has been adapted from CIEEM's Guidelines for EcIA.

Table 7-4 Importance of aquatic ecological features

Importance	Criteria
International and European	An internationally designated site or candidate site, i.e., a Special Protection Area (SPA), provisional SPA, SAC, candidate SAC, Ramsar site, or area which would meet the published selection criteria for designation (e.g. SACs and SPA: site condition, citations and conservation objectives (JNCC, 2024a)) A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole Sites supporting populations of internationally or European important species
National (UK)	A nationally designated site, i.e., SSSI, National Nature Reserve (NNR), or discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines (JNCC, 2024b)) A viable area of a priority habitat identified in the UK Biodiversity Action Plan (BAP), or smaller areas of such habitat essential to maintain wider viability Viable populations of nationally important species that are of threatened or rare conservation status, including those identified as priority species in the UK BAP
Regional (south-east)	Sites that exceed the County-level designation but fall short of SSSI selection criteria Smaller areas of key habitat identified in the UK BAP essential to maintain wider viability Viable populations of nationally scarce species identified in the Regional BAP and/or regularly occurring populations of a regionally important species
County (Oxfordshire)	Wildlife/nature conservation sites designated at the county level, such as LWS and Local Nature Reserve (LNR) Areas of habitats and species identified in county or equivalent authority plans or strategies, such as areas of key/priority habitats identified in the LBAP

Importance	Criteria
	Viable populations of species important at the County scale
District	Sites recognised by local authorities, e.g., Sites of District Importance or considered to meet published ecological selection criteria for such designation A viable area of habitat identified in the District BAP Viable populations of species important at the District scale
Local	Areas of habitat or populations/assemblages of species that appreciably enrich the local habitat resource (e.g., ponds) Sites that retain other elements of semi-natural aquatic vegetation due to their size, quality or the wide distribution within the local area are not considered for the above classifications Viable populations of species identified in the Borough BAP and/or regularly occurring populations of species important at the Local scale
Within the ZoI only	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors

Source: Developed using guidance from CIEEM (2018).

Characterising impacts and effects

7.7.3 In accordance with CIEEM guidelines reference would be made to the following characteristics, where relevant, for each effect. An 'impact' is defined as actions resulting in changes to an ecological feature and an 'effect' is defined as the outcome to an ecological feature from an impact (CIEEM, 2018).

7.7.4 For example, the construction activities of a development resulting in a loss of watercourse habitat. An effect is the outcome to an ecological feature from an impact, for example reduction in spawning activity due to loss of watercourse habitat. Describing aquatic ecological impacts and effects will take into account both on site impacts and those that may occur to adjacent and more distant ecological features (either as a result of construction or operation of the SESRO Project), i.e. within the Zone of Influence. Where impacts have been identified, details will be provided within the assessment to characterise these in terms of:

- Positive or negative impact, according to whether the change is in accordance with nature conservation objectives and policy
- Magnitude – refers to the size, amount, intensity and volume of an impact, in quantitative terms where feasible (e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species' population)

- Extent - the spatial or geographical area over which an impact / effect may occur
- Duration - the time period for which an impact is expected to last. Impacts and effects may be described as short, medium or long-term and permanent or temporary. These will be defined by months or years
- Reversibility - a permanent impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation
- Timing and frequency - the number of times an activity occurs will influence the resulting effect. This considers whether impacts are constantly ongoing, separated but recurrent or single events and whether they occur during critical seasons or life-stages for habitats or fauna. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons (such as spawning seasons)

7.7.5 The impact assessment would be undertaken for any feature identified to have 'local' value or above.

7.7.6 A key challenge will be resolving the subjectivity and philosophy of whether an effect as a result of the SESRO Project (for example, changes in the relative abundance of different fish species) is considered to be beneficial or adverse, particularly in the context of the extensive existing anthropogenic modifications of the River Thames and its flow regime which has shaped the baseline ecological communities. This will require further engagement with key regulators including the Environment Agency and Natural England. Some fish community changes would also be considered beneficial in the context of recreational angling, for example, should more rheophilic (i.e. flow-loving species) such as barbel become more abundant within sections of the River Thames.

Determining significance

7.7.7 In accordance with CIEEM guidelines, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. To determine this, CIEEM guidelines would be used alongside professional judgement.

7.7.8 Where 'significant' effects are predicted, secondary mitigation would be applied, where practicable, to reduce the magnitude of the impacts.

Assessment of residual impacts

7.7.9 Residual impacts are defined as ecological impacts that remain with the implementation of mitigation measures. An assessment of the residual impacts will be undertaken to determine the significance of their effects on ecological features.

Assessment of cumulative effects

7.7.10 Inter-development cumulative effects result from other proposed developments within the study area which may have effects on aquatic ecology additional to the SESRO Project. The PEI Report / Environmental Statement will assess the effects of the Project in conjunction with other development projects as set out in Chapter 20 – Cumulative Effects.

7.7.11 Intra-development effects arise from interaction between different impacts from the same project on the same receptor. For example, in relation to aquatic ecology cumulative effects may arise from both construction dust and changes to run-off on an adjacent watercourse habitat. Effects on aquatic ecology from the SESRO Project may also interact with other impacts to affect a non-ecological receptor, for example, effects associated with flow changes and construction noise may result in an area being less attractive to visit, thereby affecting recreational value to anglers. Such cumulative effects will be assessed within the various technical chapters within the technical assessment chapters of the PEI Report / Environmental Statement.

Assumptions, limitations, and uncertainties

7.7.12 Any assumptions, limitations or uncertainties for the EIA assessment will be reported within the Environmental Statement. The following assumptions have been made with regard to the potential construction and operational effects of the SESRO Project:

- The assessments assume the diversion of approximately 56 km of watercourse. This estimate will need to be reviewed in the PEI Report / Environmental Statement
- Whilst there is a significant volume of baseline data within the study area and potential sensitivities of the aquatic features are relatively well understood, the main limitation of the baseline understanding is the uneven spatial and temporal distribution of the data. As a result, there is uncertainty regarding the sensitivity of the watercourses especially in relation to the Ock catchment
- While further surveys are planned for 2024, there is a risk that the current ecological value of the ditches associated with the indicative location for SESRO may be underestimated

- Assumptions and limitations also underpin the investigations required to inform effects on the aquatic ecology (e.g. the magnitude of change in abstraction and augmentation driven flow and water quality changes in the watercourses within the Ock catchment and the River Thames)
- It has been assumed that a Hands off Flow (HoF) expected to be aligned with a Q50 flow at Sutton Courtenay and Kingston will limit the timing and volumes of abstraction from the River Thames (see Chapter 6 – Water Environment). This HoF will ensure that abstraction will either be limited or prevented when flows within the River Thames are at level where additional reductions in flow could result in impacts on the aquatic environment
- It is assumed the maximum augmentation to the River Thames will be 321 Ml/d. This assumption will need to be reviewed in the PEI Report / Environmental Statement

7.8 Mitigation and Environmental Net Gain

7.8.1 Mitigation will reduce the significance of the potential construction and operational related impacts. Some primary mitigation measures will eventually result in a net gain in habitat. Mitigation measures that have already been identified are presented below.

Construction phase mitigation

Primary

7.8.2 Following construction and diversion of water into the new Western and Eastern Watercourse Diversions, ecological establishment will be enhanced through localised planting as well as specific translocation of invertebrates through benthic sediment transfer.

7.8.3 Where required, culverts will be designed to maintain flow and sediment continuity and species permeability which will maintain the overall function and integrity of the associated watercourses.

7.8.4 Watercourse crossing design will prioritise those with least impact within the constraints of a given location. Clear span bridge or portal frame will be preferred and box culverts over pipe culverts, where it is not practicable for these to be accommodated.

7.8.5 The existing over-widened channels will be reshaped so they are better suited to the potential lower flows arising from catchment reconfiguration.

7.8.6 The design of other aspects of the reservoir infrastructure (such as watercourse crossing structures and screening of the intake/outfall structure) will adopt Environment Agency guidance (Turnpenny A.W.H. and O'Keeffe N, 2005) and be compliant with the Eels (England and Wales) Regulations 2009.

Secondary

7.8.7 Fish rescue and translocation will also be undertaken at the same time as the plugging of existing channels required to divert flow to the watercourse diversions.

7.8.8 A biosecurity plan will be developed prior to the implementation of any construction activities to reduce the risk of INNS colonising the newly created diversions. Surveys of the Ock catchment are required before construction to understand the distribution of INNS and the measures to be included in the biosecurity plan.

Tertiary

7.8.9 To mitigate potential impacts resulting from pollution / toxic contamination releases, all works will be undertaken with strict adherence to the Guidance for Pollution Prevention (GPP)[12] and the Construction Industry Research and Information Association (CIRIA) (CIRIA, 2003) guidance on the control of water pollution from construction sites. These detail good practice advice for undertaking works that have the potential to cause water pollution.

7.8.10 General protective and control measures in accordance with good practice will be detailed in relevant environmental management plans, risk assessments and method statements in the Construction Code of Practice (CoCP) during construction, such as:

- Excavations fenced off or covered overnight, or a means of escape provided for any wildlife that may fall in
- Construction and operational lighting should be designed in line with good practice guidance to reduce or avoid disturbance of wildlife
- Dust suppression measures will be applied to reduce/avoid emissions of dust that could affect designated or important habitats

7.8.11 Any INNS identified prior to construction would either need to be avoided allowing for a suitable buffer zone or, if unavoidable, removed or treated to prevent their spread, following the CIRIA guidance (Wade et al., 2008). Fish rescue and translocation will also be undertaken at the same time as the plugging of existing channels required to divert flow to the watercourse diversions.

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[12] *All of the pollution prevention guidelines (PPGs) are available from http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx. Note: the PPGs also make reference to environmental legal obligations, but that information is currently out of date and requires updating.*

Operation phase mitigation

Primary

7.8.12 The SESRO Project will include infrastructure to allow for mixing of the reservoir water to prevent stratification, provide stable water quality conditions and reduce the risks of harmful algal blooms.

7.8.13 As part of the design it has been assumed that there will be a HoF to limit abstraction from the River Thames and protect the higher flow ranges. This is expected to be a dual HoF which considers the Q50 flows at both Sutton Courtenay and Kingston on the River Thames. As noted above, this will ensure that abstraction will either be limited or prevented when flows within the River Thames are at level where additional reductions in flow could result in significant adverse effects on the aquatic environment.

7.8.14 Wetland lagoons will be included in the embankment design (on the western side of the reservoir) to provide additional habitats within the reservoir itself.

7.8.15 Floating islands will be included in the reservoir design to provide additional habitats above and below the waterline.

Secondary

7.8.16 Mitigation measures are also available to further reduce the significance of the effects associated with the operation of the reservoir. The extent to which these measures are required and their details will need further modelling and assessment. Such measures may broadly comprise (subject to need / feasibility):

- Further constraints on the timing and/or magnitude of abstraction and release (beyond those dictated by operational constraints / capacity and existing licencing constraints on the River Thames), for example, during hydro-ecologically sensitive periods (e.g. due to the presence of fish fry)
- Consider the inclusion of ‘planned’ low flow years where no releases from the reservoir are made, should these be considered necessary for maintaining genetic diversity and introduce variability
- ‘Optimisation’ of a ramp up flow release sequence for the reservoir to ensure fish communities in the River Thames can adapt to flow changes
- ‘Optimisation’ of the operation of level control structures within River Thames, as a level dependent system managed for navigation, the relationship between flow velocity and water levels within the Thames is heavily influenced by the control structures. Undesirable effects on velocity could be partly offset by using the existing level control structures to increase or decrease water level which will subsequently decrease or increase flow velocity

- 'Optimisation' of water temperature changes in the River Thames through the design of the reservoir draw-off level
- Habitat improvements to provide increased ecological resilience of affected Thames reaches to predicted hydraulic changes, for example, localised regrading of banks to increase the extent of areas in which important baseline habitats (such as marginal slack water) can 'migrate' up the riverbank and creation of additional backwater habitats
- Bespoke habitat design, monitoring and (if necessary) adaptive management for watercourse diversions and realignments for specific target invertebrate, macrophyte and/or fish species and communities, subject to further baseline surveys of the affected watercourses
- Species translocations targeting specific macroinvertebrates or macrophytes if required (subject to further baseline surveys of the affected watercourses)
- Selective planting of native species to prompt recovery of habitat and stabilise river banks and prevent the establishment of INNS
- Catchment or point source measures to offset any residual effects on water quality within the Ock catchment and Thames and,
- Localised planting - whilst natural colonisation is advocated over planting, some localised planting of macrophytes may speed up the process of establishing favourable habitats for aquatic features such as macroinvertebrates

Biodiversity net gain

7.8.17 A separate BNG report will be prepared at the PEI Report / Environmental Statement stage to identify the possible BNG opportunities.

7.8.18 BNG is:

'an approach to development and land management which aims to leave the natural environment, in terms of biodiversity, in a measurably better state than beforehand. Where a development has an impact on biodiversity it encourages developers to provide an increase in appropriate natural habitat and ecological features over and above that being affected in such a way that it is hoped that the current loss of Biodiversity through development will be halted and ecological networks can be restored' (CIEEM, n.d.).

7.8.19 The objective of SESRO is to achieve a minimum 10% net gain in biodiversity value, and the creation of habitat on-site will ensure that it provides a significant biodiversity net gain for biodiversity, leaving the natural environment in a measurably better state than it was prior to development.

7.8.20 BNG measures will be implemented to ensure sufficient watercourse creation to satisfy rivers and streams and ditches requirements for the BNG statutory metric. Watercourse diversions and realignments would be undertaken as part of early works to ensure continuity of the watercourses and enable habitats to establish quickly following their construction, in advance of the main reservoir construction works.

7.8.21 To accommodate the reservoir and associated infrastructure, approximately 43km of ditch and approximately 13km of river will be diverted. The creation of new and enhancement of existing watercourse habitat across the site, is considered a beneficial effect. This will need to be reviewed at the PEI Report / Environmental Statement stage.

7.8.22 These habitat gains are expected to be large as a result of the expected high quality habitat of the watercourse diversions compared to the low quality habitat of the baseline and due to the creation of a large area of interconnecting aquatic habitats including wet woodland, wetlands, ditches and running watercourses to the west of the reservoir. This in turn is expected to provide gains for aquatic and terrestrial flora and fauna.

7.8.23 Additional BNG-specific surveys will be undertaken to refine BNG calculations, and as identified in Appendix B.

7.9 Summary of Scope for the EIA

EIA scope for the preferred option

7.9.1 The EIA will establish the impacts on the relevant aquatic receptors (habitats and species).

7.9.2 The qualitative assessment will need to consider the outcomes of the assessment and modelling as identified for the water environment (see Chapter 6 - Water Environment). While the baseline information related to INNS has been provided in Section 7.5, it should be noted that an increase in the abundance of INNS already present within the study area, or the introduction and distribution of any new INNS could have adverse effects on the aquatic communities and habitats within the study area. As such, the introduction and spread of INNS will be considered as an impact in the context of the EIA.

Table 7-5 Summary of aquatic ecology matters scoped in and out of further assessment

Feature	Scoped	Mechanism	Rationale
Construction			
Statutory and non-statutory designated sites and notable (e.g. priority) habitats	IN	Direct habitat loss / gain and/or severance Changes in flow / level Changes in water quality Introduction and spread of INNS	Risks to the statutory and non-statutory designated site network shall continue to be reviewed in light of developing Project design. A formal Habitat Regulations Assessment shall be undertaken as part of the Project (see Chapter 8 - Terrestrial Ecology). This will also review the current position that designated SAC sites that are theoretically hydrologically linked are unlikely to be at risk - including Cothill Fen SAC and Little Wittenham SAC - due to hydrogeological conceptualisation and hydrological isolation of aquatic interest features respectively Several other sites are both designated on account of aquatic habitats or species and are, conceptually, at risk (either being within the indicative location for SESRO or through hydrological linkage), as identified in Section 6.5 Ongoing baseline data collection for rivers will also refine current understanding of whether any rivers within the study area qualify as priority habitat
Watercourse and pond habitats	IN		There is potential for watercourse (river and ditch) and pond habitats to be affected as a result of the construction activities (including watercourse diversions and realignments)

Feature	Scoped	Mechanism	Rationale
Fish (including protected and notable species)	IN	Direct habitat loss / gain and/or severance Changes in flow / level Changes in water quality Introduction and spread of INNS Species disturbance, injury or mortality	Construction activities affecting watercourses could reduce the habitat availability for aquatic communities resulting in a loss of diversity and/or abundance. Changes in flow / level as a result of watercourse diversions and other construction activities could also result in a change in community structure and diversity due to a loss of flow sensitive species (where present). Other construction related impacts such as pollution events and the introduction of INNS could also have adverse effects on the structure of the aquatic communities. Similarly, disturbance of species could result in a reduction in feeding success, fitness, and breeding success if not appropriately managed, which could result in a loss of fish abundance and diversity through time
Macroinvertebrates (including protected and notable species)	IN		
Macrophytes (including protected and notable species)	IN		
Phytobenthos (Diatoms)	IN	Direct habitat loss / gain and/or severance Changes in flow/level Changes in water quality	Changes in habitat extent, flow / level and water quality as a result of construction activities (e.g. pollution events and increased suspended solids) could result in a change in community structure. In the smaller watercourses (i.e. those within the SESRO EIA Scoping Boundary associated with the Ock catchment and at greatest risk from construction-related changes), phytobenthos will be an important part of the food-web. Water quality impacts could affect the aquatic communities reliant on phytobenthos as a primary producer
Phytoplankton	Out		Phytoplankton and zooplankton are unlikely to be particularly important sources of primary and secondary productivity in watercourses within the SESRO EIA Scoping Boundary, given the

Feature	Scoped	Mechanism	Rationale
Zooplankton	Out		shallow nature of these watercourses, associated flow velocities and limited water residence time as compared with (for example) the River Thames, meaning growth conditions for phytoplankton and zooplankton are unfavourable. Whilst these risks will also require management in the context of localised construction activities associated with the River Thames (intake/outfall location), significant effects on phytoplankton and zooplankton within the River Thames are considered unlikely. As such, potential impacts associated with construction activities are scoped out
Operation			
Statutory and non-statutory designated sites and notable (e.g. priority) habitats	IN	Direct habitat loss / gain and/or severance Changes in flow / level Changes in water quality Introduction and spread of INNS	Risks to the statutory and non-statutory designated site network shall continue to be reviewed in light of developing Project design. A formal Habitat Regulations Assessment shall be undertaken as part of the Project (see Chapter 8 – Terrestrial Ecology). This will also review the current position that designated SAC sites that are theoretically hydrologically linked are unlikely to be at risk - including Cothill Fen SAC and Little Wittenham SAC - due to hydrogeological conceptualisation and hydrological isolation of aquatic interest features respectively Several other sites are both designated on account of aquatic habitats or species and are, conceptually, at risk (either being within the indicative location for SESRO or through hydrological linkage), as identified in Section 6.5

Feature	Scoped	Mechanism	Rationale
			Ongoing baseline data collection for rivers will also refine current understanding of whether any rivers within the study area qualify as priority habitat.
Watercourse and pond habitats	IN		Once operational, the Project will result in the creation of several new habitats (including open water and wetlands). This could result in changes in the community structure with changes in relative abundance and the potential for species currently not present in the Ock catchment to establish. Operation of SESRO (particularly during abstraction) could result in both habitat loss in the River Thames within the study area (e.g. a loss of marginal habitats during certain periods) or habitat gains (e.g. provision of additional habitat extent during drought conditions) with potential effects on aquatic communities
Fish (including protected and notable species)	IN	Direct habitat loss / gain and/or severance Changes in flow / level Changes in water quality	The introduction of new habitats, potential changes in flow/level and water quality (through a change in hydrological catchment areas associated with diversions and the indicative location for SESRO), and potential introduction of INNS through new access and recreational opportunities within the environs, could result in both positive (e.g. increased diversity) and potentially negative
Macroinvertebrates (including protected and notable species)	IN		

<table>
<tr><th>Feature</th><th>Scoped</th><th>Mechanism</th><th>Rationale</th></tr>
<tr><td>Macrophytes (including protected and notable species)</td><td>IN</td><td rowspan="4">Introduction and spread of INNS
Changes in community structure / function caused by primary productivity changes – Thames only
Changes to barrier porosity, including function of existing fish passes – Thames / fish only
Entrainment / impingement at intake/outfall structures – Thames/fish only</td><td rowspan="4">(e.g. increased competition) impacts for species within the Ock catchment
Within the Thames, a loss of habitat (e.g. marginal habitats) due to changes in the flow regime could affect species with sensitive life stages (e.g. where juvenile fish require nursery habitats). Changes in flow could also have a direct effect on community structure, e.g. washout of flow sensitive species and/or life stages. Changes in water quality during operation could also adversely affect the distribution of species. Changes in flow and water quality could also affect primary productivity (e.g. through changes in nutrient concentrations or washout of phytoplankton and zooplankton) which could affect the food-web and result in a loss of diversity and/or abundance of some species
Conversely, changes in flow, level and water quality may have significant beneficial effects on receptor communities during certain periods (e.g. when the discharge is operational during drought conditions)
Changes in the hydrological regime have the potential for adverse and beneficial effects (though beneficial effects are considered more likely) in terms of maintaining flow conditions that support the operation of fish passes throughout the River Thames
The new abstraction could result in an increased risk of fish impingement or entrainment due to the new intake/outfall structure. Similarly, changes in operation of the abstraction points in the lower River Thames (i.e. abstractions that may be able to</td></tr>
<tr><td>Phytobenthos (Diatoms)</td><td>IN</td></tr>
<tr><td>Phytoplankton</td><td>IN</td></tr>
<tr><td>Zooplankton</td><td>IN</td></tr>
</table>

Feature	Scoped	Mechanism	Rationale
			operate for longer with SESRO in place than without it) could result in increased risk of impingement and entrainment at existing intakes at other abstraction points

Potential changes to scope and methods associated with other options

7.9.3 The scope and methods set out above for aquatic ecology would remain generally unchanged should the SESRO Project progress with other options. This includes the location of the intake/outfall infrastructure, other infrastructure and operation as the features, impacts and effects identified would remain applicable.

7.10 Next Steps

7.10.1 Further surveys have been identified to update the baseline and understanding of the sensitivity of the aquatic features (see Section 7.5 and Appendix B). These surveys should be implemented, and the outcomes should be considered when completing the EIA.

7.10.2 Further hydrodynamic modelling will also be required to inform the significance of any effects on flow, flow velocity, depth and water quality to assess the significance of the operational effects on aquatic ecology (see Chapter 6 – Water Environment).

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8 Terrestrial Ecology

8.1 Introduction

8.1.1 This chapter sets out the proposed scope of the Environmental Impact Assessment (EIA) in relation to terrestrial ecology and outlines all anticipated impact pathways associated with SESRO to features of terrestrial ecological value.

8.1.2 SESRO has the potential to affect habitats and species of ecological value within its 'Zone of Influence' (ZoI). Based on the current understanding of the baseline conditions with respect to terrestrial ecology, this chapter identifies those features that may be susceptible to significant effects and would be considered in the EIA.

8.1.3 This chapter also identifies habitats and species that would not be included in the Environmental Statement but would still be considered to ensure compliance with relevant legislation or policy. Where terrestrial ecological receptors have been 'scoped out' of the Environmental Statement, justification is provided.

8.1.4 This scoping process has been undertaken with reference to guidance provided in the Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland, Terrestrial, Freshwater and Coastal (CIEEM, 2018).

8.1.5 The key impacts to ecological features considered are:

- Permanent and temporary habitat loss within the EIA Scoping Boundary
- Deterioration or fragmentation of surrounding habitats
- Direct mortality or harm to protected or ecologically significant species within the EIA Scoping Boundary
- Anthropogenic disturbance of protected or ecologically significant species within surrounding habitats

8.1.6 Where relevant, cross reference has been made within the Terrestrial Ecology chapter where 'in-combination' effects with other aspects have been specifically considered, such as in Chapter 6 – Water Environment, Chapter 7 – Aquatic Ecology and Chapter 13 – Air Quality.

8.2 Legislation, Policy, Standards and Guidance Context

8.2.1 Key policy relevant to terrestrial ecology set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023a) includes:

- Paragraph 4.3.5 requires the applicant to ensure that the Environmental Statement outlines any likely significant effects on internationally, nationally and locally designated sites of ecological importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity

- Paragraph 4.3.6 requires the applicant to demonstrate how the Project has sought opportunities to conserve and enhance biodiversity
- Paragraph 4.3.7 requires the applicant to demonstrate the implementation of appropriate mitigation measures, to include identifying where and how these will be secured
- Paragraph 4.3.11 notes that (subject to specific policies), the development should avoid significant harm to biodiversity and geological conservation interests and provide net gains for biodiversity
- Paragraph 4.3.13 notes that the highest level of biodiversity protection is afforded to sites identified through international conventions and that habitats may be qualifying features of sites designated under the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations') and international conventions including Ramsar
- Paragraph 4.3.15 notes that where an adverse effect on a Site of Special Scientific Interest (SSSI) is likely, that a development consent should only be granted where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs
- Paragraph 4.3.17 notes that due consideration should be given to regional or local designations to ensure that these sites are safeguarded, however, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent where harm cannot be avoided or adequately mitigated
- Paragraph 4.3.18 requires the developer to identify ways to avoid negative effects on ancient woodland or ancient and veteran trees
- Paragraph 4.3.19 requires that applicants take measures to ensure species and habitat that have been identified as being of principal importance for the conservation of biodiversity in England and Wales are protected from adverse effects
- Paragraph 4.3.21 requires the applicant to set out how opportunities for on-site delivery of biodiversity net gain have been considered and, where they are proposed, how they have been incorporated into the preliminary project design
- Paragraph 4.3.22 requires when delivering biodiversity net gain off-site, that developments do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity

8.2.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, SESRO will also have regard to other relevant legislation, policy, standards and guidance for this aspect, as listed in Table 8-1. A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the SESRO Project, would be provided in the Preliminary Environmental Information Report and/or Environmental Statement.

Table 8-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
The Conservation of Habitats and Species Regulations 2017 (as amended)
The Wildlife and Countryside Act 1981 (as amended)
The Countryside and Rights of Way Act 2000
The Protection of Badgers Act 1992
The Natural Environment and Rural Communities (NERC) Act 2006
The Environment Act 2021
The Hedgerows Regulations 1997
The Invasive Alien Species (Enforcement and Permitting) Order 2019
National policy
A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)
NPS for Water Resources Infrastructure (Defra, 2023): Section 4.3
National Planning Policy Framework (NPPF) 2021: Paragraphs 180-188 (Ministry of Housing, Communities & Local Government, 2023)
Regional policy
Oxfordshire Biodiversity Action Plan (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT), Oxfordshire County Council (OCC) and Thames Valley Environmental Records Centre (TVERC), 2014)
The Oxford Core Strategy 2026 (Oxford City Council, 2008): Policy CS14
Oxford Local Plan 2036 (Oxford City Council, 2020)
Local policy
Vale of White Horse District Council Local Plan 2031 (Vale of White Horse District Council, 2016): Core Policies: 42, 44, 45 and 46

Relevant legislation, policy, standards and guidance
Standards and guidance
Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal (CIEEM, 2018)

8.2.3 Combined, the legislation and policy associated with biodiversity aims to protect designated sites, protected species and habitats from harm, as well as setting targets for proposed developments to improve the natural environment and has informed the development of SESRO.

8.3 Engagement

8.3.1 Survey methodologies and the approach to EIA scoping for terrestrial ecology have been discussed with stakeholders as part of Technical Liaison Groups (TLGs), as seen in Table 8-2. These have included:

- TLG 6 December 2023: Scope of terrestrial ecology surveys and innovation (Attended by Natural England and the Environment Agency)
- TLG 26 February 2024: Methodologies for terrestrial ecology surveys (Attended by Natural England, the Environment Agency, OCC, and the BBOWT)
- TLG 29 April 2024: Terrestrial ecology approach to scoping (Attended by Natural England and the Environment Agency)
- TLG 6 June 2024: Bat survey methodology (Attended by Natural England and the Environment Agency)
- TLG June 26 2024: Terrestrial ecology approach to scoping (Attended by OCC and BBOWT)

Table 8-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
Environment Agency	Advise systematic search for dormouse opened hazelnuts if any areas of fruiting hazel encountered	A systematic search for hazelnuts will be conducted at the same time as the dormouse surveys
	Sharing further details (methods, results, assumptions) of Habitat Suitability Modelling approach would be informative	Noted - a technical note will be produced and shared for information/comment
	Interested in reasoning behind doing three dusk visits for breeding birds - is this purely an efficiency with regard to survey effort or is there an ecological reason also?	The recommended number of surveys for breeding bird transects is six. Seven surveys per transect are being undertaken to include an additional dusk survey. This is because several species, including curlew *Numenius arquata* and short-eared owl *Asio flammeus,* have been recorded within the EIA Scoping Boundary which are often picked up more easily by dusk survey. Four of the seven surveys will be conducted at dawn as per the Bird Survey Guidelines (Bird Survey and Assessment Steering Group, 2023)
	There needs to be a wide appreciation of habitat tolerance before decisions are made about whether habitat is suitable or not (for riparian mammals)	A precautionary approach to riparian mammal survey will be taken to ensure all evidence of their presence is recorded. Robust justification will be provided for any watercourses not surveyed for riparian mammals
Natural England	Whilst Habitat Suitability Modelling (HSM) could be used, Natural England would still expect to see an element of standard methodology to be used to influence focus areas for survey effort, rather than a reliance on desktop study alone	A Preliminary Ecological Appraisal is being undertaken to help inform decisions regarding habitat suitability for species

Consultee	Comment	Response / action taken
	Where there is moderate-high potential for hibernation use (by bats) at least two tree climbing inspections would be expected approximately one month apart between January and February	Additional bat hibernation surveys will be programmed for winter 2024/2025
	Natural England agree that Advanced Level Bat Survey Techniques (ALBST) methods could help focus further survey effort (visual inspections, emergence counts etc.), although it cannot be relied upon entirely to identify bat roosts in more cryptic locations in buildings	Further emergence survey of buildings will be programmed for 2025

8.4 Existing Environment and Baseline Conditions

Study areas

8.4.1 The study area is defined by the ZoI comprising the EIA Scoping Boundary for SESRO and buffer areas outside in which important ecological features (including both habitats and species) may be significantly affected by biophysical changes (i.e., alterations in biological and/or physical conditions of the environment) as a result of the SESRO Project.

8.4.2 The ZoI will vary for different ecological features depending on their sensitivity to environmental change. ZoI buffers around the EIA Scoping Boundary for features are provided in Table 8-3 using CIEEM guidance (CIEEM, 2018) and professional judgement. Whilst the ZoI's presented in Table 8-3 have been presented to stakeholders during TLG meetings regarding the terrestrial ecology scoping approach, it is important to note that they are subject to change. This is because ZoI's will be regularly reviewed and amended as the Project evolves.

Table 8-3 Zone of influence buffers for ecological features

Feature	Zone of influence buffer
Internationally designated statutory sites with bats as a qualifying feature (Special Area of Conservation (SAC))	30km
Internationally designated sites (SAC, Special Protection Area (SPA), Ramsar)	10km
Nationally and locally designated statutory sites (SSSI, National Nature Reserve (NNR), Local Nature Reserve (LNR))	5km
Locally designated non-statutory sites (Local Wildlife Site (LWS))	2km
Priority Habitat	1km
Ancient Woodland	100m
Ancient/Veteran trees	100m
Protected and notable species	2km
Invasive non-native species (INNS)	2km

8.4.3 Species-specific buffers are provided in Table 8-4 and will inform the survey areas for particular species/species groups in the field, taking into consideration the location, nature and scale of the Project and its potential impact on each species/species group subject, in part, to any mitigation proposals/strategies to be developed with further engagement and agreement with stakeholders. Buffers will be reviewed per species/species group in light of any barriers to dispersal where relevant, such as the A34, the Great Western Main Line railway and the River Ock.

8.4.4 The species-specific buffers provided in Table 8-4 have been determined by species leads using professional judgment and relevant species-specific guidance (Appendix C).

Table 8-4 Species survey buffers

Species	Survey buffer
Badger *Meles meles*	Up to 250m
Bats (trees, buildings and structures)	100m
Bats (transects, radio tracking)	Up to 1km
Breeding birds and wintering birds (including barn owl)	500m
Dormouse *Muscardinus avellanarius*	250m (If dormice are found within the EIA Scoping Boundary of SESRO)
Great crested newt (GCN) *Triturus cristatus*	500m
Reptiles	No buffer outside the EIA Scoping Boundary of SESRO (If any receptor sites are needed for translocation, these would be subject to survey)
Riparian mammals (otter *Lutra Lutra* and water vole *Arvicola amphibius*)	Up to 1km
Terrestrial invertebrates	500m

8.5 Baseline Desk-Based Assessment and Surveys

8.5.1 The collection of baseline information to date has focused on those features that are considered to be of ‘importance’ and where SESRO could feasibly create an impact pathway via which the feature could experience a significant effect (CIEEM, 2018).

8.5.2 The baseline has been established by utilising the following sources of information:

- TVERC (2014)
- The British Trust for Ornithology (BTO)
- Multi-Agency Geographic Information for the Countryside (MAGIC) for European Protected Species Mitigation licences (Defra, 2020)
- Publicly available Ordnance Survey maps and aerial imagery
- Statutory designated site information from the Joint Nature Conservation Committee (JNCC)
- Ancient Woodland Inventory (Natural England, 2024a)
- Woodland Trust Ancient Tree Inventory (Woodland Trust, 2024)
- Priority Habitats Inventory (England) (Natural England, 2024b)
- Field data (from surveys in 2022 to the present)

8.5.3 The results of the desk-study have informed the requirements for field surveys. The area subject to field surveys has been defined by professional judgement (e.g. based on the habitat preference of the target species), good practice guidelines (refer to Appendix C, engagement responses and the extent of SESRO’s anticipated ZoI (Table 8-3).

8.5.4 Further detailed field surveys and desk studies are being undertaken during 2024/2025 to complete the baseline assessment. The results of the baseline assessments undertaken to date are summarised below. Information relating to the survey methodologies for field surveys is provided in Appendix C. Survey methodologies have been agreed with Natural England, the Environment Agency and OCC.

Statutory and non-statutory designated sites

8.5.5 The relevant internationally designated sites within 10km of SESRO include:

- Cothill Fen SAC (approximately 2.7km to the north-west)
- Hackpen Hill SAC (approximately 8.2km to the south-west)
- Little Wittenham SAC (approximately 6.5km to the south-east)

8.5.6 There are no SACs within 30km of SESRO for which bats are a qualifying feature.

8.5.7 The relevant statutory designated sites within 5km of SESRO include:

- National – Barrow Farm Fen SSSI (approximately 0.45km to the north)
- Culham Brake SSSI (approximately 1km to the north-east)
- Dry Sandford Pit SSSI (approximately 2.5km to the north)
- Frilford Heath, Ponds and Fens SSSI (approximately 1.3km to the north-west)
- Cothill NNR (approximately 2.7km to the north-west)
- Appleton Lower Common SSSI (approximately 4.4km to the north-west)
- Sugworth SSSI (approximately 4.6km to the north-east)

8.5.8 SESRO falls within the SSSI Impact Risk Zone (IRZ) for the SSSIs outlined above, excluding Appleton Lower Common SSSI and Sugworth SSSI, and all IRZ for the forementioned SSSI sites are of relevance to the works associated with SESRO.

8.5.9 The relevant non-statutory designated sites within 2km of SESRO have been identified. These include:

- The Cuttings and Hutchins Copse LWS (within the EIA Scoping Boundary for SESRO at the southern extent)
- Cowslip Meadow LWS (approximately 0.4km to the west)
- Marcham Salt Spring LWS (approximately 0.8km to the north-east)
- Gozzards Ford Fen LWS (approximately 1.7km to the north)
- Radley Gravel Pits LWS (approximately 1.45km to the north-east)

Preliminary ecological appraisal and UK Habitat Classification

8.5.10 A UK Habitat Classification Survey was undertaken in 2022 comprising field surveys (from public rights of way (PRoW) only) and analysis of aerial imagery and OS maps. Further surveys are being conducted through 2024 and are likely to extend into 2025.

8.5.11 The SESRO footprint comprises a lowland landscape primarily used for arable agriculture, with some pasture, woodlands, hedgerows and ponds. Additionally, there are various watercourses and waterbodies within the EIA Scoping Boundary for SESRO, including ponds, brooks and ditches as well as the River Ock and the River Thames.

8.5.12 A search of the Ancient Woodland Inventory identified no Ancient Woodland blocks located within the EIA Scoping Boundary for SESRO or directly adjacent (Forestry Commission, 2024).

8.5.13 The search of the Ancient Tree Inventory highlighted the presence of one tree (an ancient crack willow *Salix fragilis*) within the EIA Scoping Boundary for SESRO which would be lost (Woodland Trust, 2024). It also identified ancient and veteran trees south of Marcham (including along the River Ock and in the vicinity of Marcham Mill and Meadow Farm House), within the EIA Scoping

Boundary which would not be lost. Surveys are ongoing to assess the site for the potential presence of other, unrecorded, ancient and/or veteran trees.

8.5.14 Priority and notable habitats identified within 1km of the EIA Scoping Boundary for SESRO include:

- Deciduous woodland
- Coastal and floodplain grazing marsh
- Good quality semi-improved grassland
- Lowland dry acid grassland
- Lowland fens
- Lowland meadows
- Open mosaic habitat
- Traditional orchards
- Wood-pasture and parkland

Protected and notable species

8.5.15 TVERC and the BTO provided recent (i.e., within the last ten years) records of protected, priority and notable species within 2km of the site. These include:

- Amphibians: common frog *Rana temporaria*, common toad *Bufo bufo*, GCN, natterjack toad *Epidalea calamita*, palmate newt *Lissotriton helveticus* and smooth newt *Lissotriton vulgaris*
- Bats: brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii*, Nathusius's pipistrelle *Pipistrellus nathusii*, Natterer's bat *Myotis nattereri*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus* and soprano pipistrelle *Pipistrellus pygmaeus*
- Birds: over 100 species of bird were recorded. These include 23 Annex 1 species and 33 species listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Many are also listed as 'red list' species or 'amber list' species of Birds of Conservation Concern in the UK (Stanbury et al., 2021)
- Fungi, lichens, lower plants and higher plants: protected and notable plant species include bluebell *Hyacinthoides non-scripta*, grape-hyacinth *Muscari neglectum* and red hemp-nettle *Galeopsis angustifolia*
- Invertebrates: stag beetle *Lucanus cervus*; marsh fritillary butterfly *Euphydryas aurinia*; cinnabar moth *Tyria jacobaeae*; and white-letter hairstreak *Satyrium w-album*
- Mammals (excluding bats): brown hare *Lepus europaeus*, badger, otter, water vole, harvest mouse *Micromys minutus*, polecat *Mustela putorius*, West European hedgehog *Erinaceus europaeus*
- Reptiles: common lizard *Zootoca vivipara*, grass snake *Natrix Helvetica* and slow worm *Anguis fragilis*

8.5.16 Review of desk based aerial imagery, drone imagery and statistical modelling has identified a range of habitat features with the potential to support the following protected and notable species or groups of species: amphibians; badger; bats; breeding and wintering birds; dormice; riparian mammals; reptiles; terrestrial invertebrates; and vascular plants.

8.5.17 At the time of writing, terrestrial ecology baseline surveys are ongoing and data sets are insufficiently complete to inform this EIA Scoping Report. However, notable results to date include the presence of ground-nesting curlew recorded breeding in the far north-eastern section of Zone 1, water vole field signs utilising watercourses on site, and the presence of roosting bats, including brown long-eared bat, Daubenton's bat and noctule.

8.5.18 Appendix C details the survey methodology used for each species or species group, provides a summary of the terrestrial ecology baseline work undertaken to date, and that proposed to take place during 2024/2025.

Invasive and non-native species

8.5.19 Data returned from TVERC identified a number of recent records of non-native plant species within 2km of the site including butterfly-bush *Buddleja davidii*, Canadian waterweed *Elodea canadensis*, giant hogweed *Heracleum mantegazzianum*, Indian balsam *Impatiens glandulifera*, orange balsam *Impatiens capensis* and rhododendron *Rhododendron ponticum*, as well as records of the invasive non-native riparian mammal American mink *Neovison vison*.

Further desk study and survey work

8.5.20 Ecological surveys in 2024/2025 will continue to look for protected and notable species, including barn owl, breeding and wintering birds, badger, bats, dormice, kingfisher *Alcedo atthis*, natterjack toad, reptiles, riparian mammals and terrestrial invertebrates, alongside a Preliminary Ecological Appraisal (PEA) of the site and tree survey (including survey for ancient and veteran trees (see Chapter 9 – Landscape and Visual Effects). A site-based UK Habitat and Condition Assessment survey and hedgerow assessment are also currently underway to accurately determine the habitats present across the site.

8.5.21 Information has been requested but not yet received from the following data providers:

- The Amphibian and Reptile Group

8.5.22 Additionally, desk-based statistical modelling for habitat suitability is being undertaken to predict the suitability of habitat for bats, dormice and common reptiles using environmental factors such as vegetation type, climate and land cover.

8.6 Sensitive Receptors and Potential Environmental Effects

Future baseline

8.6.1 It would be expected that as the landscape is predominately arable, it would continue to be managed in this way in a steady state.

8.6.2 Any effect from climate change would be unlikely to significantly alter the land use and, therefore, the habitats, prior to construction of SESRO. Long term impacts from climate change could alter the species composition and types of habitats in and around the site and, thus, the types and diversity of fauna.

Potential ecological effects

8.6.3 An appraisal of the potential sensitive features and associated impacts due to construction and operation of SESRO has been undertaken to determine the scope of the terrestrial ecology Environmental Statement chapter, as set out below. This has considered the habitat and species-specific ecological requirements, legislative protections, sensitivity of the feature and type of impacts to either scope in or out of the EIA. Justification for scoping sensitive features both in and out of the EIA is provided.

8.6.4 Construction activities associated with tunnelling works, allowing for the transfer of water at the intake/outfall structure between the reservoir and the River Thames, are not considered as a pathway to effect biodiversity features where they are underground, as underground works will be via a Tunnel Boring Machine (TBM) and at depths between 10m and 20m.

Impact pathways

Habitat loss / gain, fragmentation, and modification

8.6.5 During construction, SESRO would result in the temporary and permanent loss of terrestrial habitats, including priority habitats and one known ancient/veteran tree and habitats likely to support protected and notable species. The felling of any trees with bat roosting potential, for example, would result in the loss of a potential roosting resource within the local landscape and the clearance of vegetation during construction would result in the loss of habitat for breeding birds.

8.6.6 Habitat fragmentation could potentially result from the temporary removal of linear habitat features such as hedgerows, lines of trees and riparian corridors. This could potentially affect protected and/or notable species that reply upon such habitats for commuting, dispersal and/or foraging.

8.6.7 The modification of priority habitats could impact retained terrestrial habitat within, or close to, the EIA Scoping Boundary. This could arise through hydrological and air quality changes, discussed separately in paragraphs 8.6.19 to 8.6.20.

8.6.8 Based on the above, this impact pathway is scoped into the EIA for construction.

8.6.9 There will be no habitat loss during operation of the reservoir and, therefore, there is no pathway for an effect to occur. Accordingly, this impact pathway is scoped out of the Environmental Statement for operation.

Mortality and injury of species

8.6.10 During construction, the following activities have the potential to cause mortality and/or injury of species: site clearance, earthworks, works affecting watercourses and excavations which could lead to entrapment of animals. Significant effects could arise if protected or notable species are present within the EIA Scoping Boundary for SESRO, especially if they could not avoid the works.

8.6.11 Another potential source of mortality or injury could arise through collision with construction plant and vehicles. This would be of particular relevance to notable species that are active during daytime construction periods, for example brown hare, which are known to occupy the area within the EIA Scoping Boundary.

8.6.12 Mortality and injury during operation of the reservoir could also occur due to the movement of visitor and staff vehicles, particularly to notable species that are active during operational times. There is also the potential for bird strikes with overflying aircraft during the operation of SESRO, which cannot be ruled out at this stage (see Chapter 19 – Major Accidents and Disasters).

8.6.13 Based on the above, mortality and injury during construction and operation are scoped into the EIA.

Species disturbance (from changes to noise, vibration, visual and light stimuli)

8.6.14 Disturbance to important features could result from changes in noise, vibration and/or visual stimuli.

8.6.15 During construction, disturbance could arise from the following activities: earthworks, fencing, set up of contractor's compounds, and construction plant / workers.

8.6.16 Disturbance during construction could also arise from any temporary lighting required during night-time hours, such as from car parking or rail sidings.

8.6.17 During operation, disturbance could arise from changes to light, noise and/or visual stimuli caused by the recreational opportunities provided by the reservoir, such as the proposed recreational lakes, visitor café, education centre and nature trail.

8.6.18 Based on the above, species disturbance during both construction and operation is scoped into the EIA.

Air quality changes from nitrogen deposition and dust deposition

8.6.19 Air quality changes could occur through dust generation and changes in pollutant levels caused by emissions from construction plant and machinery. Chapter 13 – Air Quality provides detail on air quality. At this stage, air quality changes associated only with dust are scoped into the EIA during construction.

8.6.20 At this stage, air quality impacts of operational/visitor vehicle exhaust emissions are considered to be negligible and, as such, are scoped out of the EIA (refer to the Chapter 13 - Air Quality). However, this will be kept under review as design progresses and more information on traffic movements becomes available.

Hydrological changes

8.6.21 There is potential for hydrological change to cause significant effects during construction where works would directly or indirectly affect watercourses. Changes in hydrology, hydrogeology and fluvial geomorphology (refer to Chapter 6 – Water Environment) can adversely affect terrestrial ecology due to the following:

- Sediment and other pollutant releases
- Changes to groundwater flow which could cause significant effects to sensitive flora, especially those within designated sites
- Alterations to runoff regimes altering the volume and quality of surface and groundwater

8.6.22 During operation, there is the potential for changes to groundwater flow which could cause significant effects to sensitive flora, especially those within designated sites (refer to Chapter 6 – Water Environment).

8.6.23 Based on the above, this impact pathway is scoped into the EIA for relevant features during construction and operation.

Introduction and spread of invasive non-native (INNS) plant species

8.6.24 Any introduction or spread of INNS would potentially cause significant adverse effects to sensitive habitats due to the dominance that these species can have over native species. During construction, topsoil and subsoil with the potential to contain plant INNS would be disturbed. Such soil or seed and ‘propagules’ could be spread during construction activities, including plant movement and excavation. This impact pathway is, therefore, scoped into the EIA during the construction phase.

8.6.25 This impact pathway is scoped out of the EIA during the operational phase as there is a negligible risk of spreading terrestrial INNS during operation. This is because INNS can be spread by construction plant disturbing soil and vegetation, which will not occur present during operation.

Impact pathways – features

8.6.26 Species scoped in for further assessment at this stage may be scoped out in future if the importance assigned to them is reduced following completion of baseline surveys. Features will only be scoped out of the Environmental Statement following engagement and agreement with the relevant statutory bodies.

Statutory designated sites

8.6.27 There are no NNR within 2km of the site and as such NNR are scoped out of further assessment.

8.6.28 The site falls within the IRZ of five SSSIs: Barrow Farm Fen, Frilford Heath, Ponds and Fens, Culham Brake, Dry Sandford Pit and Cothill Fen.

8.6.29 As a formal Habitats Regulation Assessment (HRA) will be undertaken as part of the consenting process (Development Consent Order (DCO)), based on more detailed information associated with detailed design, it is proposed to include these sites in the EIA. The sites to be considered are within 10km of SESRO and/or have potential hydrological links, and include Cothill Fen SAC, Hackpen Hill SAC and Little Wittenham SAC.

8.6.30 There is a potential for significant effects to statutory designated sites (SSSI / SAC) to arise through the following impact pathways and, as such, these sites are scoped in on the following basis:

- Hydrological changes during construction and operation (refer to Chapter 6 – Water Environment)

Non-statutory designated sites

8.6.31 There is the potential for significant effects on the Cuttings and Hutchins Copse LWS during construction through the following impact pathways, in relation to the proposed rail siding from:

- Habitat loss fragmentation or modification (if the rail siding impinges on the LWS boundary)
- Hydrological changes
- Air quality changes
- Introduction and spread of INNS

8.6.32 Cowslip Meadow LWS and Marcham Salt Spring LWS are both within 1km of the EIA Scoping Boundary, however both are scoped out of further assessment during construction and operation as there are considered to be no pathways to effect.

8.6.33 Non-statutory designated sites have been scoped out of further assessment during operation as there is considered to be no pathway to effect.

Badger

8.6.34 Badgers are common and widespread in England. The Protection of Badgers Act 1992 affords protection to badgers for welfare reasons and not due to this species being of conservation concern, however, this legislation still applies to activities associated with development.

8.6.35 The following potential impact pathways of relevance to badgers have been identified and, as such, badgers are scoped in:

- Mortality and injury (construction and operation)
- Habitat loss/gain, fragmentation or modification (construction and operation)
- Disturbance (construction and operation)

8.6.36 Badgers are also scoped in for further assessment as there is the opportunity for habitat gain for this species as a result of the SESRO Project.

Bats

8.6.37 The following potential impact pathways of relevance to bats have been identified, and as such, bats are scoped in:

- Mortality and injury (construction)
- Habitat loss/gain, fragmentation or modification (construction)
- Species disturbance (construction and operation)

8.6.38 Whilst no works with the potential for mortality, injury or disturbance to bats would be permitted without first securing an approved mitigation strategy under a European Protected Species Mitigation Licence (EPSML) from Natural England, it is not possible at this stage to scope out significant effects. This is because the extent of the unmitigated impact is not yet fully understood, as surveys to establish the baseline are ongoing (2024/2025) and impacts on high-status roosts of rare bats, if present, could result in significant effects.

8.6.39 Bats are also scoped in for further assessment as there is the opportunity for habitat gain with respect to this species group as a result of the SESRO Project.

Birds

8.6.40 There is potential for significant effects on the populations of breeding and wintering birds (including Schedule 1 species such as barn owl, Cetti's warbler *Cettia cetti* and kingfishers) during construction and operation. The following potential impact pathways have been identified and, as such, breeding and wintering birds are scoped in for further assessment:

- Mortality and injury (construction and operation)
- Habitat loss/gain, fragmentation or modification (construction)
- Species disturbance (construction and operation)

8.6.41 Birds are also scoped in for further assessment as there is the opportunity for significant habitat gain for this species group as a result of the SESRO Project.

Hazel dormice

8.6.42 Dormice surveys have not been undertaken on site at the time of authoring the EIA Scoping Report, however, it is considered unlikely that this species is utilising the site given the lack of suitable habitat available. As such, at this stage, hazel dormice have been scoped out of further assessment. If found during surveys, this species will be scoped back in.

Great crested newts

8.6.43 GCN are known to be present within the EIA Scoping Boundary and the wider landscape. The District Level Licencing (DLL) approach to mitigation, led by Natural England, will be implemented on SESRO to avoid significant effects on GCN. However, GCN have been scoped in for further assessment based on the following identified potential impact pathways:

- Mortality and injury (construction)
- Habitat loss/gain, fragmentation or modification (construction)

8.6.44 Of note, good practice guidance advises that suitable terrestrial habitat within 250m of a breeding pond is most likely to be utilised by GCN in the absence of barriers to dispersal (English Nature, 2001). Small-scale losses of terrestrial habitat, especially where they occur over 250m from a breeding pond, are considered unlikely to have significant effects on GCN (Natural England, 2022). As such, it is considered that the effects of habitat loss and fragmentation would principally only be experienced within 250m of GCN ponds, although GCN can travel up to 500m from a breeding pond.

8.6.45 GCN are also scoped in for further assessment as there is the opportunity for significant habitat gain for this species through the proposed construction of wildlife ponds, to be designed sensitively for GCN through the DLL scheme.

8.6.46 GCN have been scoped out of further assessment during operation as there is considered to be no pathway to effect.

Riparian mammals

8.6.47 There is potential for significant effects on populations of otter and water vole known to be present within the EIA Scoping Boundary, during construction and operation. The following potential impact pathways have been identified and as such, riparian mammals are scoped in for further assessment:

- Habitat loss/gain, fragmentation or modification (construction)
- Hydrological changes to surface and groundwater (resulting in mortality/injury and/or habitat loss/modification and/or impacts to prey species) (construction)
- Species disturbance (construction and operation)

8.6.48 Riparian mammals are also scoped in for further assessment as there is the opportunity for significant habitat gain for these species.

8.6.49 Whilst no works with the potential for mortality, injury or disturbance to otter would be permitted without first securing an approved mitigation strategy under an EPSML for otter or a species licence for water vole, it is not possible at this stage to scope out significant effects. This is because the extent of the unmitigated impact is not yet fully understood, as surveys onsite are ongoing (2024/2025) and impacts on otter holts and/or water vole burrows could result in significant effects.

Natterjack toad

8.6.50 The closest recent records of natterjack toad (from 2023) are approximately 1.3km to the north-west of the EIA Scoping Boundary, however, the suitability of habitat on site for this European Protected Species (EPS) is not known at the time of writing. The presence of natterjack toad cannot, therefore, be ruled out and this species is scoped in for further assessment based on the following potential impact pathways:

- Mortality and injury (construction)
- Habitat loss/gain, fragmentation or modification (construction)

8.6.51 Natterjack toad have been scoped out of further assessment during operation as there is considered to be no pathway to effect.

Other amphibians

8.6.52 Recent desktop records returned multiple records of common frog *Rana temporaria*, common toad *Bufo bufo*, palmate newt *Lissotriton helveticus* and smooth newt *Lissotriton vulgaris*. Given the presence of ponds on site, these species are scoped in for further assessment based on the following potential impact pathways:

- Mortality and injury (construction)
- Habitat loss/gain, fragmentation or modification (construction)

8.6.53 Common frog, common toad, palmate newt and smooth newt are also scoped in for further assessment as there is the opportunity for habitat gain for these species through the proposed construction of wildlife ponds.

8.6.54 Common frog, common toad, palmate newt and smooth newt are scoped out of further assessment during operation as there is considered to be no pathway to effect.

Priority animal species

8.6.55 Priority species will be present at various densities dependent on their specific habitat requirements and the quality of the habitat present.

8.6.56 The desk-study confirmed the presence of a number of priority species including brown hare, harvest mouse, hedgehog and polecat. The following potential impact pathways of relevance to priority species have been identified and, as such, priority species are scoped in for further assessment:

- Mortality and injury (construction and operation)
- Habitat loss/gain, fragmentation or modification (construction)
- Species disturbance (construction and operation)

Reptiles

8.6.57 Whilst good practice mitigation would be implemented during construction works, it is not yet possible to scope out significant effects in relation to common reptiles (adder *Vipera berus*, common lizard, grass snake and slow worm) as the extent of the impact is not yet fully understood. As such, common reptiles are scoped in for further assessment. The following potential impact pathways have been identified:

- Mortality and injury (construction)
- Habitat loss/gain, fragmentation or modification (construction)
- Species disturbance (construction)

8.6.58 Common reptiles have been scoped out of further assessment during operation as there is considered to be no pathway to effect.

8.6.59 No records of rare reptiles (sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca*) were returned from the data search, either recent or historic, and the site does not lie within the known distribution of either species. Furthermore, the site does not provide favourable habitat for these heathland and moorland species. As such, rare reptiles are scoped out of further assessment.

Terrestrial invertebrates

8.6.60 As terrestrial invertebrate surveys have not yet been undertaken, it is not possible to scope out significant effects in relation to the following possible impact pathways:

- Mortality and injury (construction and operation)
- Habitat loss/gain, fragmentation or modification (construction)
- Species disturbance (construction and operation)

Ancient Woodland

8.6.61 Historic maps do not indicate the presence of any woodland on or adjacent to the site (within 100m) prior to 1600 AD. Therefore, woodland on site is not considered to be ancient and Ancient Woodland is scoped out of further assessment.

Ancient / Veteran trees

8.6.62 The Woodland Trust's Ancient Tree Inventory (checked July 2024) identifies the following within the EIA Scoping Boundary: an ancient tree north-west of Drayton Copse, and ancient and veteran trees south of Marcham (including along the River Ock and in the vicinity of Marcham Mill and Meadow Farm House).

8.6.63 As one ancient tree listed on The Woodland Trust Ancient Tree Inventory would be lost to SESRO, and surveys are ongoing to identify other ancient and/or veteran trees, ancient/veteran trees have been scoped in for further assessment based on the following potential impact pathways:

- Habitat loss (construction)
- Air quality changes from dust deposition (construction)

8.6.64 Of note, air quality effects during construction may be scoped out of the Environmental Statement in future, subject to the assessment outputs in Chapter 13 – Air Quality.

Priority habitats

8.6.65 The following impact pathways of relevance to priority habitats have been identified and are scoped in for further assessment:

- Habitat loss/gain, fragmentation or modification (construction)
- Air quality changes (construction)
- Introduction and spread of INNS (construction)

8.6.66 Of note, air quality effects from dust deposition during construction may be scoped out of the Environmental Statement in future, subject to the assessment outputs in Chapter 13 – Air Quality.

Notable vascular plants

8.6.67 In the absence of a complete dataset, the following potential impact pathways of relevance to notable vascular plants have been identified and, as such, are scoped in for further assessment:

- Habitat loss/gain, fragmentation or modification (construction)
- Hydrological changes (construction)
- Introduction and spread of INNS (construction)

8.6.68 SESRO is located within an predominantly agricultural area and, whilst ground disturbance from construction works would favour the colonisation of arable weeds, construction could result in the loss of habitat and individual plants and lead to declines of arable weed populations. The closest recent record from TVERC of a notable arable weed is of the critically endangered priority red hemp-nettle, approximately 560m to the north-west of the EIA Scoping Boundary.

8.6.69 Notable vascular plants have been scoped out of further assessment during operation as there is considered to be no pathway to effect.

Invasive non-native plant species

8.6.70 Any introduction or spread of INNS would potentially cause significant adverse effects to sensitive habitats due to the dominance that these species can have over native species and, as such, INNS are recognised as a pathway which can result in impacts on such features during construction (refer to paragraph 8.6.25).

8.6.71 However, INNS themselves are scoped out of further assessment given that, as a feature, they are not considered to be of 'importance'. In line with guidance from CIEEM, various characteristics contribute to the importance of ecological features, including naturalness, endemic species, uncommon or threatened species, and habitats that are effectively irreplaceable (CIEEM, 2018). INNS do not fit such criteria for being 'important' and are, therefore, not in need of being safeguarded. INNS will, however, be considered in relation to legislative compliance, to ensure they are not allowed to grow or spread in the wild.

8.7 Assessment Methodology

Introduction

8.7.1 The ecological assessment will be undertaken with reference to recognised guidance given in the CIEEM guidelines (CIEEM, 2018). The assessment methodology is semi-quantitative, based on empirical data and professional judgement.

8.7.2 The aims and objectives of the assessment are to:

- Determine the importance of ecological features to be affected by SESRO through survey
- Characterise the impacts (e.g. extent, magnitude, duration, reversibility, timing and frequency)
- Identify cumulative impacts
- Identify significant effects of impacts in the absence of any mitigation
- Identify mitigation measures to avoid and/or reduce the likely significant effects and identify additional enhancement measures
- Establish residual effects likely after mitigation has been implemented

Determining the importance of ecological features

8.7.3 Ecological features will be assigned importance as set out in Table 8-5. Importance will be derived from CIEEM guidance, taking the following into consideration (CIEEM, 2018):

- Any sites, habitats and/or species considered to be of at least Local biodiversity value
- Sites, habitats and/or species that receive legal protection or are referenced in policy (e.g., Biodiversity Action Plans (BAPs))
- Habitats forming corridors and commuting networks for important species

Table 8-5 Determining the importance of ecological receptors

Importance	Criteria
International and European	An internationally designated site or candidate site, i.e., a SPA, provisional SPA, SAC, candidate SAC, Ramsar site, or area which would meet the published selection criteria for designation (e.g. SACs and SPA: site condition, citations and conservation objectives (JNCC, 2024b)) A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole Sites supporting populations of internationally or European important species
National (UK)	A nationally designated site, i.e., SSSI, NNR, or discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines (JNCC, 2024a)) A viable area of a priority habitat identified in the UK BAP, or smaller areas of such habitat essential to maintain wider viability Viable populations of nationally important species that are of threatened or rare conservation status, including those identified as priority species in the UK BAP
Regional (south-east)	Sites that exceed the County-level designation but fall short of SSSI selection criteria Smaller areas of key habitat identified in the UK BAP essential to maintain wider viability Viable populations of nationally scarce species identified in the Regional BAP and/or regularly occurring populations of a regionally important species

Importance	Criteria
County (Oxfordshire)	Wildlife/nature conservation sites designated at the county level, such as LWS and LNR Areas of habitats and species identified in county or equivalent authority plans or strategies, such as areas of key/priority habitats identified in the Local BAP Viable populations of species important at the County scale
District	Sites recognised by local authorities, e.g., Sites of District Importance or considered to meet published ecological selection criteria for such designation A viable area of habitat identified in the District BAP Viable populations of species important at the District scale
Local	Areas of habitat or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. ponds) Sites that retain other elements of semi-natural aquatic vegetation due to their size, quality or the wide distribution within the local area are not considered for the above classifications Viable populations of species identified in the Borough BAP and/or regularly occurring populations of species important at the Local scale
Within the ZoI only	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors

Source: Developed with guidance from CIEEM (2018).

Characterising impacts and effects

8.7.4 In accordance with CIEEM guidelines reference would be made to the following characteristics, where relevant, for each effect. An 'impact' is defined as actions resulting in changes to an ecological feature and an 'effect' is defined as the outcome to an ecological feature from an impact (CIEEM, 2018):

- Positive or negative impact (i.e. actions resulting in changes to an ecological feature), according to whether the change is in accordance with nature conservation objectives and policy
- Magnitude – refers to the size, amount, intensity and volume of an impact, in quantitative terms where feasible (e.g., the amount of habitat lost, percentage change to habitat area, percentage decline in a species' population)
- Extent - the spatial or geographical area over which an impact/effect may occur

- Duration - the time period for which an impact is expected to last. Impacts and effects may be described as short, medium or long-term, and permanent or temporary. These will be defined by months or years
- Reversibility - a permanent impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation
- Timing and frequency - the number of times an activity occurs will influence the resulting effect. This considers whether impacts are constantly ongoing, separated but recurrent or single events and whether they occur during critical seasons or life-stages for habitats or fauna. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons (such as the nesting bird season)

8.7.5 The impact assessment would be undertaken for any feature identified to have ‘local’ value or above.

Determining significance

8.7.6 In accordance with CIEEM guidelines, a ‘significant effect’ is an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general. To determine this, CIEEM guidelines would be used alongside professional judgement.

8.7.7 Where ‘significant’ effects are predicted, additional mitigation would be applied, where practicable, to reduce the magnitude of those effects.

Assessment of residual impacts

8.7.8 Residual impacts are defined as ecological impacts that remain with the implementation of mitigation measures. An assessment of residual impacts will be undertaken to determine the significance of the effect on ecological features (refer to paragraphs 8.7.6 and 8.7.7).

Assessment of cumulative effects

8.7.9 Inter-development cumulative effects result from other proposed developments within the study area which may have effects on terrestrial ecology additional to SESRO. Future assessment will assess the effects of the Project in conjunction with other development projects as set out in Chapter 20 – Cumulative Effects.

8.7.10 Intra-development effects arise from interaction between different impacts from the same project on the same receptor. For example, in relation to terrestrial ecology cumulative effects may arise from both construction dust and changes to run-off on an adjacent wildlife site or habitat. Effects on terrestrial ecology from SESRO may also interact with other impacts to affect a non-ecological receptor, for example, effects associated with loss of habitat and construction noise may result in an area being less attractive to visit, thereby affecting landscape and recreation. Such cumulative effects will be assessed within the various technical chapters of the Environmental Statement.

Assumptions, limitations, and uncertainties

8.7.11 For the purpose of assessing effects relating to sensitive ecological features, it is assumed that operational and construction lighting will be required during night-time hours. Sensitive features have, therefore, been assessed with respect to lighting under this assumption, in the absence of a more detailed lighting strategy at the time of authoring this EIA Scoping Report.

8.7.12 At this stage, the requirement for two main contractor compounds has been assumed ('Marcham Road compound', located near the A415 Marcham Road at the north-east of the Project; and 'Main Compound', likely located to the north-east of the reservoir footprint). However, the location of the 'Main Compound' is not yet confirmed and is subject to change. Additional temporary compounds may be necessary closer to localised areas of work, such as the rail siding.

8.7.13 It is assumed that the future baseline prior to construction would be the same as known existing conditions on completion of baseline surveys.

8.7.14 Where feasible, nationally recognised standard survey methodologies will be used to reduce limitations for ecological evaluation and impact assessment as agreed with the relevant statutory stakeholders.

8.7.15 Specific limitations relevant to each survey, such as land access constraints, will be detailed in the relevant species Technical Reports.

8.7.16 It has been precautionarily assumed at this stage that there are moderate to large numbers of GCN within the EIA Scoping Boundary. As such, it has been assumed that DLL, which provides greater flexibility than the traditional route for mitigating impacts to GCN, will be the mechanism through which GCN mitigation is secured. However, should surveys confirm the presence of only small numbers of GCN, the traditional route may be more suitable.

8.8 Mitigation and Environmental Net Gain

Mitigation

Primary

8.8.1 Proposals for habitat creation to mitigate the loss of habitat during construction include:

- Wetland mosaic, species-rich grassland and wildlife sensitive ponds
- Landscape planting to maintain habitat connectivity across SESRO to ensure the continued movement of species for foraging and commuting purposes, and to reduce noise and lighting impacts (such as proposed planting of intermittent trees and shrubs along the riverbank of the River Thames)

Secondary

8.8.2 Secondary mitigation is likely to include:

- Species translocation may be required where impact avoidance is not feasible
- Implementation of a Landscape and Ecological Management Plan (LEMP)
- Vegetation clearance method statements in accordance with legislative and licencing conditions, if required
- Protected species licences from Natural England are likely to be required for bats, badger and riparian mammals (and a DLL will be required for GCN)
- Works will be timed to avoid sensitive periods for relevant species/species groups, where feasible
- Measures to deter badgers burrowing into the reservoir embankment

Tertiary

8.8.3 General protective and control measures in accordance with good practice will be detailed in relevant environmental management plans, risk assessments and method statements in the Construction Code of Practice (CoCP) during construction, such as:

- Excavations fenced off or covered overnight, or a means of escape provided for any wildlife that may fall in
- Construction and operational lighting should be designed in line with good practice guidance to reduce or avoid disturbance of wildlife
- Dust suppression measures will be applied to reduce/avoid emissions of dust that could affect designated or important habitats
- Any INNS identified prior to construction would either need to be avoided allowing for a suitable buffer zone or, if unavoidable, removed or treated to

prevent their spread, following the Construction Industry Research and Information Association's (CIRIA) guidance (Wade et al., 2008)

Biodiversity net gain

8.8.4 Biodiversity Net Gain (BNG) is:

'An approach to development and land management which aims to leave the natural environment, in terms of biodiversity, in a measurably better state than beforehand. Where a development has an impact on biodiversity it encourages developers to provide an increase in appropriate natural habitat and ecological features over and above that being affected in such a way that it is hoped that the current loss of Biodiversity through development will be halted and ecological networks can be restored' (CIEEM, undated).

8.8.5 The objective of SESRO is to achieve a minimum 10% net gain in biodiversity value, and the creation of habitat on-site will ensure that it provides a significant net gain for biodiversity, leaving the natural environment in a measurably better state than it was prior to development.

8.8.6 At this stage, it is considered that the most significant habitat loss from the Project will likely be the loss of Lowland Mixed Deciduous Woodland (LMDW), which has an assumed precautionary condition assessment of 'good' and is of high distinctiveness. At this stage, based on the interim Master Plan, 10% BNG on site for all other habitat types is considered feasible, and the Project will seek to ensure that 10% BNG is achieved either on site, or if necessary, off site once further survey effort to inform the calculations has been undertaken.

8.8.7 Several habitat parcels will be retained as part of the Project, none of which, under the current proposals associated with the interim Master Plan, would be enhanced. Additional biodiversity units (a 'unit' is the standardised measurement of biodiversity for BNG) can be obtained by enhancing retained habitats so this would be explored further once the full UK Habitat and Condition Assessment survey has been undertaken.

8.8.8 As ancient and veteran trees are considered irreplaceable habitat, mitigation for their loss is not possible and compensation cannot be provided on a 'like-for-like' basis such that the impact on those habitats is reduced to negligible. A bespoke mitigation and compensation strategy will, therefore, be required and will be designed in recognition of the nature and extent of the loss or damage, to make a proportionate contribution to biodiversity. Bespoke compensation, which will include extensive tree planting, retention of soils and deadwood on site and tree cuttings, will be required and will need to be agreed with the statutory nature conservation body (Natural England) and the Local Planning Authority.

8.9 Summary of Scope for the EIA

EIA scope for the preferred option

8.9.1 Table 8-6 summarises the proposed scope for terrestrial ecology.

Table 8-6 Summary of terrestrial matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction		
European designated sites	IN	Hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification)
SSSI and NNR	IN	Hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification)
LNR	Out	N/A – no LNR within 2km
LWS	IN	Habitat loss/gain, fragmentation or modification; hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification); air quality changes from dust deposition; and introduction and spread of INNS (resulting in habitat loss/modification)
Badger	IN	Habitat loss/gain (potential for habitat gain), fragmentation or modification; species disturbance (from changes to noise, vibration, visual and light stimuli); mortality and injury
Bats	IN	Habitat loss/gain (potential for habitat gain), fragmentation or modification; species disturbance (from changes to noise, vibration, visual and light stimuli); mortality and injury
Birds – breeding, wintering and Schedule 1 species (including barn owl, Cetti's warbler and kingfisher)	IN	Habitat loss/gain (potential for significant habitat gain); species disturbance (from changes to noise, vibration, visual and light stimuli); and mortality and injury
Hazel dormouse	Out	N/A – dormice assumed absent

Environmental matter	Scoped in / out	Rationale
GCN	IN	Habitat loss/gain (potential for significant habitat gain); and mortality and injury
Otter	IN	Habitat loss/gain (potential for significant habitat gain), fragmentation or modification; hydrological changes to surface and groundwater (resulting in mortality/injury and/or habitat loss/modification and/or impacts to prey species)
Water vole	IN	Habitat loss/gain (potential for significant habitat gain), fragmentation or modification; hydrological changes to surface and groundwater (resulting in mortality/injury and/or habitat loss/modification and/or potential for significant habitat gain)
Natterjack toad	IN	Habitat loss/gain, fragmentation; mortality and injury
Other amphibians	IN	Habitat loss/gain, fragmentation; mortality and injury
Priority species	IN	Habitat loss/gain, fragmentation or modification (potential for significant habitat gain); species disturbance (from changes to noise, vibration, visual and light stimuli); mortality and injury
Reptiles	IN	Habitat loss/gain, fragmentation or modification (potential for significant habitat gain); species disturbance (from changes to noise, vibration, visual and light stimuli); mortality and injury
Terrestrial invertebrates	IN	Mortality and injury of species; and habitat loss/gain (potential for significant habitat gain), fragmentation or modification
Ancient woodland	Out	N/A – absent
Ancient/veteran trees	IN	Habitat loss; and air quality changes from dust deposition
Priority habitats	IN	Habitat loss/gain, fragmentation or modification; air quality changes from dust deposition; and introduction and spread of INNS (resulting in habitat loss/modification)

Environmental matter	Scoped in / out	Rationale
Notable vascular plants	IN	Habitat loss/gain, fragmentation or modification; hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification); and introduction and spread of INNS (resulting in habitat loss/modification)
Operation		
European designated sites	IN	Hydrological changes to surface and groundwater (resulting in mortality of species and/or habitat loss/modification)
SSSI and NNR	IN	Hydrological changes to surface and groundwater (resulting in mortality of species and/or habitat loss/modification)
LNR	Out	N/A – no LNR within 2km
LWS	Out	N/A – no pathway to effect
Badger	IN	Species disturbance (from changes to light stimuli and recreational activities); mortality and injury
Bats	IN	Species disturbance (from changes to light stimuli)
Birds – breeding, wintering and Schedule 1 species (including barn owl, Cetti's warbler and kingfisher)	IN	Species disturbance (from changes to noise, visual and light stimuli); mortality and injury
Hazel dormouse	Out	N/A – dormice assumed absent
GCN	Out	N/A – GCN present but no pathway to effect
Otter	IN	Species disturbance (from changes to noise, visual and light stimuli)
Water vole	IN	Species disturbance (from changes to noise, visual and light stimuli)
Natterjack toad	Out	N/A – no pathway to effect
Other amphibians	Out	N/A – no pathway to effect

Environmental matter	Scoped in / out	Rationale
Priority species	IN	Species disturbance (from changes to noise and light stimuli); mortality and injury
Reptiles	Out	N/A – reptiles assumed present but no pathway to effect
Terrestrial invertebrates	IN	Habitat fragmentation; species disturbance (from changes to light stimuli); mortality or injury of species
Ancient woodland	Out	N/A – absent
Ancient/veteran trees	Out	N/A – no pathway to effect
Priority habitats	Out	N/A – no pathway to effect
Notable vascular plants	Out	N/A – no pathway to effect

Potential changes to scope and methods associated with other options

8.9.2 The scope and methods set out above for terrestrial ecology would remain generally unchanged should SESRO progress with other (non-preferred) options. Only options relating to the location of the proposed temporary rail siding could alter the scope depending on whether the chosen location lies outside, or partially within, The Cuttings and Hutchins Copse LWS. It should be noted that the reasonable maximum case of partial impingement on the LWS has been assumed in the scope set out above. Conversely, should a rail siding location well outside the LWS be progressed direct effects on the LWS could likely be scoped out of further assessment for both construction and operation.

8.10 Next Steps

8.10.1 Ecological surveys are ongoing in 2024 and will continue through 2025 to establish the ecological baseline. As the results of terrestrial ecological surveys continue to emerge, the Applicant will continue working with consultees, including Natural England, OCC and the Environment Agency to develop suitable mitigation strategies and obtain any licences required for protected species.

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9 Landscape and Visual Effects

9.1 Introduction

9.1.1 This landscape and visual effects chapter of this Environmental Impact Assessment (EIA) Scoping Report comprises a proportionate scoping assessment in accordance with Guidelines for Landscape and Visual Impact Assessment (3rd edition) (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment (IEMA), 2013). Photographs from viewpoints have been taken in the winter, to represent maximum visibility without leaf cover, in accordance with the Technical Guidance Note 06/19 Visual Representation of Development Proposals (Landscape Institute, 2019).

9.1.2 The information presented in this chapter will be used to inform the landscape and visual impact assessment (LVIA) that will form part of the Environmental Statement (ES).

9.1.3 Two separate, but related matters, are addressed in the scoping assessment:

- Landscape effects: potential effects on the landscape as a resource as a result of the construction and operation of SESRO; and
- Visual effects: potential effects on people's views and visual amenity as a result of the construction and operation of SESRO

9.1.4 This scoping assessment has been informed by the key elements indicated within each of the Zones illustrated on the Zoning Plan on Figure 2.1 (refer to Table 2-1 in Chapter 2) and is based upon the initially preferred options of key infrastructure, as set out within Chapter 3 – Consideration of Alternatives.

9.1.5 Reference has also been made to the Interim Master Plan on Figure 3.8 which has been prepared on an illustrative basis showing the current preferred configuration of the infrastructure elements. Allowance has also been made for change to scope that may be associated with the other infrastructure options described in Chapter 3 – Consideration of Alternatives. Further, this assessment has proceeded on the basis that the conveyance tunnel would be bored underground and would not, therefore, affect landscape or views, except for any construction activities and plant or permanent structures at either end.

9.2 Legislation, Policy, Standards and Guidance Context

9.2.1 Key policy relevant to landscape and visual effects set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment Food and Rural Affairs (Defra), 2023) is as follows with further detail and other relevant clauses contained in Appendix D:

- Paragraph 4.3.18 seeks to protect ancient woodland, ancient and veteran trees, stating that:

'The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of ancient or veteran trees found outside ancient woodland, unless there are wholly exceptional reasons for the development, and a suitable compensation strategy exists'.

- Paragraph 4.9.2 requires the applicant to undertake an assessment of any likely significant landscape and visual impacts, including cumulative impacts. The assessment should include reference to any landscape character assessment and relevant policies based on these assessments
- Paragraph 4.9.5 requires that any application for development consent within, or to affect land in, a National Landscape would need to comply with the respective duties in the National Parks and Access to Countryside Act 1949 and the Countryside and Rights of Way Act 2000
- Paragraph 4.9.6 requires that applicants should demonstrate how they have fulfilled the requirements set out in *'English National Parks and the Broads: UK government vision and circular 2010'* (Defra, 2010) or successor documents. These requirements should also be complied with where infrastructure projects impact on National Landscapes

9.2.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, other legislation, policy, standards and guidance of relevance to landscape is summarised in Table 9-1 below, with further detail contained in Appendix D.

Table 9-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
European Landscape Convention (Council of Europe, 2000)
Countryside and Rights of Way (CROW) Act 2000
Levelling-up and Regeneration Act
National policy
National Policy Statement for Water Resources Infrastructure (Defra, 2023)
British Standard 5837 2012: Trees in relation to design, demolition and construction – Recommendations (British Standards Institution, 2012)

Relevant legislation, policy, standards and guidance
Local policy and guidance
South Oxfordshire District Council and Vale of White Horse District Council Joint Local Plan 2041 - Preferred Options Consultation January 2024 (South Oxfordshire District Council and Vale of White Horse District Council, 2024)
South Oxfordshire District Council and Vale of White Horse District Council Joint Design Guide (South Oxfordshire District Council and Vale of White Horse District Council, 2022)
South and Vale Green Infrastructure Strategy (Chris Blandford Associates on behalf of South Oxfordshire & Vale of White Horse District Councils, 2017)
Drayton Neighbourhood Development Plan 2015 – 2031 (Vale of White Horse District Council, 2015)
East Hanney Draft Neighbourhood Plan 2021 – 2031 (East Hanney Neighbourhood Plan Steering Committee On behalf of East Hanney Parish Council, 2022)
North Wessex Downs Area of Outstanding Natural Beauty (AONB) Management Plan 2019 – 2024 (North Wessex Downs Area of Outstanding Natural Beauty, 2019)
North Wessex Downs AONB Position Statement on Setting (North Wessex Downs Area of Outstanding Natural Beauty, 2019)
North Wessex Downs AONB Position Statement on Dark Skies and Artificial Light (North Wessex Downs Area of Outstanding Natural Beauty, 2021)
Dark Skies of the North Wessex Downs a Guide to Good External Lighting (North Wessex Downs Area of Outstanding Natural Beauty, 2021)
North Wessex Downs AONB Guidance on the selection and use of colour in development (North Wessex Downs Area of Outstanding Natural Beauty, 2020)

9.2.3 The legislation, policy, standards and guidance listed above seeks to protect the landscape, including its character, perceptual qualities and features and has informed the development of SESRO.

9.3 Engagement

9.3.1 Engagement with relevant statutory bodies, who are represented by a Landscape and Visual Technical Liaison Group (TLG) comprising Natural England (NE) and relevant local authorities (see Chapter 4 - Consultation and Engagement), has been carried out regarding technical landscape matters including viewpoint selection and the approach to the LVIA and assessment criteria. Key points from this engagement are described within Table 9-2. The viewpoints referred to in Table 9-2 are illustrated on Figure 9.3. Photographs from the viewpoints referred to are included in Figure 9.4. Two viewpoints that were included in the viewpoint engagement, representative of the view from public right of way (PRoW) 100/2/20 near Caldecott and from PRoW 192/7/10 properties on the northern fringe of Drayton, have been removed, as they are not relevant to the scope of this EIA Scoping Report which is based upon a below ground emergency discharge conveyance tunnel in the vicinity of these viewpoints.

9.3.2 Engagement on the approach to the arboricultural surveys was also carried out as part of a wider environmental TLG meeting and key points from this are also described within Table 9-2. The approach to arboricultural surveys is included within Appendix F.

Table 9-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
Viewpoint engagement January 2024		
South Oxfordshire and Vale of White Horse District Councils (SODC and VoWHDC)	Views from PRoW descending from the scarp within the North Wessex Downs National Landscape (North Wessex Downs NL from hereon) were noted. Two PRoW between representative viewpoints 19 and 20 are very well walked / often form part of circular walks that have open and, possibly, very similar views to viewpoints 19 and 20	An additional location was surveyed along one of the PRoW north of Field Barn Farm. The extent and nature of views from the additional survey location and viewpoint 19 are similar. However, viewpoint 19 is closer to the boundary of the North Wessex Downs NL and is also on the Vale Way Long Distance Path (LDP). Therefore, viewpoint 19 represents the reasonable worst case and no further viewpoint has been added between viewpoints 19 and 20
	Views along the road from Frilford to East Hanney (A338) are quite open and this may be the area where most people would perceive a change	Similar views would potentially also be experienced from the residential edge of East Hanney, which is represented by viewpoint 16. An additional viewpoint (viewpoint 29) from a layby on the A338 between Frilford and East Hanney has been added to represent more open views from the road
	A suggestion was made to consider views between Garford and Kingstone Bagpuize	An additional and slightly more open location in comparison to illustrative viewpoint B was surveyed along a PRoW in this area. The nature of the view, extent of visibility, distance from the Project and, therefore, the potential effects would be similar for viewpoint B and visual receptors at the additional survey location. Therefore, no further viewpoint has been included in addition to illustrative viewpoint B

Consultee	Comment	Response / action taken
	Views south of East and West Hanney were queried	Viewpoint 14 from the south-eastern edge of East Hanney provides more open / reasonable worst case views than views from the area queried due to vegetation along Letcombe Brook, which would filter views from further west. Viewpoint 13 also covers receptors in this area. Reflecting on the existing coverage it is not considered that an additional viewpoint from this location is required.
Oxfordshire County Council (OCC)	Although road related receptors generally have lower sensitivity, they also include leisure users such as cyclists and not just commuters, so some may be relatively sensitive. Regular users, such as people commuting to Harwell Campus, would potentially pick up changes	The approach taken has been to focus on higher sensitivity visual receptors. However, representative viewpoints 4, 9, 10, 11, 14, 15 and 19 represent road users as well as receptors of higher value (refer to Table 9-6). Receptors at viewpoint 19 include users of Reading Road across the scarp, which is a potential commuter route to Harwell Campus. Reflecting on the existing coverage it is not considered that additional viewpoints to account for road users are required
Engagement on the Approach to LVIA and Assessment Criteria April 2024		
NE	It was queried whether duration and the extent of view e.g. glimpsed / partial should be incorporated within the criteria to determine the size and scale of visual effect (which forms part of the overall assessment of magnitude of effect)	Duration is included under criteria for determining duration and reversibility. With reference to the suggestion for additional criteria describing different types of views this level of information will be included in the assessment narrative to justify the conclusions. Text to clarify this was added to the methodology. Incorporating this information into the criteria tables is not considered appropriate and would make the criteria overly complicated

Consultee	Comment	Response / action taken
NE and OCC	It was suggested that reference to 'group of viewers' was removed, and what equated to *'large numbers'* of viewers was queried under the criteria for defining geographical extent of visual effect	'Group of viewers' has been misinterpreted to refer to number of viewers. Reference removed as suggested. Number of viewers is referred to in response to GLVIA3 paragraphs 6.15 and 6.24. Judgements would be made on the number of viewers in line with paragraph 6.15 which states *'Where possible an estimate should also be made of the numbers of the different types of people who might be affected in each case. Where no firm data are available this may simply need to be a relative judgement, for example noting comparatively few people in one place compared with many in another'*
Engagement on the Arboricultural Survey Strategy May 2024		
OCC and VoWHDC	The proposed methodology (British Standard BS5837) for the arboricultural surveys was outlined, including the outputs of these surveys (i.e. Tree Constraints Report, Tree Constraints Plan, Arboricultural Impact Assessment and Tree Removal Plan). No comments were raised. Veteran tree survey methodology was also outlined. The Tree Officer from VoWHDC was in agreement with the proposed methodology	No actions required.

9.4 Existing Environment and Baseline Conditions

Study area

9.4.1 The landscape and visual study area for scoping incorporates the EIA Scoping Boundary and the extent of the Zone of Theoretical Visibility (ZTV) within an offset of up to approximately 7km from the EIA Scoping Boundary. The extent of the ZTV is illustrated on Figure 9.3. The study area has been informed by desktop study, the extent of the ZTV, fieldwork and through engagement with the Landscape and Visual TLG.

9.4.2 The ZTV presented on Figure 9.3 has been generated in line with the technical specification and assumptions recorded within the notes on Figure 9.3. The ZTV illustrates the extent of theoretical visibility, which extends in some areas to several kilometres from SESRO. However, the current ZTV is based upon a bare earth ground model, therefore, only taking account of the visual screening provided by existing topography and not surface features, such as buildings and vegetation, which could also provide screening. The ZTV is, therefore, only an indication of the areas within which visual effects may occur and the actual extent of visibility is likely to be considerably less than illustrated.

9.4.3 Key receptors have been identified following field surveys and baseline studies as set out in Section 9.5, ZTV modelling, engagement with the Landscape and Visual TLG and a review of the potential changes likely to arise from SESRO. For a landscape or visual effect to occur, there must be a link between the cause of the effect and the receptor. This would result from a direct physical effect on the landscape, or intervisibility between the receptor and the construction activities or the operational Project that would result in a direct visual effect, or an indirect effect on landscape character. Intervisibility has been established by ZTV modelling, desktop survey and by site appraisal.

9.5 Baseline Desk-Based Assessment and Surveys

9.5.1 This section presents key information derived from field surveys and desk-based assessment.

Landscape context of the site

9.5.2 The EIA Scoping Boundary (illustrated on Figure 1.2) covers an area of relatively flat and open clay vale lowland farmland, interspersed by small woodland blocks, hedgerows and tree belts which are often associated with other linear features such as watercourses, PRoW, roads and the Great Western Main Line railway. To the north of the broad clay vale, the land rises gently to a limestone ridge. To the south, the lower chalk foot-slopes of the North Wessex Downs NL separates the broad clay vale from the more steeply rising high chalk downs that form the scarp of the North Wessex Downs NL.

9.5.3 The landscape is sparsely settled, with a few scattered properties generally located along Steventon Road and Hanney Road, which are located within the EIA Scoping Boundary. To the north of the road, there are three solar farms located within the farmland; Landmead, Goose Willow and Steventon Solar Farms. To the south, an industrial estate, including storage units, lies between Hanney Road and the Great Western Main Line railway and the EIA Scoping Boundary falls south of the latter. To the west, the EIA Scoping Boundary extends to East Hanney and incorporates part of the A338, while the northern edge extends towards Marcham and the area just north of the A415 Marcham Road. The eastern fringe generally abuts the A34 and Steventon. The far eastern extent to the east of the A34 reaches east of the River Thames towards Culham.

Designations relevant to landscape

9.5.4 Table 9-3 sets out designations relevant to landscape within the study area, determined by desk study, and illustrated on Figure 9.1.

9.5.5 There are currently no local landscape designations, however, the emerging South Oxfordshire District Council and Vale of White Horse District Council Joint Local Plan 2041 Preferred Options Consultation January 2024 (South Oxfordshire District Council and Vale of White Horse District Council, (2024) includes policies based on valued landscapes and tranquillity and tranquil areas (refer to Appendix D). At the time of writing, the studies to underpin these policies were not published and the Joint Local Plan was not adopted. Future updates to the Joint Local Plan 2041 will be considered within the LVIA for the EIA.

Table 9-3 Designations relevant to landscape

Designation	Description
North Wessex Downs NL	The North Wessex Downs NL is located more than 2km south of the EIA Scoping Boundary. The North Wessex Downs AONB Management Plan 2019-2024 (North Wessex Downs Area of Outstanding Natural Beauty, 2019) seeks to protect the landscape character and special qualities of the North Wessex Downs NL. The special qualities most relevant to landscape and visual impact assessment and the Project are referred to within Appendix D
National Trails (NT), National Cycle Network (NCN) routes and LDPs	The following NTs, NCN routes and LDPs fall within the study area: • Ridgeway NT - within the North Wessex Downs NL south of Wantage and Didcot • Thames Path NT - follows the course of the River Thames between Abingdon and Oxford, with part of the route falling within the EIA Scoping Boundary west of Culham • NCN route 5 - runs north-south through the eastern part of the EIA Scoping Boundary between Culham and Drayton • NCN route 544 runs through part of the North Wessex Downs NL south of Ardington, East Hundred and West Hundred • Vale Way LDP - runs through part of the North Wessex Downs NL at Ardington and West Hundred and north-south through the eastern part of the EIA Scoping Boundary between Culham and Drayton • Oxford Green Belt Way LDP - runs to the north-east of SESRO, south-west of Oxford
Oxford Green Belt	The Oxford Green Belt lies just within the EIA Scoping Boundary to the north of Marcham Road. To the east the green belt encompasses the southernmost former gravel pit to the east of Peep-O-Day Lane and the area east of the River Thames Whilst not strictly a landscape designation, the ‘openness’ of the landscape within the green belt can be relevant to landscape assessment

Designation	Description
Ancient woodlands, ancient, veteran and notable trees, and tree preservation orders (TPOs)	Ancient woodland, ancient, veteran and notable trees and TPOs fall within the study area. Chapter 8 – Terrestrial Ecology also considers ancient woodland and ancient and veteran trees • Ancient woodland - no ancient woodlands are recorded in the Ancient Woodland Inventory (NE, 2024) within the EIA Scoping Boundary • Ancient, veteran and notable trees - The Woodland Trust Ancient Tree Inventory (checked July 2024) (Woodland Trust, 2024) identifies ancient, veteran and notable trees within the study area. Within the EIA Scoping Boundary, there is an ancient tree north-west of Drayton Copse, and there are veteran and ancient trees south of Marcham including along the River Ock and in the vicinity of Marcham Mill and Meadow Farm House. • TPOs - one group TPO impinges the EIA Scoping Boundary adjacent to business premises at Station Yard, Grove to the south-west
Cultural Heritage Designations	Heritage features help inform the sensitivity of the landscape and are relevant to the assessment of landscape and visual effects. Cultural heritage designations are set out in more detail within Chapter 10 – Historic Environment • Scheduled monuments - the nearest is Sutton Wick Settlement Site, adjoining Drayton Road and located within close proximity to the EIA Scoping Boundary near Abingdon. Several scheduled monuments lie within the North Wessex Downs NL, including along the Ridgeway • Conservation areas - numerous within the study area. Localised parts of the fringes of Culham Conservation Area and part of East Hanney Conservation Area slightly overlap with the edges of the EIA Scoping Boundary. West Hanney, Grove, parts of Abingdon, Sutton Courtenay, Drayton, Milton and Steventon are also conservation areas. Several conservation areas lie within the North Wessex Downs NL • Listed buildings – numerous within the study area, predominantly associated with the conservation areas and mainly grade II and II*. Listed buildings within the extent of the EIA Scoping Boundary include milestones along the A338, a bridge south-east of Marcham Mill, Stonehill House and associated barns south of Abingdon • Registered parks and gardens - five within the study area. The closest is Sutton Courtenay Manor (grade II) located approximately 350m to the south-east of the EIA Scoping Boundary. The others are located more than 2km from SESRO

Designation	Description
	• Important hedgerows - previous cultural heritage studies suggest a large proportion of the hedgerows within the SESRO EIA Scoping Boundary are deemed as important hedgerows under the archaeology and history criteria of the Hedgerows Regulations 1997

Other factors relevant to landscape

9.5.6 The Tranquillity Map for England (The Campaign to Protect Rural England (CPRE) [now known as CPRE, the countryside charity], 2007) identifies tranquillity zones. The EIA Scoping Boundary falls within an area indicated as moderately tranquil, with lower levels of tranquillity associated with the surrounding main roads and settlements. The highest levels of tranquillity within the study area are associated within the generally undeveloped North Wessex Downs NL, although the levels of tranquillity in this area are also affected to some extent by roads and settlements.

9.5.7 The map of England's Light Pollution and Dark Skies (CPRE, 2019) shows that the area within the EIA Scoping Boundary is mainly affected by light pollution along the eastern extent near the A34 and urban areas like Abingdon, Drayton and Steventon where lighting levels are brighter. Elsewhere, the lighting levels generally fall within the second to third darkest categories, except for the industrial area to the south of Hanney Road where some associated light pollution is indicated. Although East Hanney is a 'dark sky village', as set out in the East Hanney Draft Neighbourhood Plan 2021 to 2031 (East Hanney Neighbourhood Plan Steering Committee On behalf of East Hanney Parish Council, 2022), and has limited street lighting to reduce light pollution, the night skies within this village are mapped as falling within the third and fourth darkest categories.

The North Wessex Downs NL is affected by lighting from the surrounding urban areas in the setting of the NL, such as from Wantage and Didcot. Light control zones have been mapped by the AONB National Landscape Partnership within Dark Skies of the North Wessex Downs, A Guide to Good External Lighting (North Wessex Downs Area of Outstanding Natural Beauty, 2021). The area of the North Wessex Downs NL closest to the EIA Scoping Boundary is defined as E1 – Rest of the AONB and not as E0 – Dark Sky Zone. The AONB National Landscape Partnership suggests that the setting of the North Wessex Downs NL '*should be whatever the adjacent zone is within the AONB [being E-1]'.*

Landscape character of the study area

9.5.8 The published Landscape Character Areas (LCAs) referred to in this section are illustrated on Figure 9.2. Extracts of the relevant key characteristics of the published landscape character areas at national and regional scale and that are relevant to the study area are set out in Appendix E. The historic landscape character within the EIA Scoping Boundary is summarised in Chapter 10 – Historic Environment.

National character areas

9.5.9 At a national scale, NE has divided England into 159 National Character Areas (NCA).

9.5.10 The following NCAs are most relevant to the study area:

- NCA 108 Upper Thames Clay Vales (Natural England, 2014), which encompasses the whole of the EIA Scoping Boundary, as well as the far north-eastern extent of the North Wessex Downs NL
- NCA 109 Midvale Ridge (Natural England, 2013), located north of the EIA Scoping Boundary
- NCA 116 Berkshire and Marlborough Downs (Natural England, 2015), located to the south of the EIA Scoping Boundary and covers most of the North Wessex Downs NL within the study area

Regional and local character areas

9.5.11 At a regional scale, landscape character has been assessed within the Oxfordshire Wildlife and Landscape Study (OWLS) (OCC, NE and The Earth Trust, 2004). The North Wessex Downs AONB Integrated Landscape Character Assessment (AONB-LCA) (Land Use Consultants, 2002) characterises the North Wessex Downs NL.

9.5.12 Table 9-4 summarises the key Landscape Character Types (LCTs) and LCAs from OWLS and the AONB-LCA within the study area that would potentially be directly or indirectly affected by SESRO, based on the initially preferred options of key infrastructure. Direct landscape effects potentially apply where construction or operational activities result in a direct effect on the landscape, such as earthworks and removal of vegetation. Indirect landscape effects potentially apply to areas that would not be directly affected, but would potentially be affected due to intervisibility with a development.

Table 9-4 Key relevant LCTs and LCAs from OWLS and the AONB-LCA

<table>
<tr><th>Publication</th><th>LCTs</th><th>LCAs</th><th>Potentially directly or indirectly affected</th></tr>
<tr><td rowspan="4">OWLS</td><td rowspan="2">River Meadowlands</td><td>River Ock (WH/19)</td><td rowspan="4">Potentially directly affected</td></tr>
<tr><td>Lower River Thames (WH/1)</td></tr>
<tr><td>Alluvial Lowlands</td><td>East and West Hanney (WH/27)</td></tr>
<tr><td>Lowland Village Farmlands</td><td>Sutton Courtenay (WH/20)</td></tr>
</table>

Publication	LCTs	LCAs	Potentially directly or indirectly affected
	Lowland Village Farmlands	Marcham (CR/5)	Potentially indirectly affected
	Rolling Farmland	Blewbury (WD/6)	
	Chalk Downland and Slopes	North Wessex Downs Escarpment (WD/1)	
	Lowland Village Farmlands	Harwell (WH/2)	
	Terraced Farmland	Culham (WH/15)	
North Wessex Downs AONB Integrated Landscape Character Assessment	Downs Plain and Scarp	5C Hendred Plain	Potentially indirectly affected
		5F Liddington - Letcombe Open Scarp	

District landscape character areas

9.5.13 At a district scale, the landscape of the study area is characterised in the Vale of White Horse District Landscape Character Assessment (VoWH-LCA) (Hankinson Duckett Associates, on behalf of VoWHDC, 2017) and the South Oxfordshire Landscape Character Assessment (SO-LCA) (SODC, 2017). Table 9-5 sets out the key LCTs and LCAs from these publications that would potentially be directly and indirectly affected by SESRO, based on the initially preferred options of key infrastructure.

9.5.14 At the time of writing, the South Oxfordshire and Vale of White Horse Landscape Character Assessment was under review as part of updates to the Joint Local Plan. Draft revised LCT and LCA boundaries only, issued for consultation, were available at the time of scoping. However, details around why the boundaries had changed and descriptions and key characteristics of the amended areas were not available. Future updates to the South Oxfordshire and Vale of White Horse Landscape Character Assessment will be considered within the LVIA for the EIA.

9.5.15 Project level LCAs will be identified to provide an appropriate and consistent level of scale for the purposes of the assessment. The NCA profiles are at a national scale and OWLS is at a regional scale and are both considered to be of a scale too large to inform project level LCAs. The project level LCAs will, therefore, be based on a refinement, where necessary, of the published district scale VoWH-LCA and SO-LCA, which are of a consistent scale and level of detail across the study area, with reference to the AONB-LCA for any areas that overlap with the North Wessex Downs NL. The project level LCAs will be defined based on desktop material and field verification.

9.5.16 A proportionate approach will be adopted for defining project level LCAs, focussing on the landscape that would most likely be significantly affected by SESRO and the North Wessex Downs NL within the extent of the study area and the footslopes / setting of the North Wessex Downs NL.

Table 9-5 Project level LCAs

<table>
<tr><th>AONB-LCA</th><th>VoWH LCT</th><th>VoWH LCA</th></tr>
<tr><td></td><td colspan="2">Potentially directly affected</td></tr>
<tr><td rowspan="10">Not applicable</td><td>Corallian Limestone Ridge with Woodland</td><td>LM15 Marcham Corallian Limestone Ridge with Woodland</td></tr>
<tr><td rowspan="3">River Floodplain</td><td>RF8 Abingdon to Sutton Courtenay Thames River Floodplain</td></tr>
<tr><td>RF11 Garford to Abingdon Ock River Floodplain</td></tr>
<tr><td>RF15 Childrey Brook and Letcombe Brook River Floodplain</td></tr>
<tr><td rowspan="2">Lower Vale Farmland</td><td>VL2 Grove to Steventon Lower Vale Farmland</td></tr>
<tr><td>VL3 East Hanney to Abingdon Lower Vale Farmland</td></tr>
<tr><td colspan="2">Potentially indirectly affected</td></tr>
<tr><td>River Floodplain</td><td>RF12 Abingdon Ock River Floodplain</td></tr>
<tr><td>Lower Vale Farmland</td><td>VL4 Steventon to Sutton Courtenay Lower Vale Farmland</td></tr>
<tr><td rowspan="2">5C Hendred Plain (LCT 5 –</td><td rowspan="2">Downs Footslopes</td><td>FS2 Seven Acre Hill to Round Hill Downs Footslopes</td></tr>
<tr><td>FS3 Spring Line Villages Downs Footslopes</td></tr>
</table>

AONB-LCA	VoWH LCT	VoWH LCA
Downs Plain and Scarp)		FS4 Wantage to Milton Heights Downs Footslopes
		FS8 South Harwell Downs Footslopes
		FS9 Chilton Downs Footslopes
5F Liddington – Letcombe Open Scarp (LCT 5 – Downs Plain and Scarp)	Downs Scarp	DS1 Idstone to Chilton Downs Scarp
	South Oxfordshire LCT	South Oxfordshire LCA
Not applicable	5 Flat Floodplain Pasture	Nuneham Courtenay Ridge

Arboriculture

9.5.17 Arboricultural surveys will be carried out in line with the British Standard 5837 2012: Trees in relation to design, demolition and construction – Recommendations (BS 5837: 2012) (British Standards Institution, 2012). The surveys will identify potential veteran and ancient trees that are not included on the Woodland Trust Ancient Tree Inventory (Woodland Trust, 2024). Appendix F presents the approach to the arboricultural surveys.

Visual context

9.5.18 The landscape within the EIA Scoping Boundary and the wider vale is generally flat and low lying, with higher ground to the north and south associated with the limestone ridge and North Wessex Downs NL respectively. While hedgerows, tree belts and smaller blocks of woodland limit the extent of views to some extent, there are middle-distance to distant views available towards the scarp of the North Wessex Downs NL and views from the North Wessex Downs NL towards the vale.

9.5.19 The limestone ridge is also visible in views from the vale and from the North Wessex Downs NL looking across the vale. Views from the limestone ridge towards the vale are limited due to screening from extensive tree cover on the limestone ridge and built development, such as west of the A34 at Shippon.

However, the higher ground of the North Wessex Downs NL is visible in the distance.

9.5.20 Visual receptors, which comprise people, as defined by GLVIA3 (Landscape Institute and IEMA, 2013). Viewpoints are selected to represent the views of people for the scoping assessment include:

- '**Representative viewpoints**, selected to represent the experience of different types of visual receptor, where large numbers of viewpoints cannot all be included individually and where the significant effects are unlikely to differ…
- **Specific viewpoints**, chosen because they are key and sometimes promoted viewpoints within the landscape…
- **Illustrative viewpoints**, chosen specifically to demonstrate a particular effect or specific issues….'

9.5.21 Viewpoints have been selected to focus on sensitive receptors, likely significant effects and the North Wessex Downs NL. The relevant statutory consultees have been engaged with regarding the viewpoints, as set out in Section 9.2.

9.5.22 Table 9-6 presents potential representative and specific viewpoints and indicates those where photomontages will be prepared as part of the LVIA. The visual receptors included fall into five broad categories: users of PRoWs, residents, users of open access land, communities and road users. The locations of the viewpoints are shown on Figure 9.3. Winter photographs from the viewpoints are illustrated on Figure 9.4.

Table 9-6 Project level LCAs

Viewpoint no.	Viewpoint description	Relevant visual receptor groups				
		Users of PRoWs	Residents	Users of open access land	Communities	Road users
1	Representative view from PROW 222/6/10 south-east of Garford	✓				
2	Representative view from South Oxfordshire Crematorium and Memorial Park				✓	
3	Representative view from PRoW 192/3/10 near Marcham Mill Photomontage location	✓				
4	Representative view from properties on eastern edge of Marcham		✓			✓
5	Representative view from Vale Way LDP and National Cycle Network Route 5 south of Abingdon Marina	✓				
6	Representative view from Thames Path NT, PRoW 183/11/50 and properties on western fringe of Culham	✓	✓			
7	Representative view from local footway/cycleway and properties on north-western fringe of Drayton Photomontage location	✓	✓			
8	Representative view from PRoW 192/2/20 near western fringe of Drayton	✓				

Viewpoint no.	Viewpoint description	Relevant visual receptor groups				
		Users of PRoWs	Residents	Users of open access land	Communities	Road users
9	Representative view from properties on B4017, north of Steventon		✓			✓
10	Representative view from properties on north-western edge of Steventon Photomontage location		✓			✓
11	Representative view from properties on western edge of Steventon		✓			✓
12	Representative view from PRoW 403/19/20, as well as the nearby Great Western Main Line railway	✓			✓	
13	Representative view from PRoW 198/16/10 and property on Old Man's Lane	✓	✓			
14	Representative view from properties on south-eastern edge of East Hanney		✓			✓
15	Representative view from properties on eastern edge of East Hanney Conservation Area		✓			✓
16	Representative view from properties on eastern edge of East Hanney Photomontage location		✓			
17	Representative view from Oxford Green Belt Way LDP, PRoW 372/3/80 and properties on the southern edge of Boars Hill	✓	✓			

Viewpoint no.	Viewpoint description	Relevant visual receptor groups				
		Users of PRoWs	Residents	Users of open access land	Communities	Road users
18	Representative view from PRoW at Wittenham Clumps	✓				
19	Representative view from Vale Way LDP at West Hendred and PRoW 403/8/20 Photomontage location	✓				✓
20	Representative view from PRoW 235/10/20 at Crab Hill north of Charlton	✓				
21	Specific and representative view from memorial bench along PRoW 403/23/10 within the North Wessex Downs NL	✓				
22	Representative view from PRoW 285/8/10 South of Ardington within the North Wessex Downs NL	✓				
23	Representative view from the Ridgeway NT and PRoW 403/13/10 at East Ginge Down within the North Wessex Downs NL Photomontage location	✓				
24	Specific and representative view from the Ridgeway NT and PRoW 285/14/40 at Lord Wantage Monument within the North Wessex Downs NL	✓				
25	Representative view from PRoW 391/6/10 at Furzewick Down within the North Wessex Downs NL	✓				
26	Representative view from PRoW 275/11/10 at Segsbury Camp within the North Wessex Downs NL	✓				

Viewpoint no.	Viewpoint description	Relevant visual receptor groups				
		Users of PRoWs	Residents	Users of open access land	Communities	Road users
27	Representative view from the Ridgeway NT and PRoW 274/7/10 west of Gramps Hill within the North Wessex Downs NL	✓				
28	Representative view from Devil’s Punchbowl Open Access Land within the North Wessex Downs NL			✓		
29	Representative view from lay-by along A338				✓	

9.5.23 In line with GLVIA3 (Landscape Institute and IEMA, 2013), illustrative viewpoints have been chosen specifically to demonstrate the particular effects or specific issues described below and will not be assessed in the same way as the representative and specific viewpoints listed in Table 9-6. Winter photography from illustrative viewpoints is presented in Figure 9.4. Illustrative viewpoints include:

- Illustrative Viewpoint A: From NCN route 544 east of Wantage within the North Wessex Downs NL. Included to demonstrate that significant effects on views from NCN route 544 within the North Wessex Downs NL would be unlikely due to intervening landform, vegetation or buildings
- Illustrative Viewpoints B and C: From two PRoWs on the limestone ridge, one to the south of Fyfield and one at Gozzards Ford. Included to demonstrate that significant effects on views from the limestone ridge towards the North Wessex Downs NL would be unlikely because the area within the EIA Scoping Boundary is generally screened by intervening vegetation or buildings
- Illustrative Viewpoint D: From a PRoW within the EIA Scoping Boundary, looking towards the North Wessex Downs NL. Included as an example of views towards the North Wessex Downs NL that would potentially be lost due to SESRO and to help inform the consideration of effects on the North Wessex Downs NL and its setting

Further desk study and survey work

9.5.24 Summer surveys, including photography from the viewpoints identified in Table 9-6, have taken place in 2024, however, there was insufficient time to include the summer photographs within Figure 9.4. Arboricultural surveys will be carried out in 2024 and 2025 as described within Appendix F.

9.6 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

9.6.1 The landscape and visual receptors identified for assessment within the LVIA will comprise the project level LCAs that will be defined as part of the LVIA for the EIA and viewpoints within Table 9-6.

9.6.2 The value of landscape and visual receptors will be assessed in line with the criteria set out in Appendix G.

Potential landscape effects

Construction

9.6.3 During construction, potential landscape and visual effects are potentially associated with:

- Large scale excavation and earthworks, including widespread earthworks for the formation of the reservoir and replacement floodplain storage
- Movement of construction plant and machinery including cranes
- The presence of construction compounds, temporary rail sidings and haul routes
- Construction lighting
- Vegetation removal to facilitate construction, such as hedgerows and trees along field boundaries, as well as some woodland

9.6.4 During construction there would potentially be adverse effects on landscape character, particularly where the landscape would be directly affected. There could also potentially be indirect adverse effects from intervisibility with the large-scale construction activities for the reservoir on the wider landscape, including the scarp of the North Wessex Downs NL.

9.6.5 Surrounding visual receptors would potentially experience adverse visual effects during construction, particularly from the edges of surrounding nearby settlements and nearby PRoW. There would potentially be adverse visual effects on users of the Thames Path NT and on views from and towards the North Wessex Downs NL, including from the Ridgeway NT.

Operation

Winter Year 1

9.6.6 In winter year 1 the landscape mitigation planting would generally not have established. However, grass seeding of the earthworks would have established and this would help to soften the Project into the landscape. Areas of planting comprising reeds, species rich wet grassland and floodplain marsh, associated with watercourse diversions, would also be establishing.

9.6.7 There would potentially be extensive adverse effects on landscape character, particularly where the landscape would be directly affected. This would be caused by the large-scale change in landscape character, in particular the loss of farmland and vegetation, replaced by a large bunded reservoir within the flat landform. The presence of associated infrastructure, traffic and lighting, along with increased recreational use, would potentially affect the rural character of the landscape and the sense of tranquillity. Indirect effects would potentially affect the wider landscape, including the scarp of the North Wessex Downs NL, caused by intervisibility with the large-scale bunded reservoir and associated traffic and infrastructure, including localised lighting.

9.6.8 In winter year 1, surrounding visual receptors would potentially experience adverse visual effects as a result of the introduction of the Project, particularly from the residential edges of surrounding nearby settlements and nearby PRoW. There would potentially be adverse visual effects on users of the Thames Path NT and adverse effects on views from and towards the North Wessex Downs NL, including from the Ridgeway NT.

Summer Year 15

9.6.9 In summer year 15 of operation, the landscape mitigation planting would have established and would help to integrate the Project into the landscape.

9.6.10 It is likely that the adverse landscape and visual effects identified during winter year 1 would have reduced by summer year 15, when considering the established planting. However, the permanent change in landscape character caused by the loss of farmland and introduction of a large bunded reservoir would potentially cause residual adverse landscape effects, particularly where the landscape would be directly affected. Visual effects could potentially remain in summer year 15, such as from highly sensitive receptors where the composition of the view is substantially altered or clearly noticeable.

9.7 Assessment Methodology

Introduction

9.7.1 The LVIA that will form part of the EIA, reported in the ES, will be carried out in accordance with GLVIA3 (Landscape Institute and IEMA, 2013), which promotes a proportionate approach focussed on significant effects, and associated technical guidance.

9.7.2 A summary of the methodology for the LVIA is provided below and Appendix G sets out the proposed methodology in detail.

LVIA methodology summary

9.7.3 The LVIA will be informed by mapping and relevant national and local policy and a desktop review of background documentation as set out in this chapter, along with winter and summer fieldwork and photography.

9.7.4 Consideration will be given to effects on the special qualities of the North Wessex Downs NL within the extent of the study area.

9.7.5 The LVIA will assess landscape and visual effects at the following timeframes:

- **Construction**: Considers construction activities, temporary works and construction traffic during the construction period

- **Winter year 1**: Considers the effects in winter year 1, when the reservoir is operational and SESRO is open to the public but planting mitigation would not yet be fully effective
- **Summer year 15**: Considers the effects in summer in the fifteenth year, when the reservoir is operational, SESRO is open to the public and planting mitigation would have taken effect

9.7.6 The landscape and visual receptors identified for assessment will comprise the project level LCAs that will be defined as part of the LVIA and viewpoints within Table 9-6. The sensitivity of these receptors, the magnitude and significance of effects will be assessed using the criteria presented within Appendix G.

9.7.7 The sensitivity of landscape and visual receptors will be established by assessing the value of a receptor and its susceptibility to the particular form of change likely to result from the development of SESRO.

9.7.8 Susceptibility to change will be defined, in keeping with GLVIA3 (Landscape Institute and IEMA, 2013), as the ability of a landscape or visual receptor to accommodate a development without undue adverse consequences.

9.7.9 Magnitude of landscape and visual effects will be determined by an assessment of the nature (whether beneficial or adverse), size and scale of the change likely to result from the SESRO Project, in conjunction with the geographical extent of those changes. Duration and reversibility will also be considered.

9.7.10 The significance of effects on landscape and visual receptors will be determined by combining the sensitivity of a receptor and the magnitude of the effect. The significance of effect is assessed after known mitigation measures have been factored in. The nature of landscape and visual effects (i.e. whether the effects are beneficial or adverse) will also be assessed.

9.7.11 For landscape and visual, residual effects are considered as those assessed during operation in summer year 15 when mitigation planting would be established and, therefore, fully effective.

9.8 Mitigation and Environmental Net Gain

9.8.1 Construction and operation phase mitigation relevant to landscape is presented in this section. Mitigation measures will continue to be developed in response to findings from the LVIA. The design and refinement of the Interim Master Plan will be landscape and environment led and the assessment will be iterative, in line with the NPS for Water Resources Infrastructure.

Construction phase mitigation

9.8.2 Mitigation relevant to landscape and visual effects during construction would include, but is not limited to, the following measures.

Primary

- As much of the existing vegetation as is practicable would be retained within the EIA Scoping Boundary.

Secondary

- Implementation of a Construction Code of Practice
- Lighting design during construction would seek to reduce light spill as far as practicable
- Construction elements such as compounds and car parks would be sited away from sensitive receptors such as residential areas, where practicable
- Opportunities for advance and phased planting prior to, and during, construction would be explored, to establish mitigation planting as early as practicable
- Where practicable, stripped soil would be stored in bunds around the perimeter of the construction areas to provide temporary screening
- Opportunities for use of hoarding as site security fencing to provide an additional temporary screening function would be explored
- Consideration would be given to scheduling the reservoir embankment construction so that the outer parts are constructed first, thereby screening inner parts of the site during subsequent construction activities

Tertiary

- Retained trees would be protected in line with BS 5837: 2012
- The supply, storage, handling, planting and maintenance of proposed planting would be undertaken in accordance with relevant British Standards, including BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces) (British Standards Institution, 1989)

Operation phase mitigation

9.8.3 Mitigation during operation would be implemented in line with the Design Principles for SESRO. The Draft Design Principles are set out in document J696-AA-ZZZZ-ZZZZ-RP-ZD-100001 (Thames Water, 2024). Primary mitigation, inherent to the Project design is indicated on the Interim Master Plan, illustrated on Figure 3.8 and referenced in Chapter 3 – Consideration of Alternatives. Mitigation relevant to landscape and visual effects during operation would include, but is not limited to, the following measures.

Primary

- Design and siting of permanent buildings, structures and infrastructure to limit visual intrusion as far as practicable

- Design of embankments to seek to sympathetically integrate the earthworks into the surrounding landscape as far as practicable
- Planting, including hedgerows, woodland and copses, to help integrate the Project into the surrounding landscape
- Mitigation for any loss of verified ancient and veteran trees to be on a bespoke basis depending on the number and species

Secondary

- Implementation of a Landscape and Ecological Management Plan (LEMP)
- Use of sensitive lighting design, such as light-emitting diodes, to reduce light spill

Tertiary

- The maintenance of proposed planting would be undertaken in accordance with relevant British Standards, including BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces)

Potential for environment net gain

9.8.4 Planting would contribute towards potential environmental net gain, as indicated within the environmental proposals illustrated on the Interim Master Plan on Figure 3.8. Landscape mitigation will continue to be developed throughout the refinement of the Master Plan on an iterative basis, informed by the findings of the LVIA to reduce adverse landscape and visual effects, where practicable.

9.9 Summary of Scope for the EIA

EIA scope for the preferred option

9.9.1 The LVIA will comprise an assessment of the following effects during construction, in winter year 1 and in summer year 15 when all works are complete, the reservoir is operational and SESRO is open to the public. Table 9-7 summarises the scope of the LVIA during construction and operation.

Table 9-7 Summary of environmental matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Project level LCAs that will be defined as part of the LVIA	IN	Potential direct and indirect effects on landscape character as a result of construction activity

Environmental matter	Scoped in / out	Rationale
Representative and specific viewpoints presented within Table 9-6	IN	Potential views of construction activity from surrounding visual receptors
Operational phase – year 1 and year 15		
Project level LCAs that will be defined as part of the LVIA	IN	Potential direct and indirect effects on landscape character as a result of the introduction of the Project
Representative and specific viewpoints presented within Table 9-6	IN	Potential changes in view as a result of the introduction of the Project

Potential changes to scope and methods associated with other options

9.9.2 Assumptions relating to the construction and operation phases will be developed as the Master Plan is finalised and applied to the LVIA.

9.9.3 Whilst the scope would be similar, other infrastructure options than those which are initially preferred such as those associated with the main access road, the Steventon to East Hanney Road Diversion and the intake/outfall, could potentially necessitate a review of the landscape and visual receptors for assessment and further field survey. For example, additional viewpoints might include:

- Main access road: From the southern part of Marcham to assess other options, particularly Option C
- Steventon to East Hanney Diversion: From northern edge of Steventon to assess Options B1 and B2 where they extend east of Hanney Road
- Intake/outfall: From the edge of Culham Conservation Area, from further locations along the Thames Path NT and/or along the Vale Way LDP and NCN route 5 and from Abingdon Marina Park

9.9.4 Further engagement with Landscape and Visual TLG would be carried out regarding any changes to the landscape and visual receptors for assessment. However, the potential landscape and visual effects reported above would be unlikely to change.

9.10 Next Steps

9.10.1 Arboricultural surveys will be carried out during 2024/25. The Interim Master Plan, including the landscape design and mitigation, will continue to be developed on an iterative basis, informed by the findings of further surveys and assessment and consultation with relevant stakeholders.

9.11 References

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10 Historic Environment

10.1 Introduction

10.1.1 This chapter sets out the scope and methodology for the Historic Environment assessment for SESRO. Specifically, this chapter covers the following matters:

- The extent and value of known archaeological remains, and the potential impacts and effects arising on them from SESRO
- The potential for unknown archaeological remains
- The location and value of built heritage assets such as Conservation Areas, Listed Buildings and non-designated historic buildings, and the potential changes to their value arising from SESRO
- The presence and value of historic designed landscapes and the capacity for SESRO to affect these heritage assets

10.1.2 This Scoping chapter considers the SESRO design together with the baseline conditions and potential impacts presented in the following chapters:

- Chapter 2 – Project Description
- Chapter 6 – Water Environment
- Chapter 7 – Aquatic Ecology
- Chapter 8 – Terrestrial Ecology
- Chapter 9 – Landscape and Visual Effects
- Chapter 12 – Noise and Vibration
- Chapter 14 – Geology and Soils

10.2 Legislation, Policy, Standards and Guidance Context

10.2.1 Key policy relevant to the Historic Environment set out in the National Policy Statement (NPS) for Water Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) includes:

- Paragraph 4.8.3 covers the value of heritage assets and the factors which combine to arrive at their significance in heritage terms
- Paragraph 4.8.5 explains that some non-designated archaeological remains might be of equivalent value to nationally significant Scheduled Monuments
- Paragraphs 4.8.7 – 4.8.10 set out the need to assess a project's capacity to change the Historic Environment through Environmental Impact Assessment (EIA), reaching conclusions on asset value, identifying significant effects and managing change through design
- Paragraphs 4.8.11. – 4.8.14 set out the approach to mitigation
- Paragraphs 4.8.15. – 4.8.29 focus on the Secretary of State's decision-making on a Development Consent Order (DCO) application and the conservation of heritage assets, irrespective of the levels of harm ascribed

in assessment, as well as the way in which asset preservation is weighed against the public benefits of the project in question

10.2.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the SESRO Project will also have regard to other relevant legislation, policy, standards and guidance for this aspect as listed in Table 10-1.

10.2.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how the SESRO Project accords with it, will be provided in the Preliminary Environmental Information (PEI) Report and/or Environmental Statement.

Table 10-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Ancient Monuments and Archaeological Areas Act 1979
Planning (Listed Buildings and Conservation Areas) Act 1990
The Planning Act 2008
The Hedgerows Regulations 1997
National policy
National Policy Statement for Water Resources Infrastructure (Defra, 2023)
National Planning Policy Framework (Ministry of Housing, Communities and Local Government (MHCLG, 2023): Section 16
Local policy
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Standards and guidance
Chartered Institute for Archaeologists (CIfA): Standard and Guidance for Historic Environment Desk-Based Assessment (2020)
CIfA: Universal Guidance for Archaeological Field Evaluation (CIfA, 2023)

Relevant legislation, policy, standards and guidance
Design Manual for Roads and Bridges (DMRB) LA 104 Environmental Assessment and Monitoring (National Highways 2020a)
DMRB LA 106 Cultural Heritage Assessment (National Highways 2020b)
Principles of Cultural Heritage Impact Assessment In The UK (Institute of Environmental Management and Assessment (IEMA), 2021)
Planning Practice Guidance (DLUHC, 2019)
The setting of heritage assets: historic environment good practice advice in planning note 2, second edition (Historic England, 2017)
Oxfordshire County Council (OCC): archaeological desk-based assessment guidance document (OCC, 2024a)
OCC: archaeological evaluation guidance document (OCC, 2024b)
Oxfordshire County Council: archaeological geophysical survey guidance document (OCC, 2024c)

10.3 Engagement

10.3.1 Historic environment consultees at OCC, VoWHDC and Historic England have been engaged with as part of bi-monthly SESRO Heritage Technical Liaison Group (TLG) meetings. The key results of discussions regarding EIA scoping are summarised in Table 10-2, in addition to confirming the use of the DMRB (LA 104 – Environmental assessment and monitoring, and LA 106 – Cultural heritage assessment) standards and IEMA's Principles of Cultural Heritage Assessment in the UK as the assessment methodologies to be employed for the EIA. Note also that agreement has been reached on geophysical survey and archaeological trial trenching of the area within the EIA Scoping Boundary via the provision of Written Schemes of Investigation (WSI).

Table 10-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
Historic England	Historic environment stakeholder reviews of selected historic environment technical SESRO documents (details to be confirmed by Historic England in due course) will need to be agreed as part of an agreement policy between Thames Water and Historic England	Thames Water can arrange a Service Level Agreement with Historic England following feedback on what has been agreed between Historic England and OCC on the extent to which Historic England wishes to review technical historic environment documents
Historic England	Jacobs to include use of historic maps and most accurate level of light detection and ranging (LiDAR) data for interpretation purposes (regarding the suitability of the open source Environment Agency data (1m) for aerial interpretation and mapping (AIM) study) as part of the process of developing baseline information	The use of LiDAR data in the AIM study is to aid the location and interpretation of archaeological anomalies to assist in both developing baseline data and guiding archaeological investigation. This is particularly useful in those areas of SESRO currently inaccessible for geophysical survey or where geology is thought to inhibit geophysical survey in detection of anomalies, perhaps because of local geology Jacobs obtained clarity on the resolution of LiDAR data used from the AIM specialist. The use of 1m resolution data is high quality and appropriate for purpose as per Historic England guidelines for accuracy and resolution in recording archaeological features. It is stated by our specialist provider that 50cm resolution LiDAR would not add any further benefit in detection and interpretation
Historic England	Historic England asked whether SESRO will be surveyed across the whole EIA Scoping boundary by detailed LiDAR (25cm or 50cm)	Confirmed that whilst further bespoke LiDAR survey would be carried out to more detailed resolution, this would be partial coverage and not encompass the whole area within the EIA Scoping Boundary

Consultee	Comment	Response / action taken
Historic England and OCC (on behalf of VoWHDC)	Use of DMRB LA106 to determine asset value, magnitude of impact and significance of effect	Applied in this chapter
OCC (on behalf of VoWHDC)	A study area of 2km from the EIA Scoping Boundary for SESRO for historic environment data would be most appropriate for a scheme the size of SESRO	All data acquired has been for 2km around the EIA Scoping Boundary
OCC (on behalf of VoWHDC)	Archaeological investigation required to inform future stages of the project	Thames Water have submitted WSI for geophysical survey and archaeological trial trenching for SESRO, which have been approved by OCC. The geophysical survey has commenced, to be followed imminently by trial trenching as part of a rolling programme of work to establish the presence, extent and significance of buried archaeological remains

10.4 Existing Environment and Baseline Conditions

Study areas

10.4.1 The acquisition of historic environment data for both designated and non-designated assets has included the area within the EIA Scoping Boundary and a 2km buffer zone extending outwards from it (hereafter 'the study area'). The study area was agreed in engagement with OCC. The assets within the study area are shown on Figures 10.1 to 10.3 together with the EIA Scoping Boundary.

10.5 Baseline Desk-Based Assessment and Surveys

Archaeological assets

Designations

10.5.1 One Scheduled Monument abuts the EIA Scoping Boundary: Sutton Wick Settlement Site (NHLE 1003671) in Caldecott, Abingdon. There are 11 other Scheduled Monuments within the 2km buffer zone. All these assets have a high value and are named in Appendix H.

Non-designated assets

10.5.2 There are a total of 812 archaeological assets recorded on the Oxfordshire Historic Environment Record (OHER) within the study area. A total of 123 of these archaeological assets lie within the EIA Scoping Boundary, with 689 within the 2km buffer area. These include concentrations of archaeological anomalies detected through AIM and geophysical survey, chiefly conducted during the 1990s and 2000s for previous iterations of the SESRO project. These are reproduced in Appendix Table 22 (see Appendix H) with a preliminary assessment of their heritage values based on their likely level of survival, form, probable rarity and period. They are also reproduced on Figure 10.1. These preliminary assessments of value have been undertaken based on the available information using professional judgement and the guidance within DMRB LA 106 (National Highways, 2020b) and the IEMA Principles (2021).

Built heritage assets

Designations

10.5.3 There are six Listed Buildings located within the EIA Scoping Boundary: two milestones on the A338 (1368635 and 1199482), Marcham Mill (1199505); a bridge near Marcham Mill (1048362); Stonehill House and attached outbuildings (1052743) and two barns approximately 30m south-west of

Stonehill House (1181929) (Figure 10.2). These historic buildings are Grade II Listed.

10.5.4 Within the wider 2km study area there are 566 Listed Buildings of which 14 are Grade I Listed, 40 are Grade II* Listed and the remainder are Grade II Listed.

10.5.5 There are two Conservation Areas (East Hanney and Culham) which abut the EIA Scoping Boundary at the western and eastern edges of the EIA Scoping Boundary respectively. A further nine Conservation Areas lie within the 2km buffer zone: Abingdon Town Centre; Abingdon Albert Park; Sutton Courtenay; Drayton; Milton; Steventon; Grove; West Hanney and Marcham. These Conservation Areas have been assigned high and medium values as set out in Appendix Table 23 (see Appendix H).

Non-designated assets

10.5.6 There are 60 non-designated historic buildings recorded on the OHER, of which one, a Second World War Pillbox at Culham (15753), lies inside the EIA Scoping Boundary.

Historic landscape assets

Designations

10.5.7 There are no Registered Parks and Gardens (RPGs) within the EIA Scoping Boundary. Two RPGs: Sutton Courtenay Manor (1001107) and Albert Park, Abingdon (1001403) are Grade II registered and both lie within the 2km buffer zone outside the EIA Scoping Boundary. These RPGs have been assessed as having a medium asset value based on their designation and surviving legibility.

Non-designated assets

10.5.8 The OHER does not indicate any non-designated gardens or designed landscapes within the Project.

10.5.9 The Oxfordshire Historic Landscape Characterisation (HLC) provides an analysis of the way in which the current landscape has evolved historically. These HLCs are broad areas of characterisation rather than real historic assets. There is a total of 512 HLC units in the study area, with 127 inside the EIA Scoping Boundary and a further 385 within the 2km buffer area. The HLCs have been excluded from preliminary assessment given their nature as characterisation areas rather than heritage assets. They are, however, informative as they reflect the evolution of the historic landscape. For the purposes of this EIA Scoping Report, the historic landscape is regarded as being one asset comprising many diverse elements and has been attributed a low value in line with the DMRB guidance, given the generally 19th and 20th century character, albeit with some surviving elements from earlier periods.

Paleoenvironmental Resource

10.5.10 A preliminary archaeological deposit model has been undertaken to determine areas of archaeological potential, based on historic geotechnical ground investigation data collated from sources such as the British Geological Survey (BGS). The results have been reproduced in a geoarchaeological report (forthcoming).

Further desk study and survey work

10.5.11 An AIM study (forthcoming) will fill in data gaps from previous AIM studies dating to the 1990s and 2000s and utilise resources not previously available. It will help inform both the EIA and archaeological investigations.

10.5.12 A geophysical survey commenced in 2024 which implements a detailed magnetic survey of accessible land parcels. The Wessex Archaeology WSI (2024a) comprises a detailed method statement for this survey, approved by OCC and utilising the OCC guidance for geophysical survey (OCC, 2024c). The results of this survey will inform the programme of archaeological trial trenching, the PEI Report and the Environmental Statement.

10.5.13 The scope of trial trenching has been informed through engagement with the OCC Archaeologist and Historic England. The scope of work has been represented in the Wessex Archaeology Written Scheme of Investigation (2024b) approved by OCC. Individual mobilisation for trial trenching will require approved statements by archaeological contractors committing to adhere to the WSI, which adheres to the professional guidance set out by the CIfA (2023) and the OCC guidance document for archaeological evaluation (2024b).

10.5.14 A preliminary setting study (forthcoming) will be undertaken covering the built heritage resource (Listed Buildings, Conservation Areas and non-designated historic structures) to identify those assets whose setting would be most likely to experience potential change during the construction and operation of SESRO and those built heritage assets which can reasonably be scoped-out of further study.

10.5.15 A geoarchaeological modelling study (forthcoming) will utilise the results of historical borehole data within SESRO to create ground models which will inform the time depth of geological formations, past environments and human activity. It will also inform the need for, and scope of, further studies to inform the DCO submission.

10.6 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

10.6.1 This scoping study has identified the medium and high value non-designated and designated archaeological remains within the EIA Scoping Boundary as being the most sensitive to change Table 10-3 sets out the asset sensitivity criteria). These are the archaeological assets located within the reservoir footprint, (comprising the excavation area for the main water body, and the embankments), or affected by the proposed ecological and landscape mitigation, recreation and leisure facilities, and the various options for the Steventon to East Hanney road diversion, temporary railway sidings and the main access road to SESRO from the A415.

Archaeological assets

10.6.2 The principal known sensitive archaeological assets, pre-field survey, comprise:

- All Scheduled Monuments
- A multi-occupation site (OHER 27530)
- An Iron Age and Romano-British field system (OHER 15277)
- A prehistoric to Romano-British complex (OHER 15283)
- A small Iron Age and Romano-British cropmarked complex (OHER 26430)
- Romano-British settlements which include Iron Age activity (OHER 26440, 26442 and 26446)
- Possible enclosures and a ring ditch (OHER 15294)
- Medieval and earlier field systems (OHER 26413)
- Late Iron Age / Romano-British ditched field boundaries (OHER 26437)
- Undated possible trackways (OHER 15291)
- Romano-British agricultural complex with Middle to Late Iron Age settlement (OHER 26438)
- Romano-British and Medieval field systems and possible enclosure (OHER 26414)
- A Middle Bronze Age settlement and field system (OHER 26444)
- Wiltshire Berkshire Canal features (OHER 7144, 7145, 7127, 12656 and 8896)
- An Iron Age and Romano-British settlement with early medieval occupation layer (OHER 30276)
- A multi-phased Iron Age and Romano-British settlement (OHER 26439)
- Bronze Age and Romano-British linear features (OHER 26435)
- An area of extensive late Roman activity with limited Iron Age to early Roman features (OHER 26436)
- An early Iron Age ditch and ridge and furrow (OHER 26422)

- Middle Iron Age enclosures with small Early Iron Age activity (OHER 26445)
- A Romano-British villa on Pound Croft (OHER 7600) and linear 'ladder' settlement (OHER 26431)
- An extensive Roman agricultural settlement complex with Middle Iron Age components (OHER 26429)
- A Roman settlement with Iron Age features (OHER 26428)
- Roman features and Later Prehistoric to Post-medieval finds (OHER 26433)
- Undated Trackways, Enclosures (OHER 12146)
- Iron Age enclosures and trackway (OHER 15289)

10.6.3 These assets are presented on Figure 10.1, which detail the available archaeological baseline within the EIA Scoping Boundary and the 2km study area.

Built heritage assets

10.6.4 The most sensitive built heritage assets with the potential to have their values affected by SESRO comprise the six Listed Buildings within the EIA Scoping Boundary and the Culham and East Hanney Conservation Areas, which overlap slightly with the eastern and western fringes of the EIA Scoping Boundary respectively. Such assets could potentially be affected by changes within their setting.

Historic landscape assets

10.6.5 The Registered Parks and Gardens in Abingdon (NHLE 1001403) and Sutton Courtenay (NHLE 1001107), although located outside the EIA Scoping Boundary would be the most sensitive landscape assets given their Grade II non-statutory designations. Such assets can be affected by changes within their settings.

10.7 Potential Environmental Effects

Archaeological assets

10.7.1 Impacts on archaeological remains principally comprise their removal or damage through compression during enabling and construction works.

10.7.2 Aside from potential compression damage arising from the building of permanent structures, changes to local hydrological regimes might result in the de-watering of buried remains during operation and, therefore, result in negative effects. Chapter 14 – Geology and Soils and specialist SESRO hydrological studies will be utilised to assess this potential operational effect.

Built heritage assets

10.7.3 Impacts to built heritage assets can arise from construction activity, usually in the form of vibration-related damage from plant movement, and sometimes in terms of removal, with noise from construction works having the potential to temporarily impact the setting of historic buildings.

10.7.4 Whilst physical damage during operation is unlikely, harm to historic buildings during this phase may arise from the visual intrusion of permanent structures within their visual settings. Changes to local landscapes resulting from SESRO will also change the historic legibility of the settings of assets.

Historic landscape assets

10.7.5 Historic landscapes can be changed through their removal during construction.

10.7.6 In operational terms, infrastructure schemes can affect the visual and historic setting of designed landscapes.

10.8 Assessment Methodology

Introduction

10.8.1 This section describes the proposed methodology for determining the significance of effects on heritage assets arising from SESRO. The methodology comprises firstly, establishing the value of the heritage assets (Table 10-3) potentially affected, using professional judgement in the absence of detailed survey data. The assessment of the magnitude of impact resulting from SESRO is based on criteria (Table 10-4) taken from DMRB (agreed in principle with the historic environment consultees OCC and Historic England). The use of the significance of effect matrix (Table 10-5) rates the heritage asset values against the magnitude of impacts on them, to reach an estimation of the significance of effect.

10.8.2 The principles of assessment set out by IEMA (2021) have also been a point of reference, in addition to local guidance for assessment provided by OCC (2024a).

Direct effects during construction

10.8.3 The assessment of effects will focus primarily on the physical removal of heritage assets during construction as these are likely to be the most significant. These effects would principally apply to archaeological remains, the varied elements that make up the historic landscape and the largely unquantified paleoenvironmental resource. Some non-designated historic structures will also be affected.

Setting effects during construction and operation

10.8.4 Heritage assets will also potentially be affected during both the construction and operational phases given potential physical, visual and historic changes to their settings.

Determining the value / importance of heritage features

10.8.5 The criteria for determining the value of heritage assets are presented in Table 10-3.

Table 10-3 Environmental value (sensitivity) and descriptions

Value / sensitivity	Criteria
Very high	**Archaeological remains:** World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives **Historic buildings:** Structures recognised as of universal importance as World Heritage Sites. Other buildings of recognised international importance **Historic landscapes:** World Heritage Sites recognised for their historic landscape qualities. Historic landscapes of international value, whether designated or not. Extremely well-preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s)
High	**Archaeological remains:** Scheduled monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national research objectives **Historic buildings:** Scheduled monuments with standing remains. Grade I, Grade II* and Grade II listed buildings. Conservation areas containing very important buildings. Undesignated structures of clear national importance **Historic landscapes:** Designated historic landscapes of outstanding interest. Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance and of demonstrable national value. Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s)
Medium	**Archaeological remains:** Non-designated assets that contribute to regional research objectives **Historic buildings:** Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation areas containing buildings which contribute significantly to their historic

Value / sensitivity	Criteria
	character. Listed structures such as historic milestones which are not in their original location might warrant this value **Historic landscapes:** Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical factor(s)
Low	**Archaeological remains:** Non-designated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives **Historic buildings:** 'Locally listed' buildings. Historic (unlisted) buildings of modest quality in their fabric or historical association **Historic landscapes:** Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations
Negligible	**Archaeological remains:** Assets with very little or no surviving archaeological importance **Historic buildings:** Buildings of no architectural or historical note; buildings of an intrusive character **Historic landscapes:** Landscapes with little or no significant historical interest

Source: Based on the asset values based on asset value significance criteria in DMRB LA 106 [Ref 3.10, 3.11 with Notes 1 and 2 within LA 106].

Determining impact magnitude

10.8.6 Magnitude of impact (change) on heritage receptors will be assessed according to the magnitude of impact criteria taken from Table 3.4m in DMRB LA 104 (National Highways, 2020a). Impacts can be either adverse or beneficial.

Table 10-4 Magnitude of Impact

Magnitude of impact (change)		Typical description
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements

Magnitude of impact (change)		Typical description
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction	

Source: DMRB LA 104 (National Highways, 2024a).

Determining significance

10.8.7 Significance of effect will be derived using the significance matrix from Table 3.7 in DMRB LA 104 (National Highways, 2024a), as shown in Table 10-5. Significance of effect is determined by combining the value (sensitivity) of a receptor and the magnitude of impact (change) on the receptor.

Table 10-5 Matrix to assess the significance of effect on historic environment receptors

Heritage value		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Notes

* effects which are ‘Moderate’ or higher are considered to be significant effects.

** effects may be adverse or beneficial.

Source: Table 3.7 in DMRB LA 104 (National Highways, 2020a).

Assessment of residual impacts

10.8.8 Where adverse effects are identified, mitigation will be identified and the residual effect re-determined following its implementation.

Assessment of cumulative impacts and effects

10.8.9 Inter-development cumulative effects result from other proposed developments within the study area which may have effects on the historic environment resource additional to SESRO. Future assessment will assess the effects of the Project in conjunction with other development projects as set out in Chapter 20 – Cumulative Effects.

10.8.10 Intra-development effects may arise from interactions between different impacts from the same project on the same development. For example, in relation to the historic environment visual impacts on the setting of a historic building may combine with groundwater impacts affecting its foundations. Historic environment impacts, however, are unlikely to combine with other impacts to result in a cumulative effect on non-heritage receptors.

Assumptions, limitations and uncertainties

10.8.11 Whilst the assessment will utilise all available data, uncertainties will remain as to the exact degree of archaeological and paleoenvironmental remains within the buried environment. Ongoing archaeological investigation will seek to establish the presence, extent and value of buried archaeological remains. Detailed geoarchaeological assessment will utilise the results of currently ongoing geotechnical ground investigation data. This will more accurately model buried superficial geology and establish its potential for preservation of geoarchaeological remains.

10.9 Mitigation and Environmental Net Gain

Construction phase mitigation

Primary

10.9.1 The Project's preliminary design will be influenced by the results generated from archaeological and geoarchaeological investigation. Adverse impacts to historic environment assets will be avoided wherever practicable, to leave archaeological remains in-situ to the degree possible without compromising the Project objectives.

Secondary

10.9.2 Measures such as the use of track matting or geotextile may help to reduce or avoid impacts to buried archaeological remains from the movement of plant or other vehicular traffic necessary for the project's construction. This would prevent damage to buried archaeological remains by protecting them from soil compression. The use of other measures of temporary surface build-up from the existing ground surface to spread weight and achieve the same objectives would be fully utilised.

Tertiary

10.9.3 Archaeological preservation by record can be applied as mitigation from the outset of the construction phase to ensure that buried or built heritage assets affected by the project can be fully recorded. This will help to reduce the adverse effects of their removal by providing an accurate record in the public domain for future research. All such intervention would be secured via a requirement in the DCO for preparation of WSI. All WSI will be approved in advance of implementation by OCC.

Operation phase mitigation

Primary

10.9.4 In historic environment terms landscape planting and landscaping design will generally be the most substantive of the mitigation measures to mitigate setting effects (See Chapter 9 – Landscape and Visual Effects). This will take the form of providing vegetative planting to screen above ground assets that might experience visual intrusion during the operational phase of the Project. Whilst such landscape and visual mitigation measures are applied during the construction phase it is only during operation that they will take effect, as vegetation matures.

Secondary

10.9.5 No secondary mitigation measures have been identified for the operational Project.

Tertiary

10.9.6 No tertiary mitigation measures have been identified as part of the operational Project.

Potential for environmental net gain

10.9.7 Any opportunities to derive environmental net gain from the historic environment will be explored during the detailed assessment process. For example, on some infrastructure projects this has taken the form of community information in the form of information boards around the site. These could present historical narratives of the local settlement pattern, based on the archaeological evidence generated by the survey activities. Whilst the benefits of public information are an option, there are other ways in which community involvement can be harnessed both during construction and operation. Potential options will be explored in discussions with the historic environment consultees from OCC and Historic England as the preliminary design develops.

10.9.8 The potential reinstatement of the old Wiltshire and Berkshire Canal could be an amenity asset marking the resurrection of an operational watercourse that has been redundant since 1914. Although the line of the canal would not be along its original course, the new route would compensate by being functional. The canal's reinstatement would be provided by a future promoter and would not be part of the DCO application for SESRO.

10.9.9 The information generated from archaeological surveys, in the form of archaeological excavation, will be made available in the public domain, with final publication of the results condensed into a monograph publication.

10.10 Summary of Scope for the EIA

EIA scope for the preferred option

10.10.1 The historic environment assessment will consider all potential effects resulting from construction and operation of SESRO on all elements of the historic environment. All potential changes to the historic environment resource arising from engineering design, ecological and landscape proposals, plus noise and vibration studies will be assessed in terms of both temporary and permanent effects. These potential effects are summarised in Table 10-6.

Table 10-6 Summary of historic environment matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Non-designated archaeology	IN	Removal and other damage through construction activity Temporary changes in hydrological regime
Non-designated paleoenvironmental resources	IN	Removal and other damage through construction activity Temporary changes in hydrological regime
Non-designated historic structures	IN	Potential removal or damage from construction activity Temporary changes to setting
Listed Buildings	IN	Temporary changes to setting resulting in adverse effects No physical impacts arising from vibration identified
Non-designated historic landscapes	IN	No formal non-designated landscapes identified within the SESRO EIA Scoping Boundary but the local rural landscape, the result of generational change from human activity, will experience removal
Scheduled Monuments	IN	Potential impacts from vibration arising from construction activity Temporary changes to setting resulting in adverse effects
Registered Parks and Gardens	IN	Construction of intake/outfall structure on the River Thames might result in visual intrusion to the Sutton Courtenay RPG

Environmental matter	Scoped in / out	Rationale
Historically important hedgerows	IN	Removal during construction activity
Operational phase		
Non-designated archaeology	Out	No adverse effects identified
Non-designated paleoenvironmental resources	IN	Long-term changes in hydrological regime
Non-designated historic structures	IN	Long-term changes to setting
Listed Buildings	IN	Long-term changes to setting
Non-designated historic landscapes	IN	Long-term changes to setting
Scheduled Monuments	Out	No adverse effects identified
Registered Parks and Gardens	IN	No adverse effects identified
Historically important hedgerows	Out	No adverse effects identified

Potential changes to scope and assessment methods associated with other options

10.10.2 There remains the potential for ongoing changes to the proposed preliminary design to change impact and effect determinations for historic environment assets. The choice of other options will not alter any of the proposed methodology but may slightly alter the extent of the study area or specific assets affected.

10.11 Next Steps

10.11.1 Geophysical survey commenced in June 2024, and the results will inform intrusive trial trenching in agreement with OCC and Historic England. Archaeological trial trenching is proposed to commence in late 2024, based on the preliminary results of the geophysical survey.

10.11.2 A preliminary built heritage setting study (forthcoming) and geoarchaeological modelling (forthcoming) will inform the scope of more detailed studies, again in engagement with OCC, which will in turn inform the EIA.

10.11.3 An ongoing AIM study (forthcoming) will inform the next steps of the assessment process.

10.12 References

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Wessex Archaeology, (2024b). South East Strategic Reservoir Option Abingdon, Oxfordshire: Written Scheme of Investigation for Archaeological Evaluation.

11 Traffic and Movement

11.1 Introduction

11.1.1 This chapter outlines the proposed scope and Environmental Impact Assessment (EIA) methodology for the traffic and movement assessment during construction and operation of SESRO.

11.1.2 Any potential impacts and effects arising from traffic and movement required to construct and operate SESRO are considered in terms of:

- Severance of communities
- Road vehicle driver and passenger delay
- Non-motorised user delay
- Non-motorised user amenity
- Fear and intimidation on and by road users
- Road user and pedestrian safety
- Hazardous/large loads

11.1.3 Detailed information regarding construction and operational traffic generation is not yet available in advance of this scoping submission, however, the aim of this chapter is to identify the proposed methodology and locations where data collection is likely to be required.

11.1.4 The potential effects associated with the criteria listed in paragraph 11.1.2 is aligned with and supports information and findings communicated by other environmental disciplines in this EIA Scoping Report, including, but not limited to, Chapter 9 – Landscape and Visual Effects, Chapter 12 – Noise and Vibration, Chapter 13 – Air Quality, Chapter 17 – Communities, Chapter 18 – Human Health and Chapter 20 – Cumulative Effects.

11.2 Legislation, Policy, Standards and Guidance Context

11.2.1 There is no legislation specific to the environmental assessment of traffic and movement and associated effects.

11.2.2 The National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) is the key policy document for new reservoirs.

11.2.3 The NPS includes a set of guidelines to be considered when assessing the effects from Traffic and Movement. These are outlined in the NPS paragraph 4.14.1 – 4.14.16 summarised below.

- Paragraph 4.14.5 states that, '*If a project is likely to have significant transport implications, the applicant's Environmental Statement should include a transport appraisal…*'

- Paragraph 4.14.6 requires applicants to, '…*consult National Highways, Network Rail and Highway Authorities as appropriate…*'
- Paragraph 4.14.7 requires applicants to, *'…*Prepare a construction management plan for construction stages and a travel plan for the operational stage of the infrastructure. Both should include demand management and monitoring measures to mitigate transport impacts*'*
- Paragraph 4.14.8 suggests that, '*The assessment should also consider any possible disruption to services and infrastructure (such as road, rail, and airports)*'
- Paragraph 4.14.9 outlines that, '*If additional transport infrastructure is needed or proposed, it should always include good quality walking, wheeling and cycle routes, and associated facilities (changing/storage etc.) needed to enhance active transport provision*'
- Paragraph 4.14.12 details the requirements that could be included as possible demand management measures, such as, '*reduce the need to travel by consolidating trips'*, *'provide opportunities for shared mobility'*, and *'reroute to use parts of the network that are less busy*'
- Paragraph 4.14.13 details the requirement of mitigation that, '*All stages of the project should support and encourage a modal shift of freight from road to more environmentally sustainable alternatives, such as rail, cargo bike, maritime and inland waterways, as well as making appropriate provision for, and infrastructure needed to, support the use of alternative fuels including charging for electric vehicles*'
- Paragraph 4.14.14 highlights that, '*Regard should be given to the needs of freight at all stages in the construction and operation of the development including the need to provide appropriate facilities for Heavy Goods Vehicle drivers as appropriate*'
- Paragraph 4.14.15 states that, '*Where considerations are between rail, water-borne or road transport, rail and water-borne options are to be preferred over road transport options, where that option is safe and cost-effective*'
- Paragraph 4.14.16 highlights that, where HGV traffic is substantial, applicants should consider a series of mitigation measures such as, '*control numbers of Heavy Goods Vehicle movements to and from the site in a specified period during construction and operation where possible, and consider the impacts of alternative transport routes'* and *'provide appropriate infrastructure needed to support vehicles that use alternative fuels (including electric vehicles)*'

11.2.4 Other relevant policy documents are outlined in Table 11-1.

Table 11-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
National policy
National Policy Statement for Water Resource Infrastructure, (Defra, 2023)
National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2023)
Local Transport Note (LTN) 01/20 Cycle Infrastructure Design (Department for Transport (DfT), 2020a)
Gear Change (DfT, 2020b)
Second Cycling and Walking Investment Strategy (CWIS2) (Active Travel England, 2023)
Inclusive Mobility Guide (DfT, 2021)
Regional policy
South Oxfordshire Local Plan 2011-2035 (South Oxfordshire District Council (SODC), 2020)
Local Transport and Connectivity Plan (Oxfordshire County Council (OCC), 2022)
Swindon-Didcot-Oxford Connectivity Study, England Economic Heartlands (England Economic Hartland, 2023)
Oxfordshire Rail Corridor Study (ORCS) (Network Rail, 2021)
Local policy
Local Plan 2031 Part 1: Strategic Sites and Policies (Vale of White Horse District Council (VoWHDC), 2016)
Local Plan 2031 Part 2: Detailed Policies and Additional Sites (VoWHDC, 2019)
Abingdon Local Cycling and Walking Infrastructure Plan (LCWIP) (OCC, 2023)
Standards and guidance
Design Manual for Roads and Bridges (DMRB) – LA 101 Introduction to environmental assessment (Highways England, 2019a)
Design Manual for Roads and Bridges (DMRB) – LA 102 Screening projects for Environmental Impact Assessment (Highways England, 2019b)
Design Manual for Roads and Bridges (DMRB) – LA 103 Scoping projects for environmental assessment (Highways England, 2020d)

Relevant legislation, policy, standards and guidance
Design Manual for Roads and Bridges (DMRB) – LA 104 Environmental assessment and Monitoring (Highways England, 2020c)
Design Manual for Roads and Bridges (DMRB) – LA 112 Population and human health (Highways England, 2020b)
Design Manual for Roads and Bridges (DMRB) – GG 119 Road safety audit (Highways England, 2020a)
Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement (IEMA, 2023)
Transport Analysis Guidance (TAG) Unit M4 – Forecasting and Uncertainty (DfT, 2023)

11.2.5 The policies outlined in Table 11-1 discuss various approaches to implementing and developing strategies aimed at reducing the impact of new developments and their associated travel on the strategic and local road network, including promoting sustainable transport. These policies emphasise the need for transport assessments and travel plans that take air quality standards into account, enhance local attractiveness, and support new and innovative design principles. The policies emphasise the importance of designing infrastructure that prioritises accessibility and inclusivity through core planning principles.

11.3 Engagement

11.3.1 Engagement has taken place with relevant statutory and non-statutory consultees and stakeholders as part of scoping. To date, this has included the following:

- A Technical Liaison Group (TLG) meeting was held on 25 March 2024, which involved attendees from Thames Water, OCC, VoWHDC, Jacobs and Mott MacDonald
- A separate meeting was held on 12 June 2024 focusing on micro-climate, specifically in relation to risks associated with fog and ice on the surrounding highways. This involved attendees from Thames Water, National Highways, Network Rail, OCC, VoWHDC and Jacobs

11.3.2 Table 11-2 below outlines the main engagement comments and any response/ action taken.

Table 11-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
OCC	Clarification needed on whether the ES Scoping is taking account of the potential for a Wantage and Grove station	Wantage and Grove station is currently not part of the SESRO Project. Maintain dialogue with OCC to determine progress of the proposals
	Requested clarity on the rail sidings being either temporary or permanent	Interim Master Plan shows these to be temporary
	Explore traffic counts and consider acquiring new datasets, as previous data gathered as part of the SESRO Movement Strategy Report (Mott MacDonald, 2021) is over three years old and may not reflect recent changes in traffic volumes, including the impact of Covid-19	Scoping will prioritise identifying any requirement for new traffic surveys to ensure that a suitable baseline can be established to enable future discussions with relevant stakeholders
OCC/VoWHDC/National Highways	Requested that micro-climate assessments be undertaken to provide sufficient evidence of whether fog or ice may represent a material risk to safety on the A34 and local roads	Micro-climate assessments to be undertaken, the results of which will determine if further accident analysis needs to be captured as part of traffic and movement

11.4 Existing Environment and Baseline Conditions

Study area

11.4.1 The impact of SESRO on traffic and movement will be associated with the anticipated rise in travel activity resulting from SESRO's construction and operation across the highway network. The assessment will cover all users impacted by changes on the road and public transport networks including bus and rail, as well impacts associated with public rights of way (PRoW). The designated traffic and movement study area, hereafter referred to as the 'study area,' is outlined in this section.

11.4.2 At this early stage there is no information regarding where the construction and operational workers will live, therefore, there is no information on the generation and distribution of such traffic and other transport modes travelling to the SESRO Project. The study area for this scoping exercise has therefore been defined based on the anticipated routes that both construction and operational traffic are likely to use to access SESRO. These assumptions are based on professional judgement and will develop as the design of SESRO evolves.

11.4.3 The following assumptions have been made:

- Construction material – It is assumed that road based material would travel to the SESRO site via strategic transport corridors, mainly the A34, while concrete batching would possibly remain off-site. For more details on the routes identified within the study area, please refer to paragraph 11.4.6
- Construction workforce – As described above, there is no information on where the construction workforce will live. A proportion of them are likely to live in the surrounding area and would, therefore, use the Strategic Road Network (SRN), such as the A34, to access the SESRO construction site, i.e. the same access routes as the construction materials. A proportion of the construction workers are likely to live in locations with a shorter commuting time. It has, therefore, been assumed that they will live within a 10km radius of the SESRO EIA Scoping Boundary and would use the local road network
- Operational visitors – The design team have used a drive time catchment area of up to 90 minutes to estimate the visitor numbers which is reflected in the study area shown in Figure 11.1. Since visitors would be likely to use the same routes as those identified for construction, no additional roads were added to the study area for visitor traffic
- Operational workforce - The number of operational workers travelling to the SESRO site is likely to be significantly smaller than the number of visitor trips generated during the operational phase. The operational

workers are likely to live locally and, therefore, it is assumed that they would use similar routes to the construction workers, and hence no additional routes need to be considered

11.4.4 The traffic and movement study area encompasses five main arterial routes around Oxfordshire that form the key existing road connections to the indicative location for SESRO. These routes, along with their adjoining junctions, are designated as the traffic and movement study area for both the construction and operational phases. It is anticipated that these access routes will serve as the primary routes for construction and operational traffic contingent upon the origin of the journey. These access routes are listed below and shown in Figure 11.1.

11.4.5 In addition, the potential for movement of construction materials by rail freight is considered as part of the SESRO Project. Therefore, the Great Western Main Line (GWML) (London – Bristol) is included as part of the study area and is shown in Figure 11.1. Further detail on the use of rail freight as part of the SESRO Project is described in paragraph 11.4.8.

11.4.6 The five key arterial road routes that approach the SESRO site are shown in Figure 11.1 above, and are as follows:

- A34/ M40 from J10 (i.e. from the north)
- A40 from M40 J7 (i.e. from the east)
- A34 south from M4 J13 (i.e. from the south)
- A419 from M4 J15 (i.e. from the south-west)
- A415 from the A415/A40 junction (i.e. from the north-west)
- Additionally, the following road links are within the anticipated study area:
- A338 west of SESRO between Wantage and East Hanney
- A412 north of SESRO connecting to the A40 to the east and the A34 to the south
- A415 north-west of SESRO connecting to the A420 and A338 to the north and A34 to the south
- A417 south of SESRO between Wantage and Rostock
- Steventon Road / Hanney Road between East Hanney and Steventon
- B4017 Drayton Road / Stonehill Lane / unnamed road (potential route to Abingdon Sewage Treatment Works (STW))

11.4.7 The study area shown in Figure 11.1 is based on the EIA Scoping Boundary in accordance with DMRB LA 112 Population and human health, (Highways England, 2020b) standards.

11.4.8 In addition, the GWML, which runs east to west to the south of SESRO, is captured as part of the traffic and movement study area shown in Figure 11.1. A rail connection is proposed to facilitate the delivery of a significant proportion of the construction materials by freight train to SESRO. Currently, it is anticipated that rail freight will be used to transport essential materials such as rock, sand

and gravel, which would significantly reduce the numbers of Heavy Goods Vehicles (HGVs) generated on the highway network during construction. This will be facilitated by temporary rail sidings connecting to the existing GWML incorporating an adjacent material handling area for stockpiling.

11.5 Baseline Desk-Based Assessment and Surveys

11.5.1 This section outlines the existing information gathered to date and provides a high-level description of the immediate transport network surrounding the indicative location for SESRO. The following subsections also detail the currently available data and identify areas where additional data gathering is likely to be necessary. The baseline information is presented by mode to establish a basis for this traffic and movement chapter and for ease of reference.

11.5.2 Prior to this EIA Scoping exercise, the SESRO Movement Strategy Report (Mott MacDonald, 2021) was developed through engagement with the local highway authorities. This provides initial analysis of the operational traffic requirements and examines the existing sustainable transport infrastructure opportunities in the vicinity of SESRO. The SESRO Movement Strategy Report (Mott MacDonald, 2021) primarily focuses on the immediate area surrounding the EIA Scoping Boundary as opposed to the wider study area required for EIA purposes, as outlined in this chapter.

11.5.3 In developing this EIA Scoping Report chapter, the data gathered for the purposes of the SESRO Movement Strategy Report (Mott MacDonald, 2021) together with its initial findings and recommendations have been considered, including information on site access and transport connectivity.

Road

Existing road traffic

11.5.4 The study area for SESRO features a comprehensive road network. This includes parts of the SRN such as the M4, M40 and A34 which are high quality, high-capacity roads with grade separated junctions. The study area also includes other regionally significant roads, including the A420, A40, A415 and A338, which are lower capacity roads with lower capacity at-grade junctions facilitating connectivity within the region.

11.5.5 It is anticipated that, during construction and operation of the SESRO Project, associated traffic would use appropriate access routes, particularly the A34, for the movement of material and people, as much as possible.

11.5.6 However, it is possible that the B4017, A338, Frilford Road and Marcham Road could be used by construction and/ or operational workers, depending on where they live. Steventon Road / Hanney Road will be used temporarily until the route is diverted as part of the construction of SESRO.

11.5.7 There are currently significant volumes of through traffic within Abingdon, as well as local traffic through the town centre due, in part, to limited opportunities to cross the rivers Thames and Ock and to access the A34.

11.5.8 Following discussions with OCC, the Movement Strategy Report is currently being updated to capture recent stakeholder feedback. To inform this report, updated baseline traffic counts were conducted at nine junctions in the immediate vicinity of SESRO. These are shown in Figure 11.2 and are described below:

- Site 1: Kingston Road (A415) / Oxford Road (A338) / Frilford Road
- Site 2: Marcham Road Interchange: A34 / Marcham Road / A415
- Site 3: Abingdon Road / High Street (B4017) / Hanney Road
- Site 4: Milton Interchange: A34 / A4130
- Site 5: Abingdon Road / Reading Road (A417) / Newbury Road (A415) / Wantage Road (A417)
- Site 6: Charlton Village Road / Reading Road (A417) / Charlton Road / Lark Hill
- Site 7: Seesen Way / Wallingford Street (A417)
- Site 8: A338 / Harcourt Way
- Site 9: Crown Meadow (A338) / Steventon Road / The Green / Main Street

11.5.9 Subsequently, a Non-Motorised User (NMU) count and an Automatic Traffic Count (ATC) were carried out between June-July 2023 as part of a planning application for a Clay Compaction Trial off the Steventon to East Hanney road (Planning Application Ref: P23/V2559/FUL). These counts were conducted within the EIA Scoping Boundary for SESRO at the following location as shown in Figure 11.2.

11.5.10 Site 10: Steventon to East Hanney road, including PRoW footpaths as part of the Clay Compaction Trial.

Future road traffic

11.5.11 When determining the future baseline, future changes in traffic flows will be estimated based on industry standard traffic growth forecasts including, but not limited to, the following sources:

- Trip End Model Presentation Program (TEMPro)
- National Trip End Model (NTEM)
- Regional Traffic Forecasts (RTF)

11.5.12 Any planned significant land use change and new infrastructure projects within the study area, as agreed with OCC and VoWHDC, will be assessed, with background traffic growth reduced accordingly to avoid double counting. Such developments will include the following:

- Significant new residential developments
- Significant employment growth sites

- Planned infrastructure improvements for active travel and road projects

11.5.13 Further, the Transport Analysis Guidance (TAG) Unit M4 Forecasting and Uncertainty (DfT, 2023) provides guidance on the traffic analysis of forecasting and uncertainty. The guidance recommends the use of an uncertainty log to document and assess the certainty of various future development and infrastructure schemes in order to derive a realistic future baseline scenario. with and without the SESRO Project in place.

11.5.14 Ultimately, the planned developments considered will align with those featured in the assessment of cumulative effects, discussed in further detail in Chapter 20 – Cumulative Effects. The operational traffic generated by the planned developments will be included within the above future year baseline forecasts. However, the construction traffic associated with other planned developments does not form part of the available growth forecasts listed in paragraph 11.5.11 and would, therefore, need to be estimated and included to enable the assessment of cumulative effects to be undertaken.

Rail

Existing rail network

11.5.15 A major rail line lies north to south-east of SESRO, connecting Oxford to London Paddington. Meanwhile, the east-west London to Bristol GWML runs for approximately 2.4km immediately to the south of SESRO.

11.5.16 There are several stations in close proximity to the SESRO EIA Scoping Boundary including Radley, Culham, Appleford and Didcot Parkway. Notably, Didcot Parkway sits at a critical interchange, linking services from London to Reading and Oxford, as well as routes to the south-west of England and South Wales.

Future rail network

11.5.17 The ORCS study outlined a prospective rail strategy suggesting the need for enhancements in service frequency at certain stations and the need for new stations, including at Grove.

11.5.18 As part of the SESRO Project new temporary railway sidings along the GWML are proposed, together with a materials handling area to facilitate the delivery of significant quantities of construction materials to the SESRO construction site, thereby reducing the number of HGVs generated on the surrounding highway network. Future train paths will need to be identified to allow for the inbound / outbound movement of freight trains to SESRO.

Bus

11.5.19 Bus services are available near the SESRO site, with routes covering the A415, A338, and B4017. These services facilitate travel between local areas, including a route through Marcham village, enhancing connectivity with Oxford and surrounding locations.

Walking and cycling

Cycling

11.5.20 The Abingdon LCWIP (OCC, 2023) outlines a network of cycling routes within the town, categorised into several types. These include main routes for both walking and cycling that connect key origin and destination locations, routes of local importance that typically link trip generators such as educational institutions and employment centres, and routes that are currently not accessible for walking and cycling.

11.5.21 As outlined in Figure 11.3, much of the cycling network is fragmented with a bridleway crossing the SESRO EIA Scoping Boundary. This bridleway connects to restricted and public byways to the east and south of SESRO.

11.5.22 The Abingdon LCWIP (OCC, 2023) includes several primary and secondary routes within Abingdon itself. Additionally, a primary route is situated north of the SESRO EIA Scoping Boundary, extending along Frilford Road.

11.5.23 Several established cycling paths are primarily situated to the east of the SESRO EIA Scoping Boundary, linking Abingdon with Didcot and with future routes also planned, as outlined in the Abingdon LCWIP (OCC, 2023).

11.5.24 The National Cycling Network (NCN) Route 5 navigates north to south, past the Abingdon STW within the EIA Scoping Boundary, bordering the eastern side of Abingdon, Drayton and Milton, connecting Oxford to Didcot. This includes a seamless connection to the Didcot Parkway railway station. Beyond this point, NCN 5 extends towards Reading, while Route 544 heads in an east-west direction towards Wantage. There is also a shared path along the southern edge of the A415, running east-west from Abingdon to Marcham.

11.5.25 Figure 11.3 shows the existing cycling routes in the vicinity of the SESRO EIA Scoping Boundary.

Public rights of way

11.5.26 There are several PRoW within and around the SESRO EIA Scopign Boundary. A bridleway runs through the centre of SESRO, crossing the GWML in the south-west, before heading north, exiting at the A415/ A34 Marcham Road Interchange.

11.5.27 Public footpaths are located within the SESRO EIA Scoping Boundary at the western boundary and within the south-west corner.

11.5.28 In the far east of the SESRO EIA Scoping Boundary, on the eastern bank of the River Thames, the Thames Path Trail follows the river from its source in the Cotswolds to London. The trail runs east of SESRO through Abingdon, meandering past Drayton and heading towards London.

11.5.29 A national trail known as The Ridgeway runs several kilometres south of the GWML, between the A34 to the east and B4494 to the west. Although it does not lie within the SESRO EIA Scoping Boundary, it does pass through the North Wessex Downs National Landscape and SESRO would be visible from it.

11.5.30 In the wider area around SESRO, there are numerous public footpaths and byways connecting nearby settlements.

11.5.31 Figure 11.3 shows the existing PRoW in the vicinity of SESRO.

River Thames Navigation

11.5.32 The River Thames is a nationally significant waterway which is navigable in the vicinity of the proposed SESRO intake/outfall infrastructure. Where the Abingdon Marina connects to the waterway, to the north of the proposed SESRO intake/outfall, the River Thames measures up to approximately 40m wide. It features the historic Abingdon Lock construction, dated from around 1624, which is the oldest surviving lock chamber in the UK and possibly Europe (Visit Thames, 2024). A range of recreational craft use the waterway, including cruisers, barges, passenger steamers, narrowboats, and small powered craft.

Further survey work

Road traffic

11.5.33 Further traffic surveys will be required to determine the existing traffic volumes (daily and peak periods) on the access routes shown in Figure 11.1. The precise locations of any additional surveys will be agreed with the relevant authorities including National Highways, OCC, and VoWHDC.

11.5.34 Based on the indicative study area shown in Figure 11.1, construction and operational routes will intersect with key junctions when arriving and departing SESRO. Therefore, further surveys are likely to include, but are not limited to, the following junctions:

- M40 J7, J9 and J10
- M4 J13 and J15
- A34/A423 Hinksey Hill Interchange
- A34/A420 Botley Interchange
- A34/A44 Peartree Roundabout

- A415/A40 junction

11.5.35 Surveys for the assessment of the construction phase are likely to focus on weekdays, possibly with consideration of Saturdays, whereas for the operational phase assessment, surveys are likely to focus on weekends and possibly weekdays, subject to agreement with OCC. Surveys will be conducted during these time periods because that is when SESRO traffic is likely to be at its highest volumes.

11.5.36 Outputs will include 24-hour Average Annual Daily Traffic (AADT) required for traffic related air quality assessment and 18-hour Average Annual Weekday Traffic (AAWT) counts required for traffic noise assessments, where necessary.

11.5.37 Further survey work will be informed once construction and operational access routes are more clearly defined i.e., the likely origins of materials and the visitor catchment area. This survey work will build on the details highlighted above in Section 11.5 across the study area outlined in Section 11.4. This aims to expand upon the initial traffic surveys commissioned as part of the Movement Strategy Report (Mott MacDonald, 2021) by conducting surveys in the wider area.

11.5.38 The types of traffic and movement surveys to be used to gather data for the existing road and PRoW network will include the following:

- Automated Traffic Count (ATC) - Provides hourly traffic count information, by direction, on a road over days / weeks
- Manual Classified Counts (MCC) - Provides traffic counts, as well as pedestrian and cycle counts passing through a particular link or junction
- Manual Classified Turning Counts (MCTC) - Provides traffic counts, as well as pedestrian and cycle counts, at junctions for each turning movement by vehicle type, usually for a weekday
- NMU Counts - Provides a count of pedestrians and cyclists using an associated route

11.5.39 The data gathering exercise will also seek to make use of publicly available data sources for obtaining traffic data, as described below:

- WebTris – National Highways owned database containing monitored vehicle speeds and flows of traffic on National Highways maintained roads (e.g. A34)
- DfT road traffic statistics – Provides an estimate of the vehicle flows on a limited section of ‘A’ roads and motorways

11.5.40 To inform collision analysis, STATS19 collision data will be obtained for the latest available complete five-year period (excluding COVID years). This will be used to identify potential collision clusters within the study area defined in Section 11.4.

Walking and cycling

11.5.41 In addition to NMU movements captured as part of the road traffic surveys at the key junctions, further NMU surveys will be undertaken for PRoW in proximity to, and with the potential to interact with, SESRO. This will include the surrounding villages where construction worker traffic and/or operational worker traffic may pass through. The surveys would be undertaken during those time periods when the PRoWs are likely to be most frequently used, covering both a weekday and a Saturday/Sunday, subject to agreement with OCC.

11.5.42 Any additional baseline data will be obtained from open-source maps and relevant local planning authority websites, including information relating to walkers/wheelers, cycling, equestrian and PRoW.

11.6 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

11.6.1 The assessment of potential traffic and movement related impacts on sensitive receptors will adhere to best practice set out in paragraphs 1.28 - 1.30 of the IEMA[13] guidance. These guidelines serve as a foundation for establishing appropriate thresholds of change and emphasise the importance of considering specific groups or locations that are particularly vulnerable to changes in traffic conditions.

11.6.2 The following user groups will be considered as receptors:

- NMUs
- PRoW users
- Motorists and freight vehicles
- Public transport users
- Emergency services

11.6.3 Those people who are likely to be particularly sensitive and/or vulnerable to change would likely include those who are:

- Pregnant mothers (and their unborn children)
- Of a young age (for example school age or younger)
- Of an older age (for example those aged 65 and above)
- On a lower income
- With poor health or impaired mobility
- With a social disadvantage

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[13] *Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement (2023) – para 1.28 – 1.30: Accessed July 2024*

- With access or geographical factors (i.e. people living in remote or rural areas)

11.6.4 The following list identifies special interests that will be considered when defining sensitive receptors at geographical locations. The sensitive locations will inform the assessment of effect significance when the Project traffic is assigned to the network:

- People at home
- People at work
- Sensitive and/or vulnerable groups (see paragraph 11.6.3)
- Locations with concentrations of sensitive and/or vulnerable users (e.g. hospitals, places of worship, schools)
- Retail areas
- Recreational areas
- Tourist attractions
- Collision clusters and routes with road safety concerns
- Junctions and highway links already at (or over) capacity

11.6.5 Aspects influencing sensitivity include the receptor's level of protection, adaptability to change, the duration of the expected change and professional judgement.

11.6.6 SESRO is in proximity to a number of sensitive receptor locations, as outlined in Chapter 17 – Communities. The key community receptors located within 10km of the site boundary include, but are not limited to:

- Abingdon Community Hospital
- Aureus Primary School
- Carswell Community School
- Charlton Primary School
- Church Street Practice (healthcare centre)
- Didcot Community Hospital
- Didcot Primary Academy
- Drayton Copse (greenspace)
- Nigel Eady Community Woodland
- St James Church of England Primary School
- St Michael's Church of England Primary School
- Steventon Allotments
- Stockham Primary School
- Thameside Primary School
- Wantage Community Hospital

Potential environmental effects

11.6.7 There may be significant effects on traffic and movement experienced during both the construction and operational phases of SESRO. As described in paragraph 3.3 of the IEMA guidance (IEMA, 2023), the seven traffic and movement matters below will be assessed:

- Severance
- Driver delay
- Pedestrian delay (as a proxy for all NMU delay)
- NMU amenity
- Fear and intimidation
- Road user and pedestrian safety
- Hazardous/large loads

11.6.8 The assessment of severance is also outlined in Chapter 17 – Communities.

11.6.9 The construction of SESRO is likely to have greater significant effects than operation due to increased HGV volumes transporting materials and equipment to the construction site. However, any significant effects during construction would be temporary.

11.6.10 The sections below outline the likely significant effects associated with the construction and operation of SESRO associated with each matter outlined above.

Construction

11.6.11 Potential effects during the construction of SESRO associated with each of the seven matters include:

- Severance – there are likely to be alterations to footways, cycleways, equestrian routes, and PRoW, including temporary diversions or permanently diverted routes reinstated elsewhere to remain consistent with the existing PRoWs. These changes may temporarily affect walkers, cyclists and horse riders (WCH) due to the severance of PRoW and local roads. Furthermore, traffic management measures, such as temporary road closures, may affect severance for communities and the emergency services
- Driver delay – there may be temporary adverse effects associated with construction activities, including the movement of materials, equipment and personnel, as well as the presence of HGVs which are expected to increase traffic volumes and alter traffic flows on nearby roads. Additionally, road users may experience temporary inconveniences such as diversions and extended travel times due to partial or full road closures and roadworks, such as the realignment of Steventon to East Hanney Road

- Pedestrian delay – there are likely to be temporary adverse effects on pedestrian journey times, particularly if paths are closed or diverted, or associated with increased construction HGVs and construction worker vehicle movements. Temporary road closures may also result in disruption to public transport and may affect pedestrian travel times
- NMU amenity – there are likely to be temporary adverse effects during construction due to alterations to footways, cycleways, equestrian routes and PRoW, reducing the attractiveness and accessibility of the area for cyclists, walkers/wheelers and horse riders with noise, dust and visual intrusion diminishing user experience
- Fear and intimidation – there are likely to be temporary adverse effects on NMUs, along with perceived increased risk due to the increase in construction traffic, HGVs and the presence of construction workers, particularly in relation to vulnerable groups
- Road safety – there could be temporary adverse effects on road safety, with changes in traffic volumes and speeds. Changes to the road network can also influence collision rates and overall safety. Additionally, increased heavy construction traffic could increase the risk of accidents and road condition deterioration
- Hazardous / large loads - there may be temporary adverse effects as a result of abnormal loads during construction, which are likely to require escort vehicles, causing delay, increased risk and safety concerns

Operation

11.6.12 Potential effects during the operation of SESRO associated with each of the seven matters include:

- Severance – there are likely to be positive effects where junctions and road layouts are improved to include explicit pedestrian and cycle facilities, along with improved walking and cycling facilities within the SESRO EIA WScoping Boundary. However, there could also be adverse effects if traffic flows significantly increase
- Driver delay – there could be positive and negative effects on driver delay due to increases or decreases in traffic flows associated with any permanent road closures or access roads to SESRO, and the effects these have on local surrounding roads. The volume/composition of traffic and associated speeds / journey times would change as a result of SESRO due to increased visitor numbers. This may be particularly important for buses, emergency services and local drivers
- Pedestrian delay – there could be negative effects due to increases in traffic flows increasing the time taken to cross roads. Also, there may be potential negative impacts on walking due to roads and PRoW being permanently closed or diverted. Positive effects are also likely, resulting

from improved pedestrian facilities as part of junction enhancements and potential improvements to PRoW or permissive paths

- NMU amenity – there are likely to be positive effects for NMUs where junctions and road layouts are improved, PRoW and footpaths enhanced to include explicit pedestrian and cycle facilities, along with SESRO offering new recreational activities. However, there could also be adverse effects where traffic flows significantly increase
- Fear and intimidation – there are likely to be positive effects on pedestrian fear and intimidation where junctions and road layouts are improved to include explicit pedestrian and cycle facilities. There are also likely to be negative effects due to increased traffic on local roads resulting from visitors to SESRO
- Road safety – there could be negative effects due to traffic arriving and departing SESRO, with changes in traffic volumes and speeds having the potential to affect collisions and safety. There is also the potential for changes to the incidence of fog or ice, due to the presence of a large area of water, represented by the reservoir, which could impact traffic on the A34 and surrounding local roads. There is also the potential for positive effects on road safety resulting from potential improvements to road infrastructure and junction enhancement
- Hazardous/large loads - there are unlikely to be any abnormal loads during the operational phase

11.7 Assessment Methodology

Introduction

11.7.1 The assessment methodology for traffic and movement outlined in this section applies to both the construction and operational phases of the SESRO Project.

11.7.2 The following key guidance relevant to traffic and movement will be considered within the assessment process:

- Environmental Assessment of Traffic and Movement (IEMA, 2023)

11.7.3 The following key standards relevant to traffic and movement will be considered within the assessment as outlined in the IEMA guidance (IEMA, 2023):

- DMRB LA 101 to 104 and LA 112 (Highways England, 2019a; Highways England, 2019b; Highways England, 2020d; Highways England, 2020c; Highways England, 2020b)

11.7.4 Based on the IEMA guidance (IEMA, 2023), the following two criteria will be used to assist in identifying the extent of the assessment:

- Highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%)

- Highway links of high sensitivity where traffic flows increase by 10% or more

11.7.5 Assessments will be undertaken for the peak year of construction and the peak year of operation, which is likely to be when SESRO is opened for visitors, as no further expansion of SESRO is proposed. At this stage, it is expected that assessments will be undertaken for a typical weekday and weekend day (Saturday or Sunday) to account for both regular and peak usage, given the recreational facilities planned at SESRO.

11.7.6 A spreadsheet-based traffic model will be developed for the purpose of assessing both construction and operational traffic. This will incorporate the baseline traffic data sources outlined in Section 11.5 of this chapter to establish an existing and future baseline on which to assess traffic impact.

Characterising impacts and effects

11.7.7 The assessment of the value, sensitivity and significance of the impacted resource or receptor, as well as the overall scope, character and importance of the resulting effect would be considered. Furthermore, paragraph 3.9 of DMRB LA 104 (Highways England, 2020c) standard stipulates the necessity to determine if the expected impact will be of a short, medium, or long duration, and whether its nature will be permanent or temporary.

Construction

11.7.8 At the time of writing, construction details have not been finalised and so the potential impacts are based on key assumptions. It is expected that construction information will be available in the Preliminary Environmental Information (PEI) Report.

11.7.9 The determination of significant effects from changes to traffic hinges on various factors, including the proportion of the construction material arriving by rail (thereby reducing road generated trips), the origin and destination of construction materials arriving by road, the volume of construction traffic on certain routes, the distribution of the construction workforce, existing traffic patterns (including peak hours, average speeds and the proportion of HGVs and Light Goods Vehicles (LGVs)), as well as the proximity of receptors to the roads within the study area and the location and duration of roadworks.

11.7.10 Although a rail sidings are proposed, materials will still need to be transported by vehicle between the sidings and the worksite location(s). At this early stage it is envisaged that internal haul roads will be used and, therefore, the external highway network is unlikely to be required to transport this material. Furthermore, the potential effects of the additional rail freight trains on the wider rail users will be considered as part of the Traffic and Movement aspect.

11.7.11 Temporary or permanent road diversions may be necessary, leading to increased travel times and potential congestion. There are also likely to be adverse effects on pedestrians, cyclists and equestrians due to severance or rerouting of PRoW and footpaths.

Operation

11.7.12 At the time of writing, the operational details have not been finalised and so the potential impacts can only be assumed. Operational information traffic and movement information is expected to be available in the PEI Report.

11.7.13 During operation of SESRO, the impacts and effects can be characterised by increased visitor vehicles, particularly during peak holiday seasons and weekends. This likely increase in traffic could affect local traffic volumes, leading to driver and pedestrian delays and reduced user amenity.

11.7.14 Additionally, the increased number of vehicles could affect safety, causing fear and intimidation among local road users. Safety may also be affected by changes to micro-climate, specifically fog potentially generated by the large area of water during specific weather conditions and potential impacts on the frequency of icy conditions. This is to be assessed by determining the baseline including:

- The probability of frosty and foggy days (based on weather station and climate data)
- The probability of road accidents related to ice or fog (OCC, DfT data, STATS19)
- The current icing salt operations (OCC data)

11.7.15 Correlation and regression analysis of weather and accident / icing data sets would then be undertaken using a risk model linking frost / fog incidence with accidents (time series or probability-based model depending on data provided).

11.7.16 The future probability of frost and fog days under two future scenarios ‘medium’ and ‘high’ climate change scenarios would then be assessed using data on frost-days from UK Climate Projections (UKCP) 18 and UK Climate Risk Indicators and a sensitivity analysis on local frost / fog days based on professional judgement. Then an estimate of the future probability of accidents with and without the reservoir and with and without climate change will be made followed by identification of any mitigation required and any residual risks.

Determining the sensitivity of receptors

11.7.17 The sensitive receptors identified within the study area will be assigned to the nearest highway link, and the relationship with the highway environment examined to understand the sensitivity of those receptors to change. Subsequently, each highway link within the study area will be assigned a sensitivity value.

11.7.18 The sensitivity of the assessed links will vary based on the surrounding conditions and receptors. Paragraph 1.28-1.30 of the IEMA guidance (IEMA, 2023) highlights groups and special interests that may be more sensitive to change as detailed in Section 11.6.

11.7.19 However, when assigning the level of sensitivity to a receptor, the IEMA guidance does not explicitly identify an overarching set of criteria that can be applied that is relevant in traffic and movement terms.

11.7.20 Sensitivity values are shown in Table 11-3. These are based on Paragraph 3.2 and Table 3.2N of DMRB LA 104 Environmental assessment and monitoring (Highways England, 2020c), and Table 3.12 of DMRB LA 112 Population and human health (Highways England, 2020b).

11.7.21 Whilst these values are relatively general classifications applied across environmental assessment aspects and, as such, are not specific to the sensitivity of the human population, in the absence of explicit traffic and movement criteria it is proposed to adopt them for the purposes of the traffic and movement assessment for SESRO.

Table 11-3 Sensitivity of receptors

Value (sensitivity) of receptor / resource	Typical description (DMRB LA 104)	Typical description (DMRB LA 112)
Very High	Very high importance and rarity, international scale, and very limited potential for substitution	National routes with frequent daily commuter or recreational use, regular use by vulnerable users and with little or no potential for diversion. Joins or alongside roads with greater than 16,000 vehicles per day
High	High importance and rarity, national scale, and limited potential for substitution	Regional routes with frequent daily commuter or recreational use and with limited potential for diversion. Joins or alongside roads with 8,000 to 16,000 vehicles per day
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution	PRoW mainly for recreational use and where alternatives routes are available. Joins or alongside roads with 4,000 to 8,000 vehicles per day
Low	Low or medium importance and rarity, local scale	PRoW mainly for recreational use and which are scarcely used or

Value (sensitivity) of receptor / resource	Typical description (DMRB LA 104)	Typical description (DMRB LA 112)
		fallen into disuse. Joins or alongside roads with less than 4,000 vehicles per day
Negligible	Very low importance and rarity, local scale	N/A

Source: Highways England (2020c, 2020b).

Determining magnitude of impacts

11.7.22 Paragraph 3.3 of the IEMA guidance (IEMA, 2023) identifies the key impacts that are most important when assessing the magnitude of traffic impacts from an individual development. The impacts and levels of magnitude are discussed below:

- Severance – changes in traffic of 30%, 60% and 90% are regarded as resulting in minor, moderate and major changes in severance, respectively
- Driver delay – delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. Estimates of the changes in vehicle delays, and hence the sensitivity of each junction as a result of SESRO traffic, will be assessed using industry standard software such as Junctions 9 and LinSig
- Pedestrian delay – the delay to pedestrians, as with driver delay, is only significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. An increase in total traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross a road and would be considered 'major'
- NMU amenity – an indicative threshold for judging the significance of changes in pedestrian amenity is where the traffic flow (or its HGV component) is halved or doubled. It is, therefore, considered that a change in the traffic flow of -50% or +100% would produce a 'major' change in pedestrian amenity
- Fear and intimidation – Table 3.3 within the IEMA guidance (IEMA, 2023) provides four thresholds; high, medium, low and negligible. These thresholds are determined through a scoring approach in which the degree of hazard is estimated based on 18-hour traffic volumes (2-way) and average vehicle speeds for each assessed highway link. The level of change from the baseline is then used to determine the magnitude of impact likely to be experienced
- Road safety – professional judgement would be used to assess the implications of local circumstances, or factors which may elevate or lessen

risks of accidents. This could include increases in traffic, as well as environmental factors such as increases in the occurrence of fog and ice on the surrounding road network
- Hazardous /large loads – estimates will be made of the number of abnormal loads and their timing within the construction programme. Professional judgement will be used to assess their implications upon local circumstances

Determining significance

11.7.23 To determine the overall significance of effects, the combination of the receptor sensitivity and magnitude of impact will be applied as summarised in Table 11-4 Significance of effect, which is broadly based upon Table 3.8.1 of DMRB LA 104 (Highways England, 2020b).

Table 11-4 Significance of effect

Sensitivity / value		Magnitude			
		Negligible	Minor	Moderate	Major
	Negligible / Low	Negligible	Negligible	Slight	Moderate
	Medium	Negligible	Slight	Moderate	Major
	High / Very High	Slight	Moderate	Major	Major

Source: Highways England (2020c).

11.7.24 Significant effects are considered to be those of moderate significance and above.

Assessment of residual effects

11.7.25 The assessment of residual effects will consider the remaining effects and their significance after mitigation measures have been identified and applied. At this early stage, it is too early in the EIA process to identify which of the elements described above are likely to result in residual effects.

Assessment of cumulative effects

11.7.26 The assessment of inter-development cumulative effects is set out in Chapter 20 – Cumulative Effects of this EIA Scoping Report. In most cases the cumulative effects of traffic generated by other developments, once they become operational, should already be accounted for within the future year baseline traffic forecasts for the study area, as described in Section 11.4 of this chapter. However, the list of future developments, known as Reasonably

Foreseeable Future Projects (RFFP), will be checked and agreed with OCC and VoWHDC to ensure that all significant proposed developments are accounted for.

11.7.27 Intra-development effects will be assessed and reported in the individual chapters of the ES, including that for Traffic and Movement. Such Traffic and Movement effects may result in cumulative effects on individual receptors in combination with, for example (but not limited to), Landscape and Visual Effects (Chapter 9), Noise and Vibration (Chapter 12) and Air Quality (Chapter 13).

Assumptions, limitations, and uncertainties

11.7.28 Details relating to the construction and operation of SESRO are not confirmed at this early stage of the EIA process. However, these details are in development and will be assessed through the EIA process as the design for SESRO is refined. The assessment of traffic and movement impacts presented in the ES will be based on design and construction information available at the time of assessment.

11.7.29 As these schemes develop or locations are identified into the future and information on them becomes available, where possible, they will be dealt with as potential sources of inter-development cumulative effects in the SESRO ES.

11.7.30 It should also be noted that, while such facilities will be controlled by their own permissions and permits, these cannot guarantee that no significant effects might occur, however, they would make significant effects ‘unlikely’.

11.7.31 For traffic and movement, upstream and downstream effects have, however, been considered as part of the development of this Scoping Report in relation to HGV access routes to be used to bring in incoming materials and export wastes during the construction phase.

11.8 Mitigation and Environmental Net Gain

Primary

11.8.1 Primary mitigation is embedded within the design of a proposed development. Initial examples of such mitigation to be considered as part of the SESRO Project could include, but not be limited to:

- Rail has been identified as a key opportunity to transport construction materials to the construction site and is a fundamental part of the preliminary design and location choice for SESRO. This will help reduce the dependency on the highway network during construction and reduce the number of vehicle trips generated, most notably on the A34 corridor and A415

- As part of junction designs consideration will be given to NMU provision to ensure their safe movement along key routes between nearby settlements and SESRO
- During the construction phase there will likely be a requirement to divert existing PRoW that currently pass through the SESRO EIAcoping Boundary. However, these routes will be reinstated and incorporated back into the SESRO Project. This presents an opportunity to enhance PRoW and permissive paths, and thereby increase the attractiveness of these routes for walking, cycling and horse-riding
- New active travel provision for walkers / wheelers and cyclists is proposed along the Steventon to East Hanney road diversion, which is not currently a feature of the existing road between Steventon and East Hanney
- Every effort will be made to construct the intake / outfall with minimal disruption to the River Thames and the craft that use the waterway

Secondary

11.8.2 Secondary mitigation is that designed to mitigate specific impacts identified by the EIA process. These aim to avoid or reduce the magnitude of the likely significant effects identified, and may include:

- Improving/widening of off-site junctions
- Carriageway widening
- Provision of/improvements to pedestrian crossings
- Optimisation of off-site signalised junctions
- Pedestrian and cycleway enhancements
- Parking/loading restrictions
- Traffic calming features
- Speed limit alterations
- Public transport and bus stop improvements
- Highway lighting improvements
- Signing and road marking improvements

11.8.3 Additionally, the secondary mitigation measures would also include, but not be limited to, those outlined below:

- A Construction Traffic Management Plan (CTMP) would be included as part of the Code of Construction Practice (CoCP) and would seek to reduce the impact of construction traffic on communities and the environment. Objectives of the CTMP will include:
  - Reducing vehicle movements for both materials and workers, especially during peak periods, to reduce delay on the highway network

  - Increasing rail transport opportunities in order to reduce vehicle movements via road

  The implementation of CTMPs seek to reduce inconvenience to the public using the highway and PRoW caused during construction. They define how construction activities affecting traffic and movement during the works are undertaken and managed. The CTMP will detail how traffic management measures will be used to control temporary road and PRoW closures and diversions and how they will be coordinated with other highway works to reduce impacts
- A Construction Workforce Strategy will be developed which will explore opportunities to locate worker accommodation within reasonable distance from, or on, the SESRO construction site, with the aim of reducing commuter distances and, therefore, reducing the extent of worker vehicle trips on the highway network
- A Construction Travel Plan will be developed which will seek to influence worker travel patterns. This will include a series of objectives aimed at reducing car travel, as well as providing details of local public transport and active travel facilities and services to help workers make informed decisions on their travel behaviour
- During the operational phase a Travel Plan will be implemented which will set out clear targets and measures focused on reducing private car trips on the highway network, relating to both visitors and operational / maintenance staff. This could involve methods such as a website to guide visitors on how to reach SESRO, prioritising public transport, cycling, and walking for locals and placing car trips last or as the least preferred option. Restricting parking or providing designated parking away from sensitive receptors and allocating family or car sharing spaces only could also be considered along with shuttle bus services from nearby stations

Tertiary

11.8.4 Tertiary mitigation is mitigation that is standard practice or required by legislation. In relation to SESRO, this could include, but not be limited to:

- Road safety audits would be conducted during the development of SESRO to reduce any impacts on road safety, in accordance with the DMRB GG 119 Road Safety Audit (Highways England, 2020a). The standard outlines a four-stage approach covering preliminary design, detailed design, construction, and post opening

Environmental net gain

11.8.5 An aspect of the SESRO design will be to provide a wide range of PRoW and permissive paths for walking, wheeling, cycling and horse riding. These would connect into the existing PRoW network surrounding SESRO, ensuring an integrated network with a high standard of connectivity to surrounding settlements. These enhancements would help encourage active travel from these communities.

11.8.6 New active travel provision is also proposed along the Steventon to East Hanney diversion, which does not currently exist as part of the corridor between Steventon and East Hanney. The new route, therefore, has the potential to be used by cyclists for commuting, leisure and other travel purposes, helping to promote more sustainable travel in the local area.

11.8.7 The traffic generating nature of the construction phase means opportunities for environmental net gain in relation to traffic and movement are limited. Whilst efforts to promote sustainable travel by visitors during operation will be made, there is a high likelihood of a large proportion of visitor trips being made by private car.

11.9 Summary of Scope for the EIA

EIA scope for the preferred option

11.9.1 Table 11-5 summarises the potential traffic and movement impacts that are proposed to be scoped in or out of further assessment, along with the rationale for the choice.

Table 11-5 Summary of traffic and movement matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Severance	IN	During construction there will be an increase in traffic, including HGVs, and roads may need to be closed temporarily, with resultant increase in traffic on signed diversion routes. The consequence of this could be potential disruptions to local communities, such as limiting access to essential services like schools, healthcare, and shops. Analysing severance impacts ensures that measures can be taken to maintain community cohesion

Environmental matter	Scoped in / out	Rationale
		and connectivity, mitigating negative social and economic effects on residents.
Driver Delay	IN	Construction activities can lead to increased traffic congestion and longer travel times. This can have significant economic implications for businesses reliant on timely deliveries and employees commuting to and from work. Addressing potential delays is crucial for maintaining the overall efficiency of the transport network and reducing disruption.
Pedestrian Delay	IN	Construction activities have the potential to affect pedestrian mobility and access to services as a result of increased construction traffic levels and temporary traffic diversion measures. Delays can pose significant safety risks and disrupt daily routines.
NMU amenity	IN	During construction, likely disruptions such as increased traffic and temporary changes to PRoWs / cycleways may pose safety issues and/or reduce accessibility. The evaluation of such potential impacts is crucial for maintaining quality of life and promoting sustainable and active transport options.
Fear and intimidation	IN	During construction, machinery, increased HGV traffic and temporary changes to PRoW / cycleways could create intimidating conditions for vulnerable road users. Such impacts have the potential to alter how people use movement infrastructure. This is particularly important for vulnerable groups such as children, the elderly and people with disabilities.
Road user and pedestrian safety	IN	Construction activities and associated altered traffic patterns can increase the risk of accidents. Ensuring safety for all road users is essential for compliance with health and safety regulations, preventing accidents and protecting public health.
Hazardous / large loads	IN	During construction, there may be a requirement to transport abnormal loads and

Environmental matter	Scoped in / out	Rationale
		potentially dangerous material to the SESRO site. Such movements could lead to potential traffic disruption and safety risks to other road users.
Operational phase		
Severance	IN	During operation, there will be an increase in traffic levels associated with visitors and workforce travelling to and from the SESRO site. The consequence of this could be potential disruptions to local communities, such as limiting access to essential services like schools, healthcare and shops. On the other hand, some aspects of severance that may occur in the construction phase would likely be improved in the operational phase, for example, the reinstatement of PRoW as part of SESRO.
Driver Delay	IN	Operational traffic associated with visitors and workforce travelling to and from the SESRO site could likely lead to increased traffic congestion and longer travel times, most notably during seasonal peaks. This can have significant economic implications for businesses reliant on timely deliveries and employees commuting to and from work during these periods. Addressing potential delays is crucial for maintaining the overall efficiency of the transport network and reducing disruption.
Pedestrian Delay	IN	Increases in traffic levels associated with operational visitors and workforce travelling to and from the SESRO site have the potential to affect pedestrian mobility and access to services. Delays can pose significant safety risks and disrupt daily routines.
NMU amenity	IN	During operation, SESRO may attract recreational NMU, necessitating safe NMU provision. Assessing the potential effects is vital for encouraging the adoption of sustainable and active modes of transport.

Environmental matter	Scoped in / out	Rationale
Fear and intimidation	IN	During operation, increased traffic levels associated with visitors and workforce travelling to and from SESRO could contribute to a sense of fear and intimidation for vulnerable road users. This may result in changes to peoples travel patterns and travel behaviours impacting their daily routines. This is particularly important for vulnerable groups such as children, the elderly, and people with disabilities.
Road user and pedestrian Safety	IN	Increases in traffic levels resulting from operational visitors and workforce travelling to and from SESRO has the potential to increase the risk of accidents. Further, the potential for changes in the occurrence of fog or ice could impact the safety of road users. Ensuring safety for all road users is essential for compliance with health and safety regulations, preventing accidents and protecting public health.
Hazardous / large loads	Out	During operation, large and hazardous loads are not expected to be required.

Potential changes to scope and methods associated with other options

11.9.2 It is unlikely that the scope and methodologies determined for the preferred options would change if other options were to be incorporated.

11.9.3 Nevertheless, the adoption of alternative options could potentially introduce new receptors to the analysis and exclude others, contingent upon their spatial relationship to the proposed alternatives.

11.9.4 As such, while the core assessment methods remain consistent, the specific areas of study and the receptors involved may require adjustments to accurately reflect the implications of other options.

11.10 Next Steps

11.10.1 In preparation for the ES, it is anticipated that the following tasks would be undertaken once traffic generation and the study area are refined and agreed with the relevant stakeholders:

- Complete the traffic and movement surveys and undertake any gap analyses where data may be missing
- Liaise with the construction contractor to understand and develop the construction strategy, haulage routes, HGV volumes and numbers along with personnel trip estimates and their origins
- Refine and quantify operational and seasonal trips, such as those by visitors
- Further develop and integrate PRoW and active travel modes into the SESRO Master Plan
- Support the construction contractor in the development of the draft CTMP and draft Workforce Strategy
- Maintain regular engagement with stakeholders

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12 Noise and Vibration

12.1 Introduction

12.1.0 Noise and vibration may, in certain circumstances, lead to effects on human, ecological and infrastructure receptors. Potential noise and vibration effects are, therefore, considered during the Environmental Impact Assessment (EIA) scoping process.

12.1.1 This chapter of the EIA Scoping Report considers the potential for the following activities to give rise to noise and vibration effects:

- Construction activity within the working area, as described in Chapter 2 – Project Description, including:
- Access road creation (and traffic on those access roads)
- Excavation
- Embankment / screening mound formation
- Operations at the proposed rail sidings
- Piling, and
- Tunnelling
- Construction vehicle movements on public highways
- Normal operations at the Above Ground Infrastructure (AGI), including:
- The pumping station (which comprises the buried, below ground, pumping station and wet well and the above ground control building)
- Intake/outfall structures, and
- Operational traffic on the proposed diverted road, access road and public highways

12.1.2 The potential for effects associated with each of these activities on human receptors (such as dwellings, schools, hospitals, places of worship, recreational areas (e.g., open spaces and parks) and other noise-sensitive locations) are within the scope of this chapter. Effects of noise and vibration on other receptors are considered in the following chapters:

- Chapter 7 – Aquatic Ecology and Chapter 8 – Terrestrial Ecology respectively – which consider ecological receptors within designated sites and protected species
- Chapter 9 – Landscape and Visual Effects – which considers tranquillity
- Chapter 10 - Historic Environment – which considers the setting of historic receptors such as Listed Buildings
- Chapter 17 – Communities – which considers impacts on public rights of way,
- Chapter 18 – Human Health – which considers the effects of a range of aspects, including noise, on human health

12.1.3 A list of commonly used acoustic terms and definitions are presented in Appendix I.

12.2 Legislation, Policy, Standards and Guidance Context

12.2.1 Key policy relevant to noise and vibration is set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs) (Defra, 2023). Section 4.11 of the NPS provides guidance on the assessments and planning requirements that the applicant should meet with respect to noise and vibration. These include:

- Factors that will determine the likely noise impact of the proposals
- The components of the noise assessment to be included in the Environmental Statement (ES)
- Prediction, assessment and management techniques
- Mitigation measures
- Policy compliance requirements

12.2.2 In addition to the policy set out in the NPS, the SESRO project would also have regard to the relevant key legislation, policy, standards and guidance for this aspect as listed in Table 2-1.

12.2.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the SESRO Project would be provided in the Preliminary Environmental Information (PEI) Report and / or ES.

Table 12-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Environmental Protection Act (EPA) 1990 Part III
Control of Pollution Act (COPA) 1974
Planning Act 2008
National policy
The National Planning Policy Framework (NPPF) 2023 (Ministry of Housing, Communities and Local Government (MHCLG), 2023)
The Noise Policy Statement for England (NPSE) 2010 (Defra, 2010)
National Policy Statement for Water Resources Infrastructure April 2023 (Defra, 2023)
Planning Practice Guidance – Noise (Ministry of Housing, Communities and Local Government (MHCLG), 2019)

Relevant legislation, policy, standards and guidance
Defra Noise Action Plan: Roads (Defra, 2019a)
Regional policy
Oxfordshire Minerals and Waste Local Plan – Part 1 Core Strategy (Oxfordshire County Council, 2017)
Oxfordshire's Strategic Vision for Long-Term Sustainable Development (Future Oxfordshire Partnership, 2021)
Standards and guidance
The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment' (IEMA, 2014)
The Association of Noise Consultants, Guidelines, measurement & assessment of groundborne noise & vibration (Association of Noise Consultants (ANC), 2012)
Construction Noise - A good practice guide to the preparation, submission and management of Section 61 consents (Association of Noise Consultants (ANC), 2023)
International Organisation for Standardisation (ISO) 9613-2 Acoustics — Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors (ISO, 2024)
International Organisation for Standardisation (ISO) 14837-1:2005 – Mechancial vibration – Ground-borne noise and vibration arising from rail systems - Part 1 – General Guidance (ISO, 2005)
Ground Vibration Caused by Civil Engineering Works (New, 1986)
Legislation and practice on noise and vibration control with particular relevance to piling (British Steel & General Steels, 1986)
Professional Practice Guidance (ProPG): Planning and Noise (Association of Noise Consultants (ANC), Institute of Acoustics, Chartered Institute of Environmental Health, 2017)
Transport and Road Research Laboratory (TRRL) – Traffic Induced Vibration in Buildings - Research Report 246 (TRRLL 1986)
Groundborne vibration caused by mechanised construction works, TRL Report 429 (Transport Research Laboratory, 2000)

12.2.4 The legislation, policy, standards and guidance listed above provide methods for predicting and/or assessing environmental noise and vibration impacts resulting from construction and operation of infrastructure developments such as SESRO.

12.3 Engagement

12.3.1 Key comments and actions arising from the South Oxfordshire District Council (SODC) and Vale of White Horse District Council (VoWHDC) Environmental Protection Team during the Technical Liaison Group (TLG) meeting on 25 March 2024 are presented in Table 12-2.

Table 12-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
SODC and VoWHDC	Proposed baseline noise monitoring locations to be included in the survey will be provided to SODC and VoWHDC	The proposed baseline noise monitoring locations are presented in Section 12.5
	Noise and vibration mitigation measures to be outlined in the scoping report, with details proportionate to the current design stage	Potential construction and operational noise and vibration controls are discussed in Section 12.8

12.4 Existing Environment and Baseline Conditions

Study areas

12.4.1 Separate study areas are defined below for each element of the noise and vibration assessment. The study areas are within two Local Planning Authorities (LPAs), SODC and VoWHDC and cover a number of settlements (including Marcham, Abingdon, Drayton, Steventon, East Hanney and Oday Hill).

Construction noise and vibration

12.4.2 Following guidance in BS 5228-1, the study area (for both the scoping and impact assessment stages of the EIA process) for the construction noise assessment is 300m from any construction activity, or the area within which sound levels from the SESRO Project are forecast to give rise to potential impacts, whichever is the greater.

12.4.3 The study area (for both the scoping and impact assessment stages of the EIA process) for the construction vibration assessment is 100m from any construction activity, or the area within which vibration levels from the SESRO Project are forecast to give rise to potential impacts, whichever is the greater.

Construction road traffic noise and vibration

12.4.4 The construction traffic noise study area is defined as 50m from the carriageway edge of public roads with the potential for an increase in basic noise level (BNL) of 1 dB(A) or more. These routes will be determined on review of the data which will be generated by the Transport and Movement Assessment. The procedure for calculating a BNL is set out by the CRTN document and relates to a noise level at a reference location 10m from the carriageway edge.

12.4.5 For construction traffic vibration, the study area is based upon guidance presented by TRRL (British Steel & General Steels, 1986), which indicates that a 'Heavy lorry on a poor road surface' would result in groundborne vibration (GBV) levels of less than 1mm/s (peak particle velocity (PPV)) at a distance of approximately 2m and approximately 0.3mm/s at a distance of approximately 4m. The study area is defined as 4m from the carriageway edge of any route used by heavy goods vehicles (HGV). Chapter 11 – Transport and Movement identifies potential routes that could be used by HGVs to access the construction sites. The construction traffic vibration study areas will be confirmed once the relevant routes are determined.

Construction rail movement noise and vibration

12.4.6 The CRN document states that noise predictions may be made at distances of up to 300m from a railway. No further guidance related to an assessment study area is provided. An initial, conservative, study area of 300m from the railway shall be adopted but kept under review throughout the EIA process.

Operational noise

12.4.7 There is no current authoritative guidance on how far a noise study area should extend from operational noise sources. The study area required for operational noise sources will largely depend upon when a source is operational (day or night-time) and the noise emission level from the source (a low noise emission level would result in a smaller study area, than for a higher noise emission level).

12.4.8 It is anticipated that the most common receptor type with the potential to be affected by operational noise is residential. The study area will include, at least, the nearest residential receptors to the operational noise sources and will be kept under review, and extended, if necessary.

Operational road traffic noise

12.4.9 For operational traffic noise from any new or altered highway, DMRB LA 111 (Highways England, 2020) recommends a study area of 600m from the edge of the carriageway. Whereas, on the wider road network, LA 111 recommends a study area of 50m from the carriageway with the potential for an increase in BNL of 1 dB(A) or more resulting from the introduction of a development.

Baseline noise levels

12.4.10 The existing environment and prevailing baseline conditions in the vicinity of the site is likely to be dominated by road traffic noise, predominantly from the:

- A34, to the east and north-east of SESRO
- A338, to the west of SESRO
- A415 (Marcham Road), to the north of SESRO

12.4.11 In addition, noise from the Great Western Main Line railway on the southern EIA Scoping Boundary is likely to dominate at some locations and contribute to the local noise climate to the south of SESRO. Other noise sources would include road traffic noise from local roads and noise associated with rural activities.

12.4.12 A baseline noise survey has not yet been undertaken for the SESRO Project, and as such, where available, online noise mapping data (England Noise Map Viewer[14]) has been used to determine indicative existing baseline sound levels (arising from road and rail noise sources) in the vicinity of SESRO.

Baseline vibration levels

12.4.13 In the majority of locations adjacent to the SESRO Project, no existing appreciable level of vibration exists and, therefore, an absolute criterion is proposed. In certain locations, such as those close to an existing railway, change-based criteria are used. This approach is consistent with the vibration assessment of other major infrastructure schemes.

12.5 Baseline Desk-Based Assessment and Surveys

12.5.1 A desk-based assessment of prevailing baseline conditions, beyond that set out above, has not yet been undertaken. A baseline noise survey is proposed to supplement the on-line noise mapping data (see paragraph 12.4.12) and support the construction and operational noise assessments. The survey will include day, night, weekday and weekend periods. Broadband L_{Aeq}, L_{Amax} and

[14] *Extrium Noise and Air Quality Viewer. Available at: Extrium.co.uk/noiseviewer.html [Accessed 25 April 2022]*

L_{A90} noise levels will be measured and logged during the survey. The proposed baseline noise monitoring locations are shown in Figure 12.1 and were selected as they are the closest to SESRO in all directions around the site.

12.5.2 No baseline vibration survey is proposed at this stage, although measurements may be required at a later stage, close to existing railways, depending upon the Project design.

12.6 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

12.6.1 Sensitive residential properties are located in East Hanney, Steventon, Drayton, Oday Hill, Abingdon and Marcham, along with a number parks and open spaces.

12.6.2 There are a number of schools close to the site, these include St Michael Church of England Primary School in Steventon (370m from the site), Drayton Community Primary School in Drayton (440m), St James Church of England School in East Hanney (660m), Thameside Primary School in Abingdon (690m) and Marcham Church of England Primary School in Marcham (500m).

12.6.3 Abingdon Hospital is located approximately 800m from the site.

12.6.4 There are eight Noise Action Plan Important Areas, as designated by Defra's Noise Action Plan, in or near the study area, seven for roads (13238, 13239, 13240, 4233, 4187, 14722 and 13242) and one for rail (RI_1342).

12.6.5 The schools, hospital and Noise Action Plan Important Areas are shown in Figure 12.2.

Potential environmental effects

Construction effects

12.6.6 The following design assets/works activities are identified as having the potential to generate adverse noise and vibration impacts. This list is provisional and subject to change:

- Site preparation and site mobilisation works
- Construction of the access road and the Steventon to East Hanney road diversion. It is noted that a pipeline section close to the access road may be required as part of the Thames to Southern Transfer (T2ST) development
- Demolition of existing buildings
- Development of replacement floodplain storage and watercourse diversions
- Formation of environmental bunding

- Construction of embankments
- Construction of permanent below ground and above ground infrastructure (including pumping station and river intake/outfall structures)
- Tunnelling (from the location of the pumping station at the reservoir to the River Thames) using a Tunnel Boring Machine (TBM). Tunnelling would be on a continuous 24 hour, seven day working pattern. Based upon data from similar projects, vibration impacts during tunnelling are not anticipated to be significant; however, they remain scoped into the assessment until further information is available concerning ground conditions and tunnelling methods. In addition to vibration impacts during tunnelling, noise impacts resulting from operation of associated above ground plant and equipment may arise
- Tunnelling from the pumping station to the centre of the reservoir – method likely to be either pipe jacking or tunnelling via TBM
- Construction of towers within the reservoir
- Construction of Water Treatment Works (WTW)
- Construction traffic on the access road, diversion road and existing highways
- Construction of the rail sidings (anticipated to include sheet piling), construction rail movements and unloading / handling of construction materials at the rail sidings. It is noted that night-time working during the mainline railway 'possession' would be required when connecting the existing rail line and siding

12.6.7 Thames Water has developed an indicative construction programme of 10 years. Embankment construction works are likely to occur during the summer working season (March to October), and it is assumed that working hours would be from 07:00 to 18:00 on weekdays and between 07:00 to 13:00 on Saturdays.

12.6.8 Detailed methods for construction are not known at this time. Piling methods (e.g. at the river intake/outfall structure and temporary rail sidings) are likely to take the form of sheet piles, but the piling method to be adopted is still under review.

12.6.9 At this time, it is considered appropriate for all construction activities listed above to be scoped into the EIA and, as such, no potential construction noise and vibration effects are scoped out.

Operational effects

12.6.10 During the operational phase, noise will be generated by the use of equipment at the SESRO site and at the intake/outfall structures. Non-motorised water based recreational activities are under consideration at the reservoir, such as angling and/or sailing. Electric motorised craft would be used for access and safety.

12.6.11 The pumps and variable speed drives (VSD) at the pumping station and intake/outfall structures, and other equipment (e.g. air compressors for an air diffuser system, if one is required to maintain water quality within the reservoir), have the potential to be sources of vibration. However, as the pumps will be located on large concrete bases with suitable isolation, any vibration transmitted into the ground is likely to be negligible and at orders of magnitude lower than would be expected to give rise to nuisance or damage to properties. Pumps and other equipment at the inlet towers within the reservoir have the potential to generate noise emissions. However, these towers are located within the reservoir and over 1km from the nearest noise sensitive properties therefore, no significant effects are anticipated.

12.6.12 It is possible that emergency generators will be included in the design to be assessed at the EIA stage. Based on observations made at existing pumping stations, emergency generators will likely only be tested for around 30 minutes once a month during daytime hours, and only used in an emergency to ensure water supplies are maintained during any power outage. There would be a requirement for above ground structures to house, amongst other things, electrical transformers. Transformers are assumed likely to result in negligible noise effects at all off-site receptors. This is based upon observations made at existing pumping stations, and that transformer substations can be located and acoustically insulated to mitigate any potential for significant effects. As such, noise and vibration impacts associated with transformers and emergency generators are scoped out.

12.6.13 All valves will be located within concrete chambers, which are likely to be below ground, or in above ground kiosks. These valves are not considered likely to generate sufficient noise or vibration to be perceptible at local receptors and are scoped out.

12.6.14 Since the pipeline is below ground, noise from the flow of water within the pipeline is considered unlikely to be perceptible at receptor locations. The proposed pipeline will be designed and operated in accordance with industry good practice. This will ensure that pipeline walls are suitably rigid, and that fluid flow within the pipeline will be smooth enough that vibration issues associated with turbulent flow will be avoided.

12.6.15 High voltage overhead powerlines can generate noise due to corona discharge. Noise emissions from overhead lines are primarily influenced by voltage. 132kV voltage overhead power lines would be expected to lead to minimal noise emissions (SP Energy Networks, 2017). Operational noise has been agreed as scoped out for a consented 132kV overhead line DCO project (The Planning Inspectorate, 2017).

12.6.16 The addition or amendment of highways, and/or variations of traffic movements on the local highway network, associated with the operational phase, has the potential to result in significant noise effects.

12.6.17 In summary, operational noise is scoped into the assessment, with the exception of the following sources that are scoped out:

- Operational vibration from the pumping station and intake/outfall structures
- Operational noise and vibration from the inlet towers within the reservoir
- Noise and vibration from the operation of valves
- Noise and vibration from the flow of water within the underground pipeline
- Noise from diverted 132kV (and lower) overhead powerlines

12.7 Assessment Methodology

Introduction

12.7.1 This section sets out how sensitivity would be assigned to receptors, how impact magnitudes would be determined and how significant effects would be identified.

Assigning sensitivity

12.7.2 Both DMRB LA 111 (Highways England, 2020) and the IEMA 'Guidelines for Environmental Noise Impact Assessment' (IEMA, 2014) note that receptors may have various sensitivities to noise, but do not specifically define a sensitivity scale.

12.7.3 Many of the guidance documents cited in Section 12.2, present different assessment criteria for different receptor types. The sensitivity of receptors has, therefore, been considered when selecting the assessment criteria used to describe the magnitude of impact. As such, it is not necessary to define a separate sensitivity scale for noise receptors.

Assigning magnitude and significance of effects

12.7.4 The NPSE 2010 (Defra, 2010) introduced the concept of Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) values for noise but, for the purposes of the assessment of the SESRO Project it is assumed these can apply equally to both noise and vibration. NPSE describes a LOAEL as the level above which adverse effects on health and quality of life can be detected, while a SOAEL is the level above which significant adverse effects on health and quality of life occur. The NSPE 2010 also defines the No Observed Effect Level (NOEL), which is the level below which no effect can be detected.

Construction phase

12.7.5 The construction noise levels of the Project will be assessed throughout the construction period.

12.7.6 Where the predicted construction level exceeds the relevant SOAEL values then a likely significant adverse effect will be reported for each receptor affected.

12.7.7 For residential receptors, likely significant adverse effects (positive from noise reductions and negative from noise or vibration increases) will also be determined on a community basis where the calculated level exceeds the relevant LOAEL but is less than the relevant SOAEL values by taking into account the following factors:

- Type of effect being considered (e.g. Annoyance)
- The magnitude of the effect (i.e. The calculated noise or vibration level compared to the relevant loael and soael values and available dose-response information)
- Change in vibration level, where relevant
- The assessment category;
- The existing sound environment in terms of the absolute level and the character of the existing environment;
- The number and grouping of receptors subject to noise effect and noise change
- Any unique features of the project or the receiving environment
- The potential combined impacts of sound and vibration
- The frequency and duration over which temporary construction impacts may occur
- The effectiveness of mitigation through design or other means

12.7.8 For non-residential receptors, significant effects will be determined on a receptor-by-receptor basis taking into account:

- The use and sensitivity of the receptor
- The type of effect being considered
- Whether the calculated magnitude of noise or vibration exceed the screening criteria (presented in appendix J)
- The design of the receptor affected
- The existing ambient sound and vibration levels in the receptor affected
- The potential combined impacts of airborne sound, ground-borne sound and vibration;
- Any unique features of the project’s sound or vibration impacts in the area being considered (which may require secondary acoustic indicators / criteria)
- The frequency and duration over which temporary construction impacts may occur

- The effectiveness of mitigation through design or other means

Construction airborne noise

12.7.9 Airborne construction noise levels will be predicted at selected receptors potentially impacted by construction airborne noise. Noise modelling software or spreadsheets will be used to implement the BS 5228-1 calculation method.

12.7.10 Table 12-3 is based upon the example threshold for a potential significant effect at dwellings presented in Table E.1 of BS 5228-1 (BSI, 2014a). These noise thresholds have been adopted as the LOAEL values for the assessment of construction noise at residential properties. The Category C threshold values, or the ambient noise level, whichever is the higher, have been adopted as the SOAEL values for the assessment of construction noise at residential properties. During the day, evening or night, a construction noise adverse effect on a receptor will be identified where the impact of the Project is greater than the relevant assessment category value. This approach is consistent with other major infrastructure schemes including High Speed 2 and Thames Tideway Tunnel.

Table 12-3 Airborne noise effect levels from construction – residential receptors

Reference period	Threshold value dB $L_{Aeq,T}$ (façade)		
	Category A [(A)]	Category B [(B)]	Category C [(C)]
Weekday daytime (07:00-19:00) Saturdays (07:00-13:00)	65	70	75
Weekday evenings (19:00-23:00) Saturdays (13:00-23:00) Sundays (07:00-23:00)	55	60	65
Night-time (23:00-07:00)	45	50	55

Notes:

(A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

(B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

(C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

Note 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Reference period	Threshold value dB $L_{Aeq,T}$ (façade)		
	Category A (A)	Category B (B)	Category C (C)
Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.			

Source: Table E.1 and Annex E.5 in BS 5228-1:2009+A1:2014 (BSI, 2014a).

12.7.11 The magnitude scale, and LOAEL and SOAEL methodology set out above and in Appendix J (screening values for non-residential receptors) are applicable to the range of receptors presented. Should other receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria, such as those presented by BS 8233 and the WHO.

Construction groundborne noise

12.7.12 The prediction and assessment of groundborne noise will be undertaken with reference to The Association of Noise Consultants publication, 'Measurement and Assessment of Groundborne Noise and Vibration' (Association of Noise Consultants (ANC), 2012). In addition, where necessary, and if sufficient data from ground investigations is available, predictions of groundborne noise will be undertaken using numerical modelling methods.

12.7.13 The magnitude criteria for groundborne noise are based upon current industry good practice, including assessments presented for projects such as High Speed 2, and are set out in Table 12-4.

Table 12-4 Construction groundborne noise LOAEL and SOAEL

Time periods	LOAEL	SOAEL
All time periods	35 dB L_{ASmax}	45 dB L_{ASmax}

Source: Based on Section B.3 of BS 5228-2:2009+A1:2014 (BSI, 2014a) and High Speed 2 (HS2) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2. (Department for Transport, 2013)

12.7.14 The LOAEL and SOAEL set out above are applicable to residential receptors. Should other receptor types or unusual local circumstances be identified, other values may be set, such as those presented in Appendix J.

Construction vibration

12.7.15 Vibration levels will be predicted at selected receptors within the study area based upon guidance presented in BS 5228-2.

12.7.16 The construction vibration (human response) magnitude scale adopted for the Project is presented in Table 12-5.

12.7.17 The vibration impact criteria (human response), reproduced from BS 5228-2, is presented in Table 12-6 and would be used to assess human response to vibration in occupied residential and occupied non-residential receptors, such as hotels, hospital wards, education dormitories, offices, schools and places of worship.

Table 12-5 Magnitude of impact and construction vibration (human response) descriptions

Magnitude of impact	Construction vibration level
Major	Above or equal to 10 mm/s PPV
Moderate	Above or equal to SOAEL and below 10 mm/s PPV
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Source: Based on Table B.1 in BS 5228-2:2009+A1:2014 (BSI, 2014a) and Table 3.33 in DMRB LA 111 - Noise and vibration, Rev 2 (Highways England, 2020).

Table 12-6 Vibration impact criteria (human response)

Vibration level, PPV (mm/s)	Effect
10	10 mm/s: Vibration is likely to be intolerable for any more than a very brief exposure to this level.
1.0 (SOAEL)	1.0 mm/s: It is likely that vibration of this level in residential environments would cause complaint but can be tolerated if prior warning and explanation has been given to residents.
0.3 (LOAEL)	0.3 mm/s: Vibration might just be perceptible in residential environments.
0.14	0.14 mm/s: Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
<0.14	Vibration is below levels of perception.

Source: Table B.1 in BS 5228-2:2009+A1:2014 (BSI, 2014a).

12.7.18 The risk of structural damage due to construction vibration is considered by reference to criteria set out in BS 7385-2 (BSI, 1993). Based upon this British Standard, BS 5228-2 and the professional experience of the assessment team, the criteria set out in Table 12-7 would be adopted.

Table 12-7 Construction vibration criteria to prevent cosmetic damage to buildings

Category of building	PPV mm/s – at building foundation	
	Transient(1) vibration	Continuous(2) vibration
Potentially vulnerable buildings(3)	6	3
Structurally sound buildings	12	6

Notes

Thresholds are based on those used for HS2 vibration impact criteria for buildings. Taken from HS2 (November 2013) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2.

(1) Transient vibration relative to building response such as impulsive vibration from percussive piling.

(2) Continuous vibration relative to building response such as vibrating rollers.

(3) BS 7385 highlights that the criteria for aged buildings may need to be lower if the buildings are structurally unsound. The standard also notes that criteria should not be set lower simply because a building is important or historic (listed). Properties shall be considered structurally sound, unless stated otherwise.

Source: Based on section B.3 of BS 5228-2:2009+A1:2014 (BSI, 2014a) and HS2 London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration (Department for Transport, 2013).

12.7.19 If a numerical modelling based assessment is undertaken for groundborne noise associated with the tunnelling activities, this modelling would also be used to inform the prediction and assessment of groundborne vibration from tunnelling. The assessment criteria would be reviewed in consultation with the LPAs and updated as necessary to ensure compatibility with model output parameters.

Construction road traffic noise on public highways

12.7.20 The noise impacts magnitude scale for construction road traffic, and the LOAEL and SOAEL values for residential properties, are set out in Table 12-8.

Table 12-8 Magnitude of impact for construction road traffic noise

Magnitude of impact	Change in Basic Noise Level (BNL) resulting from construction traffic noise		
	Where BNL is less than LOAEL of 55 dB LA10,18hr facade	Where BNL is between LOAEL and SOAEL	Where BNL is more than SOAEL of 68 dB LA10,18hr façade (equivalent to 66 dB LAeq,T)
Major	-	Greater than or equal to 10.0 dB	Greater than or equal to 5.0 dB
Moderate	-	Greater than or equal to 5.0 and less than 10.0	Greater than or equal to 3.0 and less than 5.0
Minor	-	Greater than or equal to 3.0 and less than 5.0	Greater than or equal to 1.0 and less than 3.0
Negligible	Any	Less than 3.0	Less than 1.0

Source: Based on Table E.1 in BS 5228-1:2009+A1:2014 (BSI, 2014a) and Table 3.16 and Table 3.17 in DMRB LA 111 - Noise and vibration, Rev 2 (Highways England, 2020).

Construction rail movements

12.7.21 The approach to the assessment of construction noise resulting from rail movements would be similar to that presented for construction road traffic. This is due to similar principles applying in terms of a linear noise source impacting sensitive receptors on an intermittent and temporary basis. Therefore, the criteria within Table 12-8 would apply.

12.7.22 Rail vibration predictions will be undertaken with reference to ISO 14837-1: 2005 (ISO, 2005), supplemented by precedent set by major infrastructure schemes such as HS2. The criteria within Table 12-9 and Table 12-11 would apply when considering potential human response to vibration resulting from construction rail movements. The criteria would also be used when considering tunnelling activities.

Table 12-9 Construction groundborne vibration VDV criteria for rail movements and tunnelling (human response) - In the absence of appreciable existing levels of vibration

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV	
	LOAEL	SOAEL
Residential	16h day: 0.2 $m.s^{-1.75}$ 8h night: 0.1 $m.s^{-1.75}$	16h day: 0.8 $m.s^{-1.75}$ 8h night: 0.4 $m.s^{-1.75}$
Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV	
Hospice / care homes	16h day: 0.2$m.s^{-1.75}$ 8h night: 0.1$m.s^{-1.75}$	
Schools / activity centres / place of worship / offices	16h day: 0.4$m.s^{-1.75}$	
Industrial facilities	16h day: 0.8$m.s^{-1.75}$	
Note Thresholds are based on those used for HS2 vibration impact criteria for buildings.		

Source: HS2 (November 2013) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2.

Table 12-10 Construction groundborne vibration VDV criteria for rail movements and unnelling (human response) - appreciable existing levels of vibration

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), % increase or decrease in VDV	
	LOAEL	SOAEL
Residential	25%	100%
Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), % increase or decrease in VDV	
Hospice / care homes	25%	
Schools / activity centres / place of worship / offices	40%	
Industrial facilities	100%	

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), % increase or decrease in VDV	
	LOAEL	SOAEL
NOTES Thresholds are based on those used for HS2 vibration impact criteria for buildings.		

Source: HS2 (November 2013) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2.

Ground-borne vibration: particularly vibration-sensitive equipment and processes – construction and operation

12.7.23 As noted in ISO 14837-1, there are no standard criteria for assessing the potential impact of vibration on sensitive equipment or processes. Where a receptor within the study area is identified that is likely to be especially sensitive to ground-borne sound and/or vibration, a risk assessment will be undertaken for that receptor based on the information currently available for the relevant equipment / process, or information provided by the building owner or equipment manufacturer.

Site suitability of on-site worker accommodation

12.7.24 The Professional Practice Guidance (ProPG): Planning & Noise (Association of Noise Consultants (ANC), Institute of Acoustics, Chartered Institute of Environmental Health, 2017) presents noise levels to enable an initial risk assessment to be undertaken to identify the likely risk of adverse noise effects for future occupants of residential development, should additional noise mitigation not be included in the proposals.

12.7.25 External environmental noise levels from transportation noise at any on-site temporary worker accommodation (should the draft workforce travel plan indicate the need for worker accommodation) will be predicted using the CRTN and CRN methodologies. The ProPG: Planning and Noise guidance has been used to develop an indicative magnitude scale for use in the EIA process, presented in Table 12-11.

Table 12-11 Magnitude of impact descriptions for residential site suitability

Magnitude of Impact	On-site external noise levels	
	Daytime (07:00 – 23:00) $L_{Aeq,16hr}$ dB	Night-time (23:00 – 07:00) $L_{Aeq,8hr}$ dB
High	>70	<60

Magnitude of Impact	On-site external noise levels	
	Daytime (07:00 – 23:00) $L_{Aeq,16hr}$ dB	Night-time (23:00 – 07:00) $L_{Aeq,8hr}$ dB
Medium	61 to 70	51 to 60
Low	50 to 60	40 to 50
Negligible	<50	<40
No change	N/A	N/A

Source: Based on Figure 1 in ProPG: Planning and Noise.

12.7.26 If the EIA process identifies that additional mitigation is required to protect on-site worker accommodation, internal noise levels will be predicted using BS EN 12354 Building acoustics. Estimation of acoustic performance of buildings from the performance of elements (multi-part document) (BSI, 2023) and reference will be made to criteria presented by BS8233 and The Building Regulations 2010 Approved Document O: Overheating (DLUHC, 2022).

Operational noise from fixed installations

12.7.27 Operational noise from fixed installations will be predicted using the ISO 9613 (ISO, 2024) calculation protocol. The magnitude scale to be used in the assessment of operational noise has been developed based upon guidance in BS 4142. The scale to be used for residential receptors, and those of a similar sensitivity, is presented in Table 12-12. Should other receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria such as those presented by BS 8233 and the WHO.

Table 12-12 Magnitude of impact for operational noise

Magnitude of impact	Difference between background sound level and rating noise level in accordance with BS 4142
Major	More than or equal to +10 dBA
Moderate	Greater than or equal to +5 and less than +10 dBA
Minor	Greater than or equal to 0 and less than +5 dBA
Negligible	Below background ($L_{A90,T}$)

Source: Based on section 11 of BS 4142:2014+A1:2019 (BSI, 2019).

12.7.28 LOAEL and SOAEL values have not been defined for operational noise. Further details are presented in Appendix J.

Operational road traffic noise

12.7.29 Section 3 of DMRB LA 111 provides guidance on determining the magnitude of impacts for road traffic noise. Magnitude of impact is considered for both the short-term and long-term. The classification of noise impact magnitude is set out in Table 12-13, reproduced from Table 3.54a and Table 3.54b of LA 111.

Table 12-13 Magnitude of change (short-term and long-term) – operational road traffic

Magnitude of impact	Short-term Noise Change (dB $L_{A10,18hr}$ or L_{night})	Long-term Noise Change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 5.0	Greater than or equal to 10.0
Moderate	3.0 to 4.9	5.0 to 9.9
Minor	1.0 to 2.9	3.0 to 4.9
Negligible	Less than 1.0	Less than 3.0

Source: Table 3.54a and Table 3.54b of DMRB LA 111 (Highways England, 2020).

12.7.30 NPSE provides further guidance on the effects of noise, introducing the observed adverse effect level categories. LOAEL and SOAEL considered for this assessment are defined in Table 12-14, which is reproduced from Table 3.49.1 of LA 111. These LOAEL and SOAEL are considered to apply to both dwellings and other noise sensitive receptors.

Table 12-14 LOAEL and SOAEL for all receptors – operational road traffic

Time Period	LOAEL	SOAEL
Day (06:00 – 24:00)	55 dB $L_{A10,18hr}$ (façade)	68 dB $L_{A10,18hr}$ (façade)
Night (23:00 – 07:00)	40 dB $L_{night,outside}$ (free-field)	55 dB $L_{night,outside}$ (free-field)

Source: Table 3.49.1 of DMRB LA 111 (Highways England, 2020).

12.7.31 LA 111 states that the initial assessment of likely significant effects on noise sensitive buildings shall be determined. This initial assessment identifies Major and Moderate short-term magnitudes of impact as potentially significant, while Minor and Negligible magnitudes are classified as not significant.

12.7.32 Further details of the assessment approach are provided in Appendix J.

Assessment of cumulative effects

12.7.33 In terms of potential intra-development cumulative effects, in addition to exposure to noise and/or vibration during construction and/or operation of SESRO, noise and vibration sensitive receptors may also experience dust and landscape/visual impacts. Potential intra-development cumulative impacts will be kept under review during the EIA.

12.7.34 The ES will include a chapter on potential inter-development cumulative effects, where potential cumulative effects of SESRO together with other projects shall be considered. This is set out in Chapter 20 – Cumulative Effects.

Assumptions, limitations and uncertainties

12.7.35 The assessment of construction and operational noise and vibration impacts would be undertaken using the SESRO design and construction information available at the time of assessment. It may be necessary for proxy noise sources to be used and technical assumptions to be made, in order to allow an assessment to be undertaken.

12.7.36 Baseline noise monitoring is proposed at up to 12 locations in the vicinity of the SESRO site. However, obtaining permission from landowners or residents to access the monitoring locations would be necessary and, as such, there is a risk that monitoring would not be possible at all of the identified locations.

12.7.37 The Cumulative Effects Assessment (CEA) is based on information provided by promoters of other developments which is readily available in the public domain. Where this information is not available, the CEA is to be based on the professional judgement of the assessor.

12.8 Mitigation and Environmental Net Gain

12.8.1 A summary of proposed construction and operational phase mitigation measures are set out below.

Construction phase mitigation

Primary

12.8.2 The works would be carried out in accordance with Best Practicable Means as defined in section 72 of the Control of Pollution Act 1974 and in accordance with the recommendations of BS 5228 part 1 and part 2.

Secondary

12.8.3 Temporary and permanent screening bunds between the reservoir embankments and noise sensitive properties, varying in height from between approximately 2m to 10m above ground level, depending on location and the construction activities to be mitigated.

Tertiary

12.8.4 SESRO will develop and implement a noise and vibration control strategy to reduce construction noise and vibration effects at nearby receptors. Where appropriate, this may include agreeing noise and vibration limits at receptors. The strategy would be documented in a Code of Construction Practice (CoCP) and agreed with the LPA.

Operation phase mitigation

Primary

12.8.5 Noise would be generated by various sources at the above ground infrastructure sites, including pumps, compressors and mechanical ventilation systems. Mitigation of noise emissions from such sources would be controlled through various design / management measures, as appropriate, which may include enclosures, barriers, muffling devices and vibration isolation measures.

12.8.6 Table 12-15 sets out the overriding principles of noise control (note, this would also be applicable for construction noise sources).

Table 12-15 Hierarchy of noise / vibration control

	Description
Preferred option	Remove noise source (e.g., change process)
	Replace the noise source (e.g., quieter equipment available)
	Manage the source (e.g., restrict operating times)
	Control at source (e.g., enclose the noise source, muffling devices, vibration isolators)
	Control along the transmission path (e.g., erect a barrier)
Least favoured option	Control at receptor (e.g., secondary glazing)

Secondary

12.8.7 At this stage, no additional mitigation measures are considered necessary. However, additional mitigation measures may be identified during the noise and vibration assessment process.

Tertiary

12.8.8 At this stage, no tertiary mitigation measures have been identified. However, such measures would be presented, if necessary, during the preparation of the Environmental Statement.

Potential for environmental net gain

12.8.9 Permanent bunds are currently proposed along the western edge of the A34. While these will not reduce road noise levels at existing properties along the A34 (located east of the road), they would reduce noise levels to the area west of the A34 to be used by visitors to SESRO.

12.8.10 Throughout the design process, consideration would be given to opportunities for incorporating design features that would enhance the acoustic climate at, or in the vicinity of, the SESRO Project. These measures would be detailed in the Design Principles or CoCP as a means of ensuring their delivery as part of the scheme. This may include consideration of positive soundscape design to enhance tranquillity, which will be reported in Chapter 9 – Landscape and Visual Effects.

12.9 Summary of Scope for the EIA

EIA scope for the preferred option

12.9.1 Based on the above, Table 12-16 presents the potential noise and vibration impacts that are proposed to be scoped in or out of further assessment, along with the rationale for the choice.

Table 12-16 Summary of noise and vibration matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Construction airborne noise	IN	Some construction activities would occur within close proximity to sensitive receptors (within the relevant study area), would take place for a prolonged period of time, and would involve the use of noisy plant and equipment
Construction vibration	IN	

Environmental matter	Scoped in / out	Rationale
		As such, the potential for significant airborne noise and vibration impacts during the construction phase of SESRO cannot be discounted at this time
Groundborne noise and vibration from tunnelling	IN	Noise and vibration sensitive receptors are located within the study area for groundborne noise and vibration from tunnelling activities. As such, the potential for significant tunnelling noise and vibration impacts during the construction phase of SESRO cannot be discounted at this time
Construction road traffic noise and vibration	IN	There will be additional construction vehicles on existing and proposed new access / diversion roads (including existing roads affected by construction workforce movements), during the construction phase of the SESRO Project. Sensitive receptors are positioned within the construction traffic study area, as such, the potential for significant road traffic noise and vibration impacts during the construction phase of SESRO cannot be discounted at this time
Rail noise and vibration	IN	The potential for significant rail noise and vibration impacts during the construction phase of SESRO cannot be discounted at this time.
Potential use of on-site temporary worker accommodation	IN	Potential for environmental noise and vibration to result in conditions unsuitable for residential purposes
Operational phase		
Noise from the pumping station and intake/outfall structures	IN	The potential for significant noise impacts resulting from the operation of the pumping station and intake/outfall structures, during the operational phase of SESRO, cannot be discounted at this time. An assessment of operational effects would be made at the closest sensitive receptors and the study area adjusted accordingly to ensure all potential significant effects are identified

Environmental matter	Scoped in / out	Rationale
Operational vibration from pumping station and intake/outfall structures	Out	Through the adoption of good practice design and vibration isolation methods for equipment within the AGIs, transmission of groundborne vibration to the AGIs would not result in significant effects
Noise from the operation of valves	Out	While no details are available regarding the presence or location of valves, at this time it is assumed that valves would be located within concrete chambers and are likely to be below ground. These valves are not considered likely to generate sufficient noise to be perceptible at local receptors
Noise and vibration from the flow of water within the underground pipeline	Out	The pipeline is located below ground and associated noise and vibration is considered unlikely to be perceptible at receptors
Noise during emergency conditions	Out	Atypical emergency conditions, including the testing of emergency generators or the emergency discharge of water at the outfall at the River Thames, would occur infrequently. Where testing of equipment can be scheduled, it would be undertaken during daytime hours and for short durations
Noise from transformer substations	Out	Based on observations made at existing pumping stations, and because transformer substations / kiosks can be located and acoustically insulated to mitigate potential significant effects
Road traffic noise	IN	The potential for significant road traffic noise impacts during the operational phase of SESRO cannot be discounted at this time. An assessment of operational effects would be made at the closest sensitive receptors and the study area adjusted accordingly to ensure all potential significant effects are identified
Operation of diverted 132kV (and lower) overhead powerlines	Out	Potential increased noise levels from corona discharge Noise emissions from overhead lines are primarily influenced by voltage. 132kV voltage overhead power lines would be expected to

Environmental matter	Scoped in / out	Rationale
		lead to minimal noise emissions (SP Energy Networks, 2017). Operational noise has been agreed as scoped out for a consented 132kV overhead line DCO project (The Planning Inspectorate, 2017)

Potential changes to scope and methods associated with other options

12.9.2 At this stage, based on the scale of activities and professional judgement, the scope and methods associated with reasonable worst-case options are unlikely to change from those presented in this assessment. It is possible, however, that the implementation of alternative options would both bring new receptors into the assessment and others out, depending on their proximity to the options in question.

12.10 Next Steps

12.10.1 In preparation for the PEI Report, it is anticipated that the following tasks would be undertaken:

- Complete the baseline noise monitoring survey
- Work with the construction contractor to develop a construction plant list and indicative programme of works
- Identify any areas of potential significant effects and seek to integrate environmental design measures to avoid, reduce or mitigate noise or vibration effects

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13 Air Quality

13.1 Introduction

13.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report outlines relevant legislation and policy, the baseline of the receiving environment, possible effects associated with the SESRO Project and sets out the scope and assessment methodology to be used in the Environmental Statement (ES), in relation to air quality.

13.1.2 The term 'air quality' refers to air pollution that could potentially affect health, such as emissions of air pollutants from vehicle exhausts and other combustion sources. It also refers to dust, which could affect health or give rise to annoyance due to the soiling of surfaces through deposition. Both air pollution and dust could also affect sensitive plants and ecosystems. Additionally, odour, which could give rise to annoyance, is also considered within the term 'air quality'.

13.1.3 The pollutants of concern[15] in this scoping assessment are nitrogen dioxide (NO_2) and particulate matter (PM_{10}, particles with an aerodynamic diameter of 10 microns or less and $PM_{2.5}$, particles with an aerodynamic diameter of 2.5 microns or less). Particulate matter and NO_2 are both major components of air pollution in the United Kingdom and are considered key pollutants as stated in the Air Quality strategy: framework for local authority delivery (Department for Environment, Food & Rural Affairs) (Defra, 2023)).

13.1.4 This chapter considers the potential emission sources of air pollutants, dust and odour associated with the SESRO Project as set out below.

Construction phase

- Dust emissions generated by demolition and construction activities including site preparation, excavation and material handling / storage
- Emissions of pollutants to air from construction vehicles on the local road network
- Emissions of pollutants to air from construction plant and machinery
- Emissions from freight trains transporting bulk material (e.g. sand, gravel and rip rap etc.) to the SESRO site

[15] *Ammonia (NH3) can be emitted from vehicle exhausts as a by-product of the catalytic conversion process, which can cause long-term harm to sensitive habitats by increasing nitrogen concentrations in the soil. However, based on an understanding of the scale of activities associated with the SESRO Project, NH3 is not considered a pollutant of concern in this scoping assessment.*

- Odour emissions during earthworks

Operational phase

- Emissions of pollutants to air from operational and visitor vehicles on the local road network
- Dust emissions generated by operational activities
- Emissions of pollutants to air from operational plant and machinery including the Thames to Southern Transfer (T2ST) Water Treatment Works (WTW)
- Odour emissions generated from the operation of the T2ST WTW and reservoir (caused by biological processes)

13.1.5 This air quality scoping assessment is aligned with and supports information and findings communicated by the other environmental aspect chapters of this EIA Scoping Report, including, but not limited to, Chapter 8 – Terrestrial Ecology.

13.2 Legislation, Policy, Standards and Guidance Context

13.2.1 Key policy relevant to air quality set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023) includes:

- Paragraph 4.2.3 requires the applicant, through design, to minimise the emissions of air pollutants as far as reasonably practicable
- Paragraph 4.2.4 emphasises greater consideration should be afforded to those water resources infrastructure projects within or adjacent to Air Quality Management Areas (AQMAs), any road links exceeding limit values, densely populated areas or particularly sensitive human receptor locations such as schools and hospitals
- Paragraph 4.2.5 details the requirements of the content of an ES air quality chapter
- Paragraph 4.2.6 requires the applicant to include future projections of air quality and detailed modelling to demonstrate local impacts, where appropriate
- Paragraph 4.2.7 requires the applicant to work with the relevant authority to secure appropriate mitigation measures to ensure that any statutory air quality limits and objectives are not breached and sufficient consideration of air quality targets is made
- Paragraph 4.2.11 states that the Secretary of State should consider air quality impacts in the vicinity of the proposed development and also the wider area that is likely to be affected
- Paragraph 4.2.12 states that Secretary of State should be satisfied with the proposed construction and operational mitigation put forward by the applicant

- Paragraph 4.2.14 states that the Secretary of State should refuse consent where air quality impacts of the development will result in a breach of the statutory air quality objectives (AQOs) or where it is likely to hinder achievement of statutory emission and concentration targets

13.2.2 In addition to the policy set out in the NPS for Water Resource Infrastructure, the SESRO Project would also have regard to other relevant legislation, policy, standards and guidance for air quality as listed in Table 13-1.

13.2.3 A detailed summary of the legislative, policy and guidance framework for air quality, and how it accords with the SESRO Project, will be provided in the Preliminary Environmental Information (PEI) Report and/or ES.

Table 13-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Directive 2008/50/EC on ambient air quality and cleaner air for Europe (European Union, 2008)
European Union Withdrawal Act 2018
Environment Act 1995, Part IV (UK Government, 1995)
The Air Quality (Standards) Regulations 2010 (2016 as amended)
Environmental Protection Act 1990 Part III
Environment Act 2021
The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020
The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
National policy
National Policy Statement for Water Resources Infrastructure (Defra, 2023)
National Planning Policy Framework, Conserving and enhancing the natural environment (Paragraph 180) and Ground conditions and pollution (Paragraph 192) (Ministry of Housing, Communities & Local Government, 2023)
National Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Defra, 2007)
The air quality strategy: framework for local authority delivery (Defra, 2023)
The Clean Air Strategy (Defra, 2019)
Local policy

Relevant legislation, policy, standards and guidance
The Vale of White Horse Local Plan 2031 Part 1: Strategic Sites and Policies, Spatial Vision and Strategic Objectives (Strategic Objective SO 12), District Wide Policies; Core Policy 33: Promoting Sustainable Transport and Accessibility and Core Policy 34: A34 Strategy (Vale of White Horse District Council (VoWHDC), 2016)
The Vale of White Horse Local Plan 2031 Part 2: Detailed Policies and Additional Sites, Development policy 26: Air Quality (VoWHDC, 2019)
Standards and guidance
Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction (IAQM, 2024)
Defra - Local Air Quality Management Technical Guidance (TG22) (Defra, 2022)
Environmental Protection UK & Institute of Air Quality Management - Land-Use Planning & Development Control: Planning for Air Quality (Environmental Protection UK (EPUK)/IAQM, 2017)
Vale of White Horse District Council (VoWHDC) Air Quality Developer's Guidance (VoWHDC, 2021)
IAQM Guidance on the assessment of odour for planning (IAQM, 2018)

13.2.4 The legislation and policies listed in Table 13-1 above aim to prevent or reduce the impact of air quality at sensitive receptors. Planning policy ensures that new development proposals adequately consider potential impacts on air quality.

13.3 Engagement

13.3.1 Engagement with representatives from VoWHDC and Oxfordshire County Council (OCC) was undertaken on 25 March 2024 to discuss the air quality EIA scoping approach. The key comments and actions from the engagement are presented in Table 13-2.

Table 13-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
VoHWDC and OCC	As agreed with the VoHWDC and OCC, emissions from freight trains proposed to transport bulk material do not need to be considered. However, all associated activities should be included	Activities associated with the rail sidings (e.g. movement of materials and formation of stockpiles) have been considered

Consultee	Comment	Response / action taken
	As agreed with the VoHWDC and OCC, pollutant emissions from the operation of the T2ST WTW do not need to be included within this scoping report and ES	Pollutant emissions from the operation of the T2ST WTW have not been considered
	There are no expected odour sources associated with the operation of the T2ST WTW and reservoir. Therefore, as agreed with the VoHWDC and OCC, emissions of odour do not need to be included within this scoping report and ES	Odour emissions from the operation of the T2ST WTW and the reservoir have not been considered
	As agreed with the VoHWDC and OCC, an air quality monitoring survey to support the scoping assessment would not be required	An air quality monitoring survey has not been carried out and is not proposed

13.4 Existing Environment and Baseline Conditions

Study areas

Dust effects

13.4.1 For dust emissions, the assessment at human receptors focuses on areas up to 250m from the EIA Scoping Boundary for SESRO. This distance is based on the IAQM Guidance on the assessment of dust from demolition and construction (hereafter 'IAQM construction dust guidance') (IAQM, 2024) for identifying when an assessment of dust effects is required. The effects of trackout (i.e. the transport of dust and dirt from a construction site onto the public road network, where it may be deposited and re-suspended by vehicle movements) has the potential to occur up to 50m from the edge of local construction routes up to 250m from the construction site exit(s) (IAQM, 2024). In line with IAQM construction dust guidance (IAQM, 2024), the assessment considers potential ecological receptors up to 50m from the EIA Scoping Boundary for SESRO, in respect of dust emissions generally, and up to 50m from the edge of the local construction routes within up to 250m of the construction site exit(s) in relation to trackout effects. Further description is provided in IAQM construction dust guidance (IAQM, 2024).

13.4.2 It is noted that the VoWHDC Air Quality Developer's Guidance (VoWHDC, 2021) states a dust risk assessment should consider human and ecological receptors up to 500m from the construction site exit(s), which differs to the 250m distance as stated in the IAQM construction dust guidance (IAQM, 2024).

13.4.3 As a conservative approach, the 500m distance from the construction site exit(s) has been applied in the scoping assessment.

Vehicle exhaust emissions

13.4.4 For the assessment of emissions from road traffic, the study area is based on identifying where construction or operation activities would lead to a change in traffic flows on the road network, that exceed the relevant thresholds set out in the EPUK/IAQM Land-Use Planning & Development Control: Planning for Air Quality guidance (hereafter ‘EPUK/IAQM planning guidance’) (EPUK/IAQM, 2017), as set out below:

- The change in light duty vehicles (LDV) [16] flows of more than 100 annual average daily traffic (AADT)[17] within or adjacent to an AQMA or more than 500 AADT elsewhere
- The change in heavy duty vehicles (HDV)[18] flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere

13.4.5 Road links where the change in traffic flows exceed these thresholds are considered to be 'affected' roads (EPUK/IAQM, 2017). The study area for the assessment of potential air quality effects from road traffic generated by the SESRO Project includes receptors within 200m of these 'affected' roads.

13.4.6 As per the VoWHDC Air Quality Developer's Guidance (VoWHDC, 2021), the relevant minimum conditions for a detailed assessment are where the development will result in the following on roads with more than 10,000 vehicles per day, or any road within an AQMA:

- changes in peak traffic volumes (>5% AADT or peak)
- changes in speeds (+/- 10kph), or
- increases in percentages of HDVs
- proposals which will substantially increase congestion on major and/or local roads

[16] *cars and small vans <3.5 tonnes (t) gross vehicle weight.*

[17] *total volume of vehicle traffic of a highway or road for a year divided by 365 days.*

[18] *total volume of vehicle traffic of a highway or road for a year divided by 365 days.*

13.4.7 Although a study area distance is not stated in the Air Quality Developer's Guidance (VoWHDC, 2021), the guidance does refer to the EPUK/IAQM planning guidance (EPUK/IAQM, 2017) in terms of the assessment approach, which sets out that receptors are to be considered within 200m of 'affected' roads. Accordingly, the study area for the scoping assessment includes receptors within 200m of 'affected' roads.

Non-Road Mobile Machinery (NRMM) emissions

13.4.8 A qualitative assessment of emissions from plant and machinery (i.e. NRMM), during construction would consider the potential effects at the nearest receptors within 500m of the EIA Scoping Boundary for SESRO. Based on an understanding of the scale of activities associated with the SESRO Project, NRMM emissions are unlikely to have significant effects on sensitive receptors beyond a distance of 500m.

Odour emissions

13.4.9 The study area for the assessment of emissions of odour is limited to the closest adjacent land users within 2km of the EIA Scoping Boundary for SESRO. The nature and scale of activities associated with the SESRO Project means the potential odour impact at sensitive human receptors beyond 2km are likely to be negligible.

13.5 Baseline Desk-Based Assessment and Surveys

13.5.1 A review of baseline air quality data was carried out prior to undertaking the air quality scoping assessment. The following baseline sources were reviewed:

- UK Air Information Resource (UK-AIR) (Defra, 2024), and
- South Oxfordshire District Council (SODC) and VoWHDC air quality monitoring survey (SODC and VoWHDC, 2023)

Existing air quality baseline

13.5.2 As part of the Local Air Quality Management (LAQM) process, VoWHDC has declared three AQMAs across its administrative area. The closest AQMA to the SESRO Project is 'Marcham AQMA', declared for exceedances of the annual mean AQO for NO_2 in 2015. Marcham AQMA comprises an area along the A415 and includes part of Abingdon Road, Packhorse Lane and Frilford Road within Marcham. This AQMA is approximately 480m west of the preferred SESRO main site entrance at its closest point. The next closest AQMA is 'Abingdon AQMA', declared for exceedances of the annual mean AQO for NO_2 in 2006. This AQMA encompasses an area along the main road system in the centre of Abingdon and is approximately 1.2km north of the SESRO Project at its closest point. The third AQMA is 'Botley AQMA', which was declared for exceedances of the annual mean AQO for NO_2 in 2008. This AQMA, which encompasses a number of properties in Westminster Way, Coles Court, Stanley Close and along the Southern Bypass in Botley, is approximately 8.2km north-northeast of the indicative location for SESRO at its closest point.

13.5.3 VoWHDC carries out regular assessments and monitoring of air quality within its administrative boundary. The most recent Air Quality Annual Status Report (SODC and VoWHDC, 2023) was reviewed to determine concentrations of NO_2 and particulate matter (PM) within the vicinity of the SESRO Project. Furthermore, information on background air quality in the vicinity of the SESRO Project was obtained from Defra's background map datasets (Defra, 2024). A review of these data is provided in Appendix K. Based on the findings of the desk-based assessment (see Appendix K), it is considered likely that the background NO_2 and PM concentrations in the vicinity of the SESRO Project would be relatively low and well below the relevant Environmental Quality Standard (EQS)[19]. A primary reason for this is because the site is in a rural location and the A34, which is to the east of the EIA Scoping Boundary for SESRO, is downwind[20] of the site.

Existing and future baselines

13.5.4 Paragraph 13.5.3 and Appendix K indicate that concentrations of pollutants considered in the vicinity of the SESRO Project are well below the relevant EQS. For the purposes of this Chapter, the future baseline is expected to remain largely unchanged from the current baseline. This represents a worst-case approach as concentrations of NO_2, PM_{10} and $PM_{2.5}$ are likely to reduce as the uptake of newer vehicles complying with the most recent Euro Emission standards, and electric vehicles, are likely to increase. In addition, changes to technology and the move away from combusting fossil fuels driven by climate change mitigation are likely to lead to decreases in emissions of the key pollutants considered in this assessment.

Further desk study and survey work

13.5.5 Given the low existing concentrations of air pollutants in the vicinity of the SESRO Project site (see Appendix K), it is not considered necessary to undertake an air quality monitoring survey to inform the air quality ES chapter. No objection to this approach has been received during engagement with the VoWHDC and SODC Environmental Health Departments.

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[19] *For the purposes of reporting, the AQOs and Environmental Assessment Levels (EALs) have been collectively termed as Environmental Quality Standards (EQSs).*

[20] *The prevailing wind is from a south-westerly direction.*

13.6 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

13.6.1 Human receptors include locations where members of the public could be present for both short or long periods, for example residential properties, schools, hospitals, doctors' surgeries, places of worship, shops, playing fields / parks and Public Rights of Way (PRoW).

13.6.2 An ecological receptor (also referred to in this assessment as a 'designated ecological site') refers to any designated habitat that might be sensitive to dust soiling or other pollutant emissions associated with the SESRO Project. Examples may include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) or Local Wildlife Sites (LWS).

Human receptors

13.6.3 There are human receptors within 500m[21] of the EIA Scoping Boundary for SESRO (in some instances within 20m) and within 50m of the route(s) used by construction vehicles, up to 500m[7] from the site exit(s). These receptor locations represent residential properties, commercial / agricultural premises and a public footpath that runs along the A415 (Marcham Road) between the proposed main site entrance and the A34 Marcham interchange.

Ecological receptors

13.6.4 The closest designated ecological receptor is The Cuttings and Hutchins Copse LWS, which is within the EIA Scoping Boundary for SESRO. Marcham Salt Spring LWS and Cowslip Meadow LWS, which are approximately 95m and 400m, respectively, from the EIA Scoping Boundary, are the next closest relevant ecological receptors. In terms of nationally and internationally designated sites Barrow Farm Fen SSSI and Cothill Fen SSSI and SAC are approximately 540m north-northeast and 2.6km north-northwest, respectively, of the SESRO access road. Further descriptions are provided in Chapter 8 – Terrestrial Ecology.

13.6.5 Assessment locations and receptor counts would be identified in detail as part of the air quality assessment during the EIA process and presented in the air quality ES chapter.

[21] *As per VoWHDC Air Quality Developer's Guidance (VoWHDC, 2021).*

Dust effects

Construction dust

13.6.6 The extent of dust emissions generated from demolition, earthworks, construction and trackout activities associated with the SESRO Project would depend on a variety of conditions including the scale of activities, weather conditions, vehicle movements and the nature of the construction haul routes. Dust emissions could lead to adverse impacts on amenity, affect health at sensitive human receptors and cause damage to vegetation and ecosystems where very high levels of dust soiling occur.

13.6.7 The primary construction activity associated with the SESRO Project is the excavation of the borrow pit and creation of the embankments. Additional construction activities include construction and use of the main access road, use of internal haul routes, the formation (and operation) of the rail siding, construction of the intake / outfall and the Steventon to East Hanney road diversion.

13.6.8 Given the scale and proximity of the proposed works to nearby sensitive locations, such as residential properties and The Cuttings and Hutchins Copse LWS, an assessment is required to determine the risk associated with dust emissions in order to identify the required level of mitigation and monitoring to ensure that no significant effects would occur.

Operation dust

13.6.9 As dust emissions are not anticipated during the operation phase (apart from that associated with occasional maintenance vehicles and maintenance works, which would be temporary in nature and smaller in scale than those associated with the construction phase), the potential effect would be negligible and is, therefore, scoped out of the EIA.

Vehicle exhaust emissions

Construction emissions

13.6.10 Emissions of pollutants to air from vehicles travelling on the local road network (e.g. HDVs delivering material and LDVs transporting construction workers), could lead to increases in pollutant concentrations (NO_2 and PM_{10} / $PM_{2.5}$) at sensitive receptors adjacent to the local road network. Therefore, these emissions could have the potential to affect local air quality.

13.6.11 At this stage, anticipated construction-related traffic flow data are yet to be finalised. However, preliminary construction-related traffic flow data have been considered.

13.6.12 It is anticipated construction vehicles would enter and exit the SESRO site via the proposed main site entrance situated on the A415 (Marcham Road). Construction traffic would be routed from the A34 Marcham Interchange (avoiding Marcham AQMA).

13.6.13 Preliminary estimates provided by the engineering design team (Mott MacDonald) indicate that the peak AADT entering and exiting SESRO via the A415 (Marcham Road) and SESRO access road would be approximately 780 LDVs (i.e. 390 entering and then 390 exiting the site) and 184 HDVs (i.e. 92 entering then 92 exiting the site), which are above the criteria (see paragraph 13.4.4) for identifying the need for further assessment. Therefore, the stretch of the A415 (Marcham Road) before joining the A34 at the Marcham interchange would be considered an 'affected road'.

13.6.14 However, the only receptors currently within 200m of the stretch of the A415 (Marcham Road), before joining the A34 at the Marcham interchange, are an adjacent footpath, two laybys either side of the A415 (Marcham Road) and a Driver and Vehicle Standards Agency Enforcement Site near Marcham interchange. Based on Defra's Local Air Quality Management Technical Guidance (TG22) (Defra, 2022), a relevant receptor is a location representative of human (or ecological) exposure to a pollutant, over a time period relevant to the objective that is being assessed against, where the Air Quality Strategy objectives are considered to apply. Therefore, due to the expected limited exposure period, these are not considered relevant receptors.

13.6.15 Furthermore, once construction traffic would reach the Marcham interchange, the vehicles would then either travel northwards or southwards on the A34. As a result of this distribution, the LDV and HDV AADT increase would likely fall well below the screening criteria. Therefore, emissions from construction-related traffic would likely lead to negligible changes in air quality and are, therefore, scoped out of the EIA. However, this will be kept under review as the project develops and more accurate construction traffic information becomes available.

Operation emissions

13.6.16 At this stage, anticipated operational-related traffic flow data are yet to be finalised. However, preliminary operational-related traffic flow data has been considered and applied in this scoping assessment.

13.6.17 With regard to visitors travelling to the SESRO site, they design team have estimated that there would be approximately 272,000 annual total vehicle trips (based on approximately 600,000 total visitors travelling by car with 2.2 visitors per car). Therefore, the estimated AADT would be approximately 750 LDVs, which is above the criteria (see paragraph 13.4.4) for identifying the need for further assessment. However, this assumes all visitors travelling to and from the SESRO site would utilise the same route. In practice, visitors would travel to the SESRO site via a multitude of routes including the A34, A420 or A338. As a result of this distribution, the LDV AADT would likely fall well below the screening criteria. For those visitors travelling through Marcham and Abingdon and the associated AQMAs (see Section 13.5 of this chapter), the AADT may exceed the current criteria (see paragraph 13.4.4). However, by 2040 (the anticipated project completion date), the number of petrol and diesel fuelled vehicles on the road network is likely to have reduced significantly and fall below the screening criteria for petrol and diesel fuelled vehicles travelling within an AQMA.

13.6.18 For operational vehicles (e.g. workers), there would be activities associated with day to day operation, maintenance, repair, refurbishment or replacement of the various elements of the SESRO Project. However, these would be on a considerably smaller scale than required for construction. Therefore, any air quality impacts of operational / visitor vehicle exhaust emissions would be negligible and are scoped out of the EIA. However, this will be kept under review as the project develops and more accurate operational traffic information becomes available.

Non-Road Mobile Machinery (NRMM), generator and combustion plant emissions

Construction emissions

13.6.19 During construction, there would be emissions from construction plant and machinery. The type and numbers of construction plant would vary over the construction period and across the different working areas. The IAQM construction dust guidance (IAQM, 2024) states *'Experience of assessing the exhaust emissions from on-site plant (also known as Non-Road Mobile Machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed'*.

13.6.20 Although the total number of construction plant and machinery required for the different elements of the SESRO Project are likely to be relatively high, the anticipated works are set over a large geographic area and would not be carried out simultaneously (assuming a 10 year construction programme). Furthermore, the background NO_2 and PM concentrations in the vicinity of the SESRO Project are considered relatively low and well below the relevant EQS (see Section 13.5 and Appendix K). Therefore, the potential effect on local air quality at human and ecological receptors in the vicinity of the construction works would be negligible. On this basis, and in line with IAQM construct dust guidance (IAQM, 2024), the effect on air quality from construction plant and machinery emissions is considered likely to be 'not significant' and scoped out of the EIA. It should be noted the use of alternatives to diesel powered plant are currently being explored (see Section 13.8 of this chapter) and will be assessed in the PEI Report and ES, should these alternatives be considered viable.

Operation emissions

13.6.21 There is likely to be a negligible impact from the operation of the T2ST WTW and other elements of the SESRO Project. The likely primary mitigation to be adopted (such as an appropriate stack height for any back-up emergency generators) and the absence of highly sensitive receptors in the vicinity of these SESRO components means there is likely to be a negligible impact on local air quality. Therefore, NRMM, generator and combustion plant emissions associated with the operational phase are scoped out of the EIA.

Odour emissions

Construction emissions

13.6.22 Earthworks activities across the SESRO Project, such as the topsoil stripping or excavation from the borrow pit, may generate odours associated with soils and vegetation but these would not be considered as offensive (compared to odours associated with processes such as those involving septic effluent or sludge, putrescible waste landfill or intensive livestock rearing) or likely to generate annoyance and subsequent complaints. Should earthworks activities be undertaken in contaminated areas, which may contain odorous materials, these would be managed through the application of good practice and appropriate controls/mitigation as agreed with the local authority through the development of a suitable management plan.

13.6.23 At the time of writing, it is considered that there should be no significant sources of odour associated with construction of the SESRO Project. Therefore, construction odour is scoped out of the EIA. However, this will be kept under review, in the event that potential odour sources are identified.

Operation emissions

13.6.24 As the T2ST WTW will not be treating wastewater or storing waste material, the potential odour from the T2ST WTW (and indeed reservoir) is not likely to be offensive. The likely primary mitigation to be adopted (such as odour containment and reservoir management) and absence of sensitive receptors in the vicinity of these SESRO aspects means there is likely to be a negligible impact on local air quality. Therefore, odour emissions associated with the operational phase are scoped out of the EIA.

13.7 Assessment Methodology

Introduction

13.7.1 The air quality assessment for the EIA will be undertaken in accordance with the following relevant guidance:

- IAQM Guidance on the assessment of dust from demolition and construction (IAQM, 2024)
- Defra - Local Air Quality Management Technical Guidance (TG22) (Defra, 2022)
- Environmental Protection UK & Institute of Air Quality Management - Land-Use Planning & Development Control: Planning for Air Quality (EPUK / IAQM, 2017)
- VoWHDC Air Quality Developer's Guidance (VoWHDC, 2021)

Construction dust assessment methodology

13.7.2 The dust risk assessment is to be carried out in accordance with the IAQM construction dust guidance (IAQM, 2024). The IAQM construction dust assessment methodology provides approaches to consider three separate dust effects:

- annoyance due to dust soiling
- harm to ecological receptors
- risk of health effects due to increased exposure to PM_{10} and $PM_{2.5}$

13.7.3 The IAQM construction dust guidance determines the risk level for the key potential dust emission sources associated with construction and, based on the outcome of this, sets out recommendations for control and mitigation of dust emissions to achieve a residual effect of 'not significant'. For example, a high-risk site with several nearby receptors would be required to adopt a more comprehensive suite of mitigation measures and monitoring techniques to achieve a 'not significant' effect than a low-risk site which is remote from receptors. The significance of dust effects is a binary definition of either 'significant' or 'not significant' overall and, unlike other environmental disciplines, does not include a scale of significance or deal with specific receptors.

Charactering impacts and effects

13.7.4 As per IAQM construction dust guidance (IAQM, 2024), *following 'Step 2A – Define potential dust emission magnitude'*, a dust emission magnitude is assigned on the basis of the scale and nature of the dust generating works. Then, applying *'Step 2B – Define sensitivity of the area'*, a sensitivity is assigned, which considers the number and distance of receptors from the construction boundary and baseline conditions. Following these steps, appropriate site-specific mitigation (*'Step 3 – Site specific mitigation'*) can be determined.

13.7.5 The approach in 'Step 4 – Determine significant effects' (IAQM, 2024) is adopted to determine the significance of dust impacts. The guidance states the following 'For almost all construction activity, the aim should be to prevent significant impacts on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant''.

13.7.6 IAQM construction dust guidance (IAQM, 2024) also states that 'Even with a rigorous DMP [Dust Management Plan] in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that, with mitigation, the impacts will be 'not significant''.

13.7.7 Step 4 of the IAQM construction dust guidance (IAQM, 2024) recognises that the key to the above approach is that it assumes that the regulators ensure that the proposed mitigation measures are implemented. The relevant management plan(s) would include the necessary systems and procedures to enable on-going checking by the regulators to ensure that mitigation is being delivered, and that it is effective in reducing any residual effect to 'not significant' in line with the guidance.

Assessment of residual effects

13.7.8 Once the appropriate dust management measures have been identified the determination of residual effects would be made using the IAQM construction dust guidance (IAQM, 2024) methodology. The assessment methodology followed (IAQM, 2024) states that with the implementation of appropriate dust management measures, there are not predicted to be any significant residual air quality impacts from construction activities. IAQM construction dust guidance (IAQM, 2024) notes that, even with a rigorous package of good practice mitigation measures in place, such as those examples presented in Section 13.8, it is not possible to guarantee that the dust mitigation measures would be effective all the time. But the likely scale of such impacts would not change the conclusion that, with mitigation, effects would not be significant. The IAQM construction dust guidance (IAQM, 2024) determines the risk level for the key potential dust emission sources associated with construction and, based on the outcome of this, sets out recommendations for control and mitigation of dust emissions to achieve a residual effect of 'not significant'.

Assessment of cumulative effects

13.7.9 The assessment of intra-project effect interactions will be carried out taking into consideration potential impacts identified for a given receptor in the aspect-specific assessments of the ES. The assessment will mainly focus on receptors subject to incremental and/or synergistic residual effects for environmental aspects such as Landscape and Visual Effects and Noise and Vibration (e.g. temporary noise effects combined with dust and visual effects on human receptors).

13.7.10 Inter-project effect interactions may arise with other traffic generating developments. However, these are generally accounted for in predictive baseline traffic models that account for expected development in an area, such that cumulative impact assessment is inherent in any traffic emissions assessment.

13.8 Mitigation and Environmental Net Gain

Construction phase mitigation

Primary

13.8.1 Where practicable, the SESRO Project shall adhere to good principles of design to reduce the impact on local air quality. Examples include measures to reduce the number of HDV movements importing material, such as the formation of the reservoir embankment from the Kimmeridge and Gault clays sourced from the borrow pit, the routing of construction vehicles eastwards along the A415 from, and to, the A34 away from Marcham AQMA and proposals to utilise a temporary rail siding and materials handling area.

Secondary

13.8.2 No secondary mitigation measures are currently considered necessary. However, mitigation measures may be identified during the preparation of the air quality ES chapter.

Tertiary

13.8.3 As a minimum, tertiary (or good practice) dust mitigation measures to ensure minimal dust emissions, as described in the IAQM construction dust guidance (IAQM, 2024), would be applicable during the construction phase. Examples of such measures are listed below:

- Planning site layout so that machinery and dust generating activities are located away from receptors, as far as is possible
- Ensure all vehicles switch off engines when stationary - no idling

- Ensuring an adequate water supply for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate
- Reuse and recycle waste to reduce dust from waste materials
- Ensure water suppression is used during demolition
- Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport
- Avoiding site runoff of water or mud

13.8.4 For construction-related vehicles, emissions will meet the Euro VI emission standards (European Union, 2005) for oxides of nitrogen (NOx) and PM, where practicable. The use of electric, hydrogen or Hydrotreated Vegetable Oil (HVO) fuel may be considered.

Operation phase mitigation

Primary

13.8.5 Even though the design of the T2ST WTW is yet to be finalised, it will incorporate appropriate primary (or inherent) mitigation such as an appropriate stack height for any back-up generators to improve pollutant dispersion such that emissions will comply with the relevant emission limit values and standards. Reservoir management will also incorporate primary mitigation (e.g. mixing) to control odour emissions.

Secondary

13.8.6 No additional (or secondary) mitigation measures are currently considered necessary. However, mitigation measures may be identified during the preparation of the air quality ES chapter.

Tertiary

13.8.7 No tertiary mitigation measures are currently considered necessary. However, mitigation measures may be identified during the preparation of the air quality ES chapter.

Potential for environmental net gain

Construction phase mitigation

13.8.8 From an air quality perspective, there is currently no potential for environmental net gain. However, consideration shall be given to reduce the potential air quality impact on sensitive receptors throughout the design process.

Assessment, limitations and uncertainties

13.8.9 During the preparation of the air quality ES chapter, where information is not available for the assessment of construction dust emissions (e.g., earthworks volumes), assumptions will be made based on an understanding of the scale of activities and professional judgement.

13.9 Summary of Scope for the EIA

EIA scope for the preferred option

13.9.1 Table 13-3 presents the potential air quality impacts that are proposed to be scoped in or out of further assessment, along with justification for the choice.

Table 13-3 Summary of air quality matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Dust soiling, human health and ecological impacts arising from dust and particulate matter emissions	IN	Construction of the SESRO Project has the potential to generate dust, which can cause annoyance and have health effects on local residents and cause harm to nearby ecological receptors
Impacts on air quality due to emissions from site plant and machinery	Out	Given that plant and items of machinery would likely be used for only a limited duration in any one location and spread across the SESRO Project, and due to the absence of sensitive receptors in the vicinity of the proposed works, effects on air quality are considered to be negligible (i.e. not significant)
Impact on air quality due to emissions from proposed freight trains transporting bulk material	Out	Due to the low frequency of train deliveries (two trains per day), there is likely to be a negligible impact on local air quality
Impacts on air quality due to emissions from construction-related off-site traffic	Out	Predicted construction-related traffic flows associated with construction are likely to be less than the EPUK and IAQM screening criteria. Therefore, the likely effects on air quality are considered to be negligible (i.e. not significant)

Environmental matter	Scoped in / out	Rationale
Odour impacts from construction activities	Out	There should be no significant sources of odour associated with the construction phase
Operational phase		
Impacts on air quality due to emissions from operational off-site traffic	Out	The predicted operational traffic flows associated with construction are likely to be less than the EPUK and IAQM screening criteria. Therefore, effects on air quality are considered to be negligible (i.e. not significant)
Dust soiling, human health and ecological impacts arising from dust and particulate matter emissions	Out	As dust emissions are not anticipated during operation (and if generated would be temporary in nature and smaller in scale than those associated with construction), the potential effect would be negligible (i.e., not significant)
Impacts on air quality from operational pollutant emissions	Out	Given the likely primary mitigation to be adopted (such as an appropriate stack height for any T2ST WTW back-up emergency generators) and absence of sensitive receptors in the vicinity, the effects on air quality are considered to be negligible (i.e., not significant)
Odour impacts from operational activities	Out	Given the likely primary mitigation to be adopted (such as reservoir management and odour containment at the T2ST WTW), it is considered that there should be no significant sources of odour associated with operation

Potential changes to scope and methods associated with other options

13.9.2 At this stage, based on the scale of activities and professional judgement, the scope and methods associated with any change to component options are unlikely to change from those presented in this scoping assessment.

13.10 Next Steps

13.10.1 During the preparation of the ES chapter for air quality, stakeholder engagement will continue as the project design develops. Should the data applied in the scoping assessment remain unchanged or not change significantly as the project design develops, stakeholder engagement with the SODC and VoWHDC will be carried out to agree justification for those elements scoped in and out of requiring further assessment (see Table 13-3). Should the data applied in the scoping assessment change significantly, the proposed scope will be reviewed and updated accordingly.

13.11 References

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14 Geology and Soils

14.1 Introduction

14.1.1 This chapter sets out the scope and methodology for the Geology and Soils assessment for the SESRO Project. Specifically, it considers the following matters:

- Effects on agricultural soils supporting biomass production (food and non-food crops) and soils supporting sites of ecological importance and soil carbon
- Effects on geologically designated sites
- Effects from potential land contamination on human heath, property, surface water, groundwater and ecological receptors

14.1.2 The potential for effects associated with the above are within the scope of this chapter, other effects which may be of relevance to soil, geology and land contamination are considered in the following chapters:

- Chapter 6 – Water Environment. Chapter 14 (this chapter), considers impacts from historical and contemporary land contamination on surface water and groundwater quality, other potential impacts (e.g. drainage emissions) on water quality are also considered in Chapter 6
- Chapter 7 – Aquatic Ecology and Chapter 8 – Terrestrial Ecology
- Chapter 15 – Materials and Waste. Note: Chapter 14 (this chapter) assesses the impact of the Project on designated geological receptors, whereas Chapter 15 assesses the impact on mineral resources from an economic perspective
- Chapter 16 – Carbon and Climate Change
- Chapter 18 – Human Health

14.2 Legislation, Policy, Standards and Guidance Context

14.2.1 Key policy relevant to Soils, Geology (and land contamination) set out in the Department for Environment, Food and Rural Affairs' (Defra) National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023a) includes:

- Paragraph 4.10.5 requires the applicant to consider the risk posed by land contamination associated with previously developed land. Risks would require consideration in accordance with contaminated land statutory guidance as a minimum. The guidance is published under Part 2A of the Environmental Protection Act 1990 (Defra, 2012) and provides detail on when land may be designated as contaminated by the Environment Agency
- Paragraph 4.10.14 requires the applicant take account of the economic and other benefits of best and most versatile (BMV) agricultural land

(Grades 1, 2 and 3a), to reduce impact. Where development on agricultural land is demonstrated to be necessary applicants should use poorer quality land (Grades 3b, 4 and 5), where feasible, to reduce impacts on soil quality. Assessments of agricultural land should be supported by relevant survey information to confirm the agricultural land grade. Applicants should also identify any effects on soil quality and show how they would reduce those effects, including by proposing appropriate mitigation measures

- Paragraph 4.10.17 requires the applicant to reduce the direct effects of a project on the existing use of the proposed site, or proposed and existing uses near the site, by the application of good design principles, including the layout of the project and the protection of soils during construction

14.2.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the SESRO Project will also have regard to the relevant key legislation, policy and guidance for this aspect as listed in Table 14-1.

14.2.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how the SESRO Project accords with it will be provided in the Preliminary Environmental Information Report and/or Environmental Statement.

Table 14-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Environmental Protection Act 1990: Part 2A (Contaminated Land)
Contaminated Land (England) Regulations 2006
Town and Country Planning (Environmental Impact Assessment (EIA)) Regulations 2017
Environmental Damage (Prevention and Remediation) (England) Regulations 2015
Water Resources Act 1991
Control of Asbestos Regulations 2012
Planning Act 2008
Construction (Design and Management) Regulations 2015
National policy
National Policy Statement for Water Resources Infrastructure (Defra, 2023a)
Environmental Improvement Plan (Defra, 2023b)
A Green Future: Our 25 Year Plan to Improve the Environment (Defra, 2018a)

Relevant legislation, policy, standards and guidance
Safeguarding our Soils: A Strategy for England (Defra, 2009)
Regional policy
Oxfordshire's Strategic Vision for Long-Term Sustainable Development (Future Oxfordshire Partnership, 2021)
Local policy
Local Plan 2031 (Vale of White Horse District Council, 2016)
Oxfordshire Planning Advice Note Dealing with Land Contamination During Development: A Guide for Developers, Version 4 (Vale of White Horse District Council, 2019)
Standards and guidance
Contaminated Land Statutory Guidance (Defra, 2012)
Guidance for the Safe Development of Housing on Land Affected by Contamination (National House Building Council, Environment Agency and Chartered Institute of Environmental Health, 2008)
Land Contamination: Risk Management (LCRM) (Environment Agency, 2020)
Design Manual for Roads and Bridges (DMRB) LA 109 Geology and Soils (National Highways, 2019a)
DMRB LA 104 Environmental Assessment and Monitoring (National Highways, 2019b)
A New Perspective on Land and Soil in EIA (Institute of Environmental Management and Assessment (IEMA, 2022)
Contaminated Land: Applications in Real Environments (CL:AIRE). Definition of Waste: Development Industry Code of Practice (DoW:CoP) (CL:AIRE, 2011)
Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition materials: Industry Guidance (CAR-SOIL) (CL:AIRE, 2016)
Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2018b)

14.3 Engagement

14.3.1 Engagement on the scope of the EIA Geology and Soils assessment was undertaken with the Vale of White Horse District Council Contaminated Land Officer, Natural England (Soils and Ecology) and the Environment Agency via a Technical Liaison Group (TLG) on 10 April 2024. The output of this engagement is summarised in Table 14-2.

Table 14-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
Natural England	Suggested that a soil survey density of one sample per hectare would be appropriate	Thames Water and Natural England to agree validity of existing Agricultural Land Classification (ALC) data and what survey density is appropriate going forward
Vale of White Horse District Council Contaminated Land Officer	Can provide information on known contaminated sites, landfills and private water abstractions	Ongoing dialogue between Thames Water and the regulators. Desk study is ongoing, a request for information will be sent upon completion of the desk study
Environment Agency	No comments	As above

14.4 Existing Environment and Baseline Conditions

Study areas

14.4.1 The Geology and Soils study area is defined by the construction footprint and any areas which are likely to be disturbed to enable construction, plus a 250m buffer area (Figure 14.1). This has been used to establish baseline conditions and identify potentially contaminative land uses and sensitive receptors which may be affected by the SESRO Project. This is based on Guidance for the Safe Development of Housing on Land Affected by Contamination (National House Building Council, Environment Agency and Chartered Institute of Environmental Health, 2008) and represents a conservative approach in the context of the Project, considering the distance over which contamination can migrate. This guidance, whilst having been developed for housing is also applicable SESRO as it is used as the standard approach for all other development types.

14.5 Baseline Desk-Based Assessment and Surveys

Information sources

14.5.1 The following information sources and reports have been used to inform scoping:

- Groundsure report and historical mapping (GSIP-2021-12379-8636_A_1 and B-1)
- British Geological Survey (BGS). Abingdon (Solid and Drift) geological maps. Sheet 253. Scale 1:63,360 (BGS, 1971)
- BGS – GeoIndex (onshore) (BGS, 2024)
- Multi-Agency Geographic Information for the Countryside (MAGIC) (Defra, 2024)
- ALC data Provisional (Natural England, 2024a)
- ALC data Post 1988 (Natural England, 2024b)
- Soilscapes mapping (Cranfield University, 2024)
- Zetica Pre-Desk Study Assessment (PDSA) (Land Southwest of Abingdon, Oxfordshire, 2022) and Zetica Unexploded Ordnance (UXO) Desk Study and Risk Assessment (document ref. P13129-23-R1, 2023)
- Local sites of geological importance (Thames Water Environment Records Centre, n.d.)

14.5.2 A desk study is currently being produced by Thames Water in accordance with guidance presented in LCRM (Environment Agency, 2020).

Surveys

14.5.3 The following surveys have been completed:

- Magnetometer survey (BACTEC International Ltd, 2005)
- Site walkover in 2022 by a Jacobs Land Quality consultant
- Ground investigation (Norwest Holst Soil Engineering Limited, 2006)

14.5.4 A ground investigation is currently underway focused on geotechnical and hydrogeological requirements.

Soils

Biomass production

14.5.5 The value of soils for biomass production can be determined using the ALC grading system (Ministry of Agriculture, Fisheries and Food, 1988). This defines six grades of agricultural land: Grade 1 (excellent quality), Grade 2 (very good quality), Subgrade 3a (good quality), Subgrade 3b (moderate quality), Grade 4 (poor quality) and Grade 5 (very poor quality). Higher quality land has the widest range and versatility of use and offers the opportunity for higher and more consistent yields with less input than lower quality land.

14.5.6 Provisional ALC data indicate the study area is dominated by Grade 4 and undifferentiated Grade 3 soils, with some Grade 2 in the east, as shown in Figure 14.2. Some publicly accessible post-1988 survey data are available in the east of the site, which identify Grade 2, 3a, 3b and 4 land.

Soils supporting sites of ecological importance

14.5.7 The only site of ecological importance, where soils support ecological functions which could be affected by the SESRO Project, is The Cuttings and Hutchins Copse Local Wildlife Site (LWS) in the south of the study area. Refer to Chapter 8 – Terrestrial Ecology for further information.

Soil carbon and resilience to structural damage

14.5.8 Soilscapes (Cranfield University, 2024) identifies the following soil types within the study area:

- Soilscape 5 – Freely draining lime-rich loamy soils
- Soilscape 7 – Freely draining slightly acid but base-rich soils
- Soilscape 18 – Slowly permeable seasonally wet slightly acid but rich loamy and clayey soils
- Soilscape 20 – Loamy and clayey floodplain soils with naturally high groundwater

14.5.9 The Soilscapes data indicate that mineral and organic-mineral soils (i.e. those with less than 20-25% organic matter – dependent on clay content) are likely to be present, and are likely to be predominantly of medium resilience to structural damage during handling. However, this would be confirmed at the Environmental Statement stage.

Geology

Artificial

14.5.10 Made Ground is an area where the pre-existing (natural or artificial) land surface has been altered in some way by human activity. Made Ground may be present in any areas which have undergone previous development or disturbance and, whilst the majority of the site is agricultural land, Made Ground may be present associated with this land use.

14.5.11 Suspected areas of Made Ground across the study area include the following:

- Abingdon sewage works
- The railway and historical railway sidings
- The route of the old Wiltshire and Berkshire canal which runs across the study area

- Embankments associated with the A34
- Steventon Depot

Superficial

14.5.12 The majority of the study area is covered by various sand and gravel members in the form of floodplain terrace deposits. These comprise Northmoor Sand and Gravel Member Lower Facet, Northmoor Sand and Gravel Member Upper Facet, Summertown Radley Sand and Gravel Member and Wolvercote Sand and Gravel Member.

14.5.13 Alluvial deposits are found in the north-west and east as well as a small area in the centre of the study area. Small areas of alluvial are also located in the south and south-east of the study area. Alluvium is made up of clay, silt, sand and gravel.

14.5.14 Head deposits (poorly sorted gravel, sand, silt and clay rock) can be found in the central, eastern and south-eastern parts of the study area. Within the head deposits there may be lenses of silt, clay, peat and other organic material.

14.5.15 The distribution of superficial deposits within the study area is presented in Figure 14.3.

Bedrock

14.5.16 The majority of the study area is underlain by Ampthill and Kimmeridge Clay Formation in the form of Mudstone. A thin strip of Lower Greensand Group sandstone crosses the location of the proposed reservoir from south-west to east. The Gault Mudstone Formation is present across the south and south-east corner of the SESRO EIA Scoping Boundary. Limestone (Stanford Formation) is present in the north, along with a small section of Kingstone Sandstone Formation. The eastern section of EIA Scoping Boundary (Zone 7), following the proposed intake/outfall pipeline route, is underlain by the Ampthill and Kimmeridge Clay Formation with a small area of Lower Greensand Sandstone and Mudstone at the eastern extent.

14.5.17 The Kimmeridge Clay and Gault Mudstone Formations are fossil rich bedrock formations.

14.5.18 The bedrock geology is presented in Figure 14.4.

Sites of geological importance

14.5.19 There are no geologically sensitive sites within the study area that have been designated or classified as having international, national or local importance.

Hydrogeology and Hydrology

14.5.20 The hydrogeological and hydrological baseline conditions and figures are discussed in Chapter 6 - Water Environment and are not repeated here.

Potential sources of contamination

14.5.21 The study area is predominantly rural dominated by agricultural fields, with Landmead Solar Farm and Steventon Solar Park also present covering large areas. The site is crossed by the partially infilled route of the old Wiltshire and Berkshire canal and Steventon to East Hanney Road and bounded by the A34, A415, A338 and Great Western Main Line railway. Land uses identified as potential sources of contamination within the study area are listed in Table 14-3.

14.5.22 The majority of potentially contaminative land uses are shown on Figure 14.5, with the exception of the Kimmeridge Clay deposits (which are known to contain naturally occurring bitumen) shown on Figure 14.5. It should also be noted that some smaller land uses may not be visible on the figure such as small tanks and substations.

Table 14-3 Summary of potential (non-landfill) sources of contamination within the study area

Potential sources of contamination
Disused and infilled route of the old Wiltshire and Berkshire Canal
Naturally occurring bitumen content of Kimmeridge Clay
Contemporary Great Western Main Line railway line and associated railway sidings
Potential contamination associated with highway construction (the A34, A338 and Steventon – East Hanney Road)
Contemporary Landmead Farm airstrip
Historical Marcham Bombing range
Contemporary numerous isolated farms and agricultural buildings
Contemporary Solar Farms
Historical rifle range
Contemporary large electricity substation (north of Steventon)
Contemporary Steventon Depot (historical Ministry of Defence (MoD) depot)
Contemporary Abingdon Sewage Treatment Works
Contemporary Oday Hill Gravel Quarry operational activity

Potential sources of contamination
Contemporary horticultural nurseries
Petrol Station (Marcham Road)
Chemical manufacturer (north of Marcham Road)
Historical and Authorised landfills (Table 14-4)

14.5.23 A summary of the recorded historical and authorised landfills found in the study area is provided in Table 14-4.

Table 14-4 Summary of potential (non-landfill) sources of contamination within the study area

Type	Name (permit)	Location	Licensed to accept
Historical	Southern Town Park	Eastern end of intake/outfall pipeline route	Inert, commercial, household, liquid sludge
	Sutton Wick No.1	Eastern end of intake/outfall pipeline route	Inert, industrial, household, special, liquid sludge
	South of A34 at Drayton	South-east area of the main site	Inert, industrial
	Drayton Golf Course	South-east area of the main site	Inert, industrial, commercial, household, liquid sludge
Authorised	Cemex UK Material Limited - EA/EPR/FB3106HL/V002	Eastern end of intake/outfall pipeline route	Non-Biodegradable Wastes

Receptors sensitive to contamination

14.5.24 Potential exposure to, or mobilisation of, existing contamination and the creation of new contamination (for example, due to spillages) during construction could result in the creation of pathways to impact the following receptors:

- Human health – construction workers, future maintenance workers, future site users such as members of the public and those in existing residential and commercial areas

- Surface watercourses and surface waterbodies
- Superficial and bedrock aquifers
- Ecological receptors
- Buildings, property and infrastructure

14.6 Sensitive Receptors and Potential Environmental Effects

Construction effects

14.6.1 Potential effects relating to Geology and Soils are summarised in Table 14-5.

Table 14-5 Summary of potential effects

Receptor	Description of potential effect
Geological Designations	No sites of geological importance have been identified within the study area Excavation will expose Kimmeridge Clay and Gault Formation which are fossil rich and, therefore, may identify geologically important information
Soils supporting biomass production	Soils could be affected in two ways during construction, via: • Adverse - Soil sealing due to permanent development over soils • Adverse or beneficial - Loss of, or improvements to, soil functions due to contamination, degradation during soil handling, remediation, or land use change
Soils supporting sites of ecological importance	Adverse – potential impacts on soils associated with the Cuttings and Hutchins Copse LWS, depending on location of the rail sidings
Soil carbon	Adverse – disturbance of soil carbon during soil handling. Temporary, reversible loss of soil carbon sequestration potential
Land contamination	The following potential impacts could arise during construction in relation to land contamination: • Adverse - Risks to on-site and off-site receptors from contamination from potential contaminant linkages • Beneficial -Betterment of ground or groundwater contamination conditions through remediation and/or mitigation

Operational effects

14.6.2 Impacts on geology and soils would not continue into the operational phase. The permanent loss of agricultural land that would occur during construction would persist during operation but is not considered to be an additional impact. It is not anticipated that further loss of soil resources would take place during operation.

14.6.3 At this early stage of the Project the risks in relation to land contamination have not been fully assessed and the possibility of potential contaminant linkages remaining at the operational stage cannot be discounted.

14.7 Further Baseline Studies

14.7.1 A geoenvironmental desk study is being prepared including a Conceptual Site Model (CSM) and preliminary risk assessment (PRA). This will identify potential sources of contamination across the study area, potential sensitive receptors and pathways. The desk study will identify areas of uncertainty in respect to contamination and where additional information may be required to assess the significance of effects. Further Ground Investigation will be agreed with relevant consultees, such as Natural England, the Environment Agency and local authorities, targeting the identified potential sources of contamination.

14.7.2 Engagement with Natural England will take place as the Project progresses to inform the scope of any supplementary soil survey required. Any such survey would be undertaken prior to submission of the Environmental Statement to inform the assessment, if practicable.

14.7.3 Further engagement with regulators and the local authority is planned to gather further information on identified potential sources of contamination and other baseline aspects relevant to geology and soils.

14.8 Assessment Methodology

Introduction

14.8.1 The soils, geology and land contamination assessment will be undertaken by considering:

- The value or sensitivity to harm and resilience of the receptor
- The magnitude of the impact

14.8.2 This section sets out the approach to the geology and soils assessment and methodology applied. The assessment has been undertaken with regard to guidance within both the DMRB LA 109 Geology and Soils (National Highways, 2019a) and the IEMA ‘A New Perspective on Land and Soil in Environmental

Impact Assessment' (IEMA, 2022) using professional judgement and drawing on experience from similar assessments.

Determining the sensitivity of receptors

14.8.3 Table 14-6 will be used to assign each receptor a value (sensitivity).

Table 14-6 Receptor sensitivity / value

Sensitivity / Value	Receptor Descriptions
Very High	Geology Geology is of international importance (e.g. United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Sites, UNESCO Global Geopark and geological conservation review sites where citations indicate features of international importance, Site of Special Scientific Interest (SSSI) where citation indicate features of international importance) Soils Biomass production: soils supporting agricultural land of grades 1 and 2 (BMV land) Biodiversity: soils supporting a European designated site (e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA)) Soil Carbon: peat soils Land contamination Human health: very high sensitivity land use such as residential and allotments Surface water: watercourse classified by the Water Framework Directive (WFD) shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m3/s. Site protected/designated under European Commission (EC) or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water) / Species protected by EC legislation Groundwater Principal aquifer and/or supporting a site protected under EC and UK legislation Source protection zone (SPZ) 1 Groundwater Dependent Terrestrial Ecosystem (GWDTE)
High	Geology Geology is of national importance (e.g. SSSI, National Nature Reserve (NNR), Geological Conservation Review (GCR) sites) Soils

Sensitivity / Value	Receptor Descriptions
	Biomass production: soils supporting agricultural land of subgrade 3a (BMV land) Biodiversity: soils supporting UK designated sites (e.g. SSSI, NNR, Local Nature Reserve (LNR)) and ancient woodland Soil Carbon: loamy peat or sandy peat soils. <u>Land contamination</u> Human health: high sensitivity land use such as public open space Surface water: watercourse classified by the WFD shown in a RBMP and Q95 <1.0m^3/s Species protected under EC or UK legislation Groundwater: principal aquifer providing locally important resource or supporting a river ecosystem Groundwater supports a GWDTE, SPZ 2
Medium	<u>Geology</u> Geology is of regional importance (e.g. Local Geological Sites (LGS)) <u>Soils</u> Biomass production: soils supporting agricultural land of Subgrade 3b Biodiversity: soils supporting non-statutory designated sites (e.g. LWS) Soil carbon: peaty loam or peaty sand soils <u>Land contamination</u> Human health: medium sensitivity land use such as commercial or industrial Surface water: watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m^3/s Groundwater : aquifer providing water for agricultural or industrial use with limited connection to surface water Other: buildings, crops and livestock
Low	<u>Geology</u> Candidate geological sites <u>Soils</u> Biomass production: soils supporting agricultural land of Grades 4 and 5 Biodiversity: soils supporting non-designated notable or priority habitats Soil carbon: mineral/organic-mineral soils <u>Land contamination</u> Human heath: low sensitivity land use such as highway and rail

Sensitivity / Value	Receptor Descriptions
	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m^3/s Groundwater: Unproductive aquifer
Negligible	Geology N/A Soils Biomass production: soils in non-agricultural or urban areas Biodiversity: soils outside any of the habitats identified above Soil carbon: N/A. Land contamination Human health: undeveloped land / non sensitive land use identified or proposed Surface water: N/A Groundwater: unproductive aquifer

Source: Based on Table 3.11 in DMRB LA 109 (National Highways, 2019a) and Table 2 in IEMA guidance (IEMA, 2022).

Determining magnitude

14.8.4 Potential impacts on soil, geology and land contamination receptors will be assessed according to the predicted magnitude of change, as determined by the criteria set out Table 14-7.

Table 14-7 Magnitude of impact

Magnitude	Criteria
Major	Geology Negative: loss of geological feature/designation and/or quality and integrity; complete loss of/severe damage to key characteristics, features or access Positive: major improvement to geological feature/designation Soils Negative: permanent, irreversible sealing or loss of one or more soil functions (including downgrading of ALC) over an area of >20ha Positive: permanent improvement in one or more soil functions (including upgrading of ALC) over an area of >20ha Land contamination

Magnitude	Criteria
	Negative: soil contamination considered to pose a high risk to receptors with one or more contaminant linkages certain to be present Positive: substantial betterment of ground or groundwater contamination conditions through remediation and/or mitigation (benefit) and removal of risk to receptors
Moderate	<u>Geology</u> Negative: partial loss of geological feature/designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or access Positive: moderate improvement to geological feature/designation <u>Soils</u> Negative: permanent, irreversible sealing or loss of one or more soil functions (including downgrading of ALC) over an area between 5ha and 20ha Positive: permanent improvement of one or more soil functions over an area of between 5ha and 20ha <u>Land contamination</u> Negative: soil contamination considered to pose a moderate risk to potential receptors with one or more contaminant linkages likely present Positive: moderate betterment of ground or groundwater contamination conditions through remediation and/or mitigation (benefit) and reduction of risk to receptors
Minor	<u>Geology</u> Negative: minor change in geological feature/designation attributes, quality or vulnerability; minor loss of/detrimental alteration to key characteristics, features or access Positive: minor improvement to geological feature/designation <u>Soils</u> Negative: permanent, irreversible sealing or loss of one or more soil functions (including downgrading of ALC) over an area of <5ha, or a temporary, reversible loss of one or more soil functions Positive: permanent improvement of one or more soil functions over an area of <5ha <u>Land contamination</u> Negative: soil contamination considered to pose a low risk to potential receptors with one or more contaminant linkages possibly present

Magnitude	Criteria
	Positive: slight betterment of ground or groundwater contamination conditions through remediation and/or mitigation (benefit) and reduction of risk to some or all receptors
Negligible	Geology Negative: very minor loss of/detrimental alteration to one or more characteristics, features or access of/to geological feature/designation; overall integrity not affected Positive: very minor improvement to geological feature/designation Soils Negative or Positive: no discernible loss, reduction or improvement of soil functions that restrict or decrease restrictions to current or proposed land use Land contamination Negative: soil contamination considered to pose a very low risk to potential receptors with one or more contaminant linkages unlikely to be present
No change	Geology No change to characteristics, features or access Soils No loss/reduction of soil functions that restrict current or proposed land use Land contamination Soil contamination not considered to pose any risks to potential receptors, with no contaminant linkages present

Source: Based on Table 3.12 in DMRB LA 109 (National Highways, 2019a) and Table 3 in IEMA guidance (IEMA, 2022).

14.8.5 To establish the magnitude of impact from land contamination a PRA is being undertaken in accordance with LCRM (Environment Agency, 2020) developing a CSM to identify potential contaminant linkages.

14.8.6 In determining the magnitude of change for soil receptors, the resilience of the soils to structural damage during handling (i.e. soil stripping, stockpiling and restoration) will also be considered. The interactions between soil texture, moisture, structure and climate are key to understanding soil resilience, and Table 14-8 sets out the criteria that would be followed. This follows the approach set out in ‘A New Perspective on Land and Soils in Environmental Impact Assessment’ (IEMA, 2022). Professional judgement informed by desk study would be used to assign provisional soil texture classes for the purpose of assessment where quantitative data are not available.

Table 14-8 Resilience of soil receptors

Resilience	Description
High	Soils with a high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where field capacity days (FCD) are fewer than 225 and are in wetness class (WC) I (rarely wet) or WC II (seldom wet)
Medium	Clays, silty clays, sandy clays, heavy silty clay loams, heavy clay loams, silty loams and organic mineral and peaty soils where FCD are fewer than 150 Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams where FCD are fewer than 225 Sands, loamy sands, sandy loams and sandy silt loams where the FCD are 225 or greater or are in WC III (occasionally wet) or WC IV (commonly wet)
Low	Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organic mineral and peaty soils where the FCD are 150 or greater Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where the FCD are 225 or greater All soils in WC V (usually wet) or WC VI (permanently wet)

Source: Adapted from Table 4 of IEMA guidance (IEMA, 2022).

Determining significance effects

14.8.7 The overall significance of environmental effects will then be assessed using the significance matrix as shown in Table 14-9, which combines the value/sensitivity of a receptor with the magnitude of change to identify the significance of effect. This would be decided by professional judgement, as appropriate, where there is more than one definition in a cell.

Table 14-9 Significance matrix

		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
Sensitivity / value	Very High	Neutral	Slight	Moderate or large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: Based on Table 3.8.1 in DMRB LA 104 Environmental Assessment and Monitoring (National Highways, 2019b).

14.8.8 Significant effects are defined as those that are moderate, large or very large.

Assessment of residual impacts

14.8.9 At this stage it is not possible to meaningfully describe the likely magnitude of residual effects. In order to meaningfully describe residual effects, assessment would need to be carried out in accordance with LCRM including a desk study, ground investigation and risk assessment in order to define appropriate mitigation. With relevant mitigation implemented residual effects are unlikely to be significant, however, significant effects cannot be discounted at this stage.

Assessment of cumulative impacts

14.8.10 Inter-development cumulative effects occur where effects combine with those from other developments. Intra-development cumulative effects arise from the interactions between effects from a proposed development. Inter-development cumulative effects will be reported in a separate cumulative effects chapter (Chapter 20 – Cumulative Effects), while intra-development effects will be assessed and reported in the individual technical chapters of the Environmental Statement, including this one. Potential intra-development effects associated with geology and soils may, for example, include those associated with the water environment combining to affect ecology and health, air quality affecting health, and materials and waste potentially affecting traffic.

Assumptions, limitations and uncertainties

14.8.11 The assessment undertaken at this stage is largely based on third party records. It is assumed that these records are accurate and representative.

14.8.12 Ground investigation data are not yet available, therefore, there is still a high level of uncertainty in respect to land contamination at this stage. In any case ground investigation cannot determine the level of contamination everywhere within a site and it is possible that some contaminated areas will only be identified during construction works.

14.8.13 The ALC information is based on publicly available maps and data, not site specific data.

14.9 Mitigation and Environmental Net Gain

Construction phase mitigation

Primary

14.9.1 The SESRO Project would, where practicable, be designed to avoid high sensitivity/value soils and geological receptors and areas where potential land contamination has been identified e.g. routing of roads to avoid disturbing potential sources of contamination.

14.9.2 Mitigation would be identified throughout the design process to ensure that potential impacts are reduced, for example through limiting construction footprints, the stripping and sustainable re-use of soils and spillage containment to be set out within a Construction Code of Practice (CoCP).

Secondary

14.9.3 At this stage, the requirement for specific mitigation measures in respect of geology and soils cannot be meaningfully identified, particularly in relation to impacts from land contamination. Nevertheless, where contamination impacts are identified during survey or construction, bespoke remediation strategies will be developed, as appropriate to the nature and extent of contamination encountered, and agreed with the relevant authorities.

Tertiary

14.9.4 The following legislation, industry guidance and good practice will be adhered to (but not limited to) in order to mitigate impacts related to soils, geology and land contamination:

- LCRM (Environment Agency, 2020) process with regards to potential contamination risk assessment and implementation of mitigation if required
- CL:AIRE DoW:CoP (CL:AIRE, 2011)

- Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition materials: Industry Guidance (CAR-SOIL) (CL:AIRE, 2016)
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2018b)
- Control of Asbestos Regulations 2012
- Construction (Design and Management) Regulations 2015

14.9.5 A soil survey will be completed and used to inform a Materials Management Plan (MMP) and a Soil Resource Plan (SRP) in accordance with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2018b).

14.9.6 A desk study, ground investigation and relevant land contamination risk assessments will be completed to inform remedial strategies in accordance with LCRM (Environment Agency, 2020) and an MMP in accordance with the DoW:CoP (CL:AIRE, 2011).

Operation phase mitigation

14.9.7 Operational impacts related to geology and soils are not anticipated. It is assumed that the majority of effects related to land contamination would be controlled by tertiary mitigation, along with remediation of contamination during construction. Standard controls would be in place, such as the use of hardstanding and appropriate drainage / pollution control systems and any industrial processes (such as the Water Treatment Works (WTW)) would be controlled under an Environmental Permit by the Environment Agency. However, given that detailed information relating to land contamination and Potential Contaminant Linkages (PCLs) is not available at this stage, or the possible mitigation required, the potential for effects in the operational stage cannot yet be discounted.

Potential for environment net gain

14.9.8 Potential environmental net gain opportunities in relation to geology and soils are summarised below:

- Improvement of geological features and/or exposure of previously concealed geological features for study/viewing
- Improvement in one or more soil functions
- Removal or remediation of soil and/or groundwater contamination

14.10 Summary of Scope for the EIA

EIA Scope for the preferred option

Table 14-10 Summary of geology and soils matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Geological designations	IN	No sites of geological importance have been identified within the study area Excavation will expose Kimmeridge Clay and Gault Formation which are fossil rich and, therefore, may identify geologically important information
Soils supporting biomass production	IN	Soils could be affected in two ways during construction, via: • Adverse - Soil sealing due to permanent development over soils, or • Adverse or beneficial - Loss of, or improvements to, soil functions due to contamination, degradation during soil handling, remediation, or land use change
Soils supporting sites of ecological importance	IN	Adverse – potential impacts on soils associated with the Cuttings and Hutchins Copse LWS, depending on the location for the rail sidings
Soil carbon	IN	Adverse – disturbance of soil carbon during soil handling. Temporary, reversible loss of soil carbon sequestration potential
Land contamination	IN	The following potential impacts could arise during construction in relation to land contamination: • Adverse - Risks to on-site and off-site receptors from contamination from potential contaminant linkages • Beneficial - betterment of ground or groundwater contamination conditions through remediation and/or mitigation (benefit) and removal or reduction of risk to receptors

Environmental matter	Scoped in / out	Rationale
Operational phase		
Geological designations	Out	Impacts would not continue into the operational phase. The permanent loss of agricultural land that would occur during construction would persist during operation but is not considered to be an additional impact. It is not anticipated that further loss of soil resources would take place during operation
Soils supporting biomass production	Out	
Soils supporting sites of ecological importance	Out	
Soil carbon	Out	
Land contamination	IN	At this early stage of the Project the risks in relation to land contamination have not been fully assessed and the possibility of potential contaminant linkages remaining in the operational stage cannot be discounted

Potential changes to scope and methods associated with other options

14.10.1 At this stage, based on the scale of activities and professional judgement, the scope and methods associated with the reasonable worst-case options considered for SESRO are unlikely to change from those presented in this assessment. The study area used captures all options considered and, therefore, there would be no expected change to scoping should any of these options be put forward for the Project.

14.11 Next Steps

14.11.1 The next steps to be undertaken for geology and soils assessment are as follows:

- Liaison with local authorities to gain additional local information and data on potential sources of contamination
- Propose Ground Investigation targeting potential sources of contamination and agree with the relevant authorities
- A Preliminary CSM is being developed in order to identify PCLs As the project progresses and further design details are made available, the CSM will need to be reviewed and updated.
- Undertake a soil survey as required, in consultation with Natural England

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15 Materials and Waste

15.1 Introduction

15.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report presents the results of the Materials and Waste scoping assessment undertaken for the SESRO Project in accordance with the Institute of Environmental Management and Assessment's (IEMA, 2020) Guide to Materials and Waste in EIA.

15.1.2 Specifically, this chapter of the EIA Scoping Report determines whether the following materials and waste matters associated with constructing and operating the SESRO Project are likely to result in significant adverse environmental effects:

- Consumption of 'material resources'
- Sterilisation of 'allocated mineral sites'
- Generation and disposal of 'waste'

15.1.3 This determination has been made after considering the influence of mitigation on the potential for likely significant adverse environmental effects. Where matters are scoped-in, this chapter of the EIA Scoping Report defines the level of detail to be provided and the assessment methods to be adopted.

15.1.4 As reported in paragraph 15.6.25, the materials and waste scoping assessment is aligned with and supports information and findings communicated by the other environmental aspect chapters of this EIA Scoping Report, including, but not limited to, Chapter 14 – Geology and Soils and Chapter 16 – Carbon and Climate Change.

15.1.5 The indirect impacts of off-site upstream materials extraction and production, and downstream waste management and disposal do not form part of the materials and waste scoping assessment for the reasons discussed in paragraphs 15.6.31 to 15.6.37.

15.2 Legislation, Policy, Standards and Guidance Context

15.2.1 Key policy relevant to materials and waste set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs) (Defra, 2023) includes:

- Paragraph 4.12.6 requires the applicant to set out the arrangements that are proposed for managing any waste produced in the application for development consent and prepare a Site Waste Management Plan (SWMP) and Materials Management Plan (MMP) where relevant. These should include information on the proposed waste recovery and disposal systems, and the alternatives that have been considered

- Paragraph 4.12.7 requires the applicant to demonstrate that waste will be managed in accordance with their duty of care requirements as a waste producer and the waste hierarchy and that, during construction, excavated soil, subsoil and rock will, where feasible, be reused as per the Soil Resource Plan (SRP)
- Paragraph 4.10.16 requires the applicant to identify and assess any impacts the proposed project may have for mineral safeguarded areas (or other minerals supply aspects) with the relevant Mineral Planning Authority
- Paragraph 4.10.28 indicates that where the development has an impact on a mineral safeguarding area, the Secretary of State must ensure that the applicant has put forward appropriate mitigation or compensation measures to safeguard mineral resources

15.2.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the SESRO Project would also have regard to other relevant legislation, policy, standards and guidance for this aspect as listed in Table 15-1.

15.2.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the SESRO Project, would be provided in the Preliminary Environmental Information (PEI) Report and/or Environmental Statement (ES).

Table 15-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Environment Act 2021 (as amended)
Environmental Protection Act 1990 (as amended)
The Environmental Permitting (England and Wales) Regulations 2016 (as amended)
The Waste (England and Wales) Regulations 2011 (as amended)
The Hazardous Waste (England and Wales) Regulations 2005 (as amended)
National policy
National Policy Statement for Water Resources Infrastructure (Defra, 2023a)
Environment Improvement Plan (Defra, 2023b)
National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2023)
Consultation version of the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2024)

Relevant legislation, policy, standards and guidance
Waste Prevention Programme for England: Towards a Resource Efficient Economy (Defra, 2021a)
Waste Management Plan for England (Defra, 2021b)
National Infrastructure Strategy (HM Treasury, 2020)
A Green Future: 25 Year Environment Plan (Defra, 2018a)
Resources and waste strategy for England (Defra, 2018b)
National Planning Policy for Waste (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2014)
Regional policy
Oxfordshire Minerals and Waste Local Plan – Part 1 Core Strategy (Oxfordshire County Council, 2017a)
Oxfordshire's Strategic Vision for Long-Term Sustainable Development (Future Oxfordshire Partnership, 2021)
Local policy
Local Plan 2031 Part 1 (Strategic Sites and Policies) (Vale of White Horse District Council, 2016)
Local Plan 2031 Part 2 (Detailed Policies and Additional Sites) (Vale of White Horse District Council, 2019a)
Sustainable Construction Checklist (Vale of White Horse District Council, 2022)
Thames Water policy
Sustainability Policy POL012 V2.0 (Thames Water, 2023)
Standards and guidance
Sustainable Management of Surplus Soil and Aggregates from Construction (Construction Industry Research and Information Association, 2023)
Routemap for Zero Avoidable Waste in Construction (Green Construction Board, 2021)
Technical Guidance WM3: Waste Classification – Guidance on the Classification and Assessment of Waste (Environment Agency et al., 2021)
Guide to Materials and Waste in EIA – Guidance for a Proportionate Approach (IEMA, 2020)
The Circular Economy and Net Zero Carbon, White Paper No. 4 (Major Infrastructure – Resource Optimisation Group (MI-ROG), 2020)

Relevant legislation, policy, standards and guidance
Circular Economy Guidance for Construction Clients (UK Green Building Council, 2019)
Mineral Safeguarding Practice Guidance (the Mineral Products Association and the Planning Officers' Society, 2019)
Waste Duty of Care Code of Practice (Defra, 2016)
BES 6001 Framework Standard for Responsible Sourcing (Building Research Establishment, 2014)
Quality Protocol – Aggregates from Inert Waste: End of Waste Criteria for the Production of Aggregates from Inert Waste (Environment Agency, 2013)
The Definition of Waste: Development Industry Code of Practice (Contaminated Land: Applications in Real Environments (CL:AIRE), 2011)
Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2011)
BS 8903:2010 Principles and Framework for Procuring Sustainably – Guide (British Standards Institution, 2010)
BS 8902:2009 Responsible sourcing sector certification schemes for construction products. Specification (British Standards Institution, 2009)

15.3 Engagement

15.3.1 A Technical Liaison Group (TLG) meeting was held with Oxfordshire County Council and the Vale of White Horse District Council on 15 March 2024 to set out the scope, methodology and initial mitigation measures for this aspect.

15.3.2 An additional TLG meeting was held with Oxfordshire County Council's (OCC) Minerals and Waste Planning Team on 14 May 2024 to discuss relevant minerals and waste safeguarding issues.

15.3.3 While no changes to the assessment scope or methodology were proposed by the consultees, a summary of relevant stakeholder comments are provided in Table 15-2.

Table 15-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
	It is helpful to see what mitigation is being looked at this stage	No response / action required

Consultee	Comment	Response / action taken
Oxfordshire County Council (OCC)	Requested information on construction details; material quantities / provenance; and waste quantities / management routes. OCC commented that this information would be useful in preparing its new Minerals and Waste Local Plan	This information would be provided when available at the PEI Report and/or ES stage of the SESRO Project.
	The future Minerals and Waste Local Plan will need to be considered	This would be considered at the PEI Report and/or ES stage of the SESRO Project.
Vale of White Horse District Council (VoWHDC)	Reuse of materials from the existing road is welcome	No response / action required
	Queried whether there are existing buildings within the area that are going to have to be demolished that could be repurposed for a temporary period during construction	To be considered at the PEI Report and/or ES stage of the SESRO Project.
	Interested to hear about the plans for the removal of existing solar farms	To be considered SESRO Project at the PEI Report and/or ES stage of the SESRO Project.

15.4 Existing Environment and Baseline Conditions

Study areas

15.4.1 In accordance with the IEMA (2020) guidance, the assessment of materials and waste utilises the following spatial scope to examine the consumption of material resources, sterilisation of allocated mineral sites and the generation and disposal of waste:

- The first study area (the development study area[22]) – extends to the EIA Scoping Boundary for the SESRO Project. Within these areas, materials

[22] *The development study area includes the Project footprint (including temporary land take) for which consent is being sought. The area within which construction materials would be consumed (used / deployed), and waste generated (including temporary compounds and storage areas etc.). This is referred to as the EIA Scoping Boundary.*

would be consumed; mineral safeguarding sites could be sterilised; and waste would be generated

- The second study area (the expansive study area) – extends to south-east England's regional (or where justified, national) availability of construction materials and capacity of waste management infrastructure, including remaining landfill void space

15.4.2 The expansive study area for this aspect depends on the types of materials required and waste to be generated. Where materials can be sourced, and wastes managed locally / sub-regionally, the study area would be commensurately small. However, where materials sourcing and waste management is required at a regional or national level, the study area would be defined accordingly.

15.4.3 Given the current limitations pertaining to materials provenance and waste management defined in Section 15.6 of this chapter, the desk-based assessment reported in this section has been determined based on professional judgment and the availability of baseline information. The expansive study area will be more accurately defined at the PEI Report and/or ES stage of the SESRO Project, when further information on the materials to be consumed and wastes to be disposed of becomes available.

15.4.4 In contrast to other environmental aspects, impacts from the consumption of material resources and the generation and disposal of waste, such as the depletion of material resources and use of landfill void capacity, are largely dispersed, rather than affecting specific receptor locations. The baseline environment for this aspect, therefore, comprises the following key receptors:

- Materials availability – regional (or where justified, national) availability (stocks, production, sales, other) of key construction and operational materials within the expansive study area
- Mineral safeguarding sites – local Mineral Strategic Resource Areas, Mineral Safeguarding Areas and allocated mineral sites within the development study area
- Landfill void capacity – regional (or where justified, national) availability of inert / non-hazardous and hazardous landfill void capacity within the expansive study area

Desk-based assessment

15.4.5 A desk-based assessment has been undertaken to establish existing baseline conditions. This has been prepared with reference to the following documents, which represent the most recent information available:

- British Geological Survey (2024) – British Pits (database) (BritPits)

- Environment Agency (2024) – 2022 Waste Data Interrogator (including 2022 Waste Summary Tables for England)
- Forest Research (2023) – Wood Production 1976-2022
- Ministry of Housing, Communities & Local Government (2019) – Aggregate Minerals Survey for England and Wales
- Mineral Products Association (2023) – Profile of the UK Mineral Products Industry 2023 Edition
- Oxfordshire County Council (2023) – Local Aggregates Assessment 2022
- Oxfordshire County Council (2017b) – Oxfordshire Minerals and Waste Local Plan Policies Map South
- Oxfordshire County Council (1996) – Saved policies from the Minerals and Waste Local Plan 1996
- South-East England Aggregate Working Party (2023) – Annual Report 2022
- Thames Water (2023b) – TMS10 Bioresources: AMP8 and Market Strategy
- UK Steel (2023) – Key Statistics Guide 2023
- Vale of White Horse District Council (2019b) – Local Plan 2031 Adopted Policies Map: Abingdon-on-Thames and Oxford Fringe Sub-Area

Existing baseline conditions

Materials availability

15.4.6 The regional and/or national availability of the key materials that would be required in constructing and/or operating the SESRO Project are summarised in Table 15-3 (i.e. noting the limitations discussed in paragraphs 15.4.2 and 15.4.3). This list has been formulated through the application of professional judgement to the SESRO Project description provided in Chapter 2 – Project Description. At this stage the quantities of key materials is not currently known, but this will be revisited in the PEI Report and / or ES.

15.4.7 The SESRO Project design is at an early stage, and there is currently limited information available regarding precise material requirements. It has, therefore, not been possible to obtain data for the mechanical and electrical (M&E) plant that are likely to be required in constructing and/or operating the SESRO Project, nor any materials and products that are likely to be consumed in the fit-out of operational buildings (e.g. floor and ceiling coverings; wall materials; partitions and doors; decorative elements; and lighting).

15.4.8 Notwithstanding this, based on the application of professional judgement to the operational nature of the SESRO Project described in Chapter 2 – Project Description, the M&E plant and fit-out materials and products are likely to represent a negligible proportion of the overall materials that are likely to be consumed by the SESRO Project. Equivalent published information, on the availability of these materials and products, may also be unobtainable owing to supplier confidentiality.

Table 15-3 Baseline materials availability in the expansive study area

Material	Availability (Million tonnes per annum)	Reporting metric	Source and reporting year
National – as specified			
Primary aggregates	168.26	GB annual supply	Mineral Products Association, 2022
Secondary / recycled aggregates	73.95	GB annual supply	Mineral Products Association, 2022
Ready-mixed concrete	50.10	UK annual production	Mineral Products Association, 2022
Concrete products	24.78	UK annual production	Mineral Products Association, 2021
Asphalt	26.72	UK annual production	Mineral Products Association, 2022
Cementitious products[23]	11.37	UK annual sales	Mineral Products Association, 2022
Mortar	3.14	GB annual sales	Mineral Products Association, 2022
Dimension stone	1.03	GB annual sales	Mineral Products Association, 2022
Rip rap	0.31	England and Wales annual sales	Ministry of Housing, Communities & Local Government, 2019
Railway ballast	1.45	England and Wales annual sales	Ministry of Housing, Communities & Local Government, 2019

[23] *Excludes imports but includes fly ash and other slags. Blast furnace / steel slags and fly ash can be used as a low-carbon replacement for Ordinary Portland Cement; with 1.36 and 0.34 Mt respectively being sold in the UK in 2022. Includes cement that goes into soil stabilisation, specialist grouts and other applications.*

Material	Availability (Million tonnes per annum)	Reporting metric	Source and reporting year
Crude steel[24]	6.00	UK annual sales	UK Steel, 2022
Timber	10.00	UK annual production	Forest Research, 2022
Regional – South East England			
Asphalt	1.74	Annual sales	Mineral Products Association, 2022
Ready-mixed concrete	5.39	Annual sales	Mineral Products Association, 2022
Sand and gravel	5.98	3-year average annual sales	South East England Aggregates Working Party, 2022
Crushed rock	2.48	3-year average annual sales	South East England Aggregates Working Party, 2022
Marine aggregates	6.45	3-year average annual sales	South East England Aggregates Working Party, 2022
Secondary / recycled aggregates	4.20	3-year average annual sales	South East England Aggregates Working Party, 2022
Rip rap	0.04	Annual sales	Ministry of Housing, Communities & Local Government, 2019
Dry sewage sludge[25]	0.37	Annual production	Thames Water, 2023

[24] *The UK steel sector produces around 6.0 Mt per year, around 70% of the UK's annual requirement (annual demand of 8.9 Mt). Currently, the carbon intensity of steel produced via electric arc furnace (EAF) route is around a fifth of that of steel made through basic oxygen steeling (BOS). The current ratio between EAF (29%) and BOS (71%) for UK steel making is unable to change in the short term due to the costs and lead times associated with installing new steel production capacity.*

[25] *Which is being considered for its potential to be used in low carbon aggregate – see paragraph 15.7.5.*

Mineral safeguarding sites

15.4.9 A review of the Oxfordshire County Council (2017b) – Minerals and Waste Local Plan Policies Map South confirms a negligible degree of intersection[26] between the development study area and a Mineral Strategic Resource Area (Corallian Ridge – Oxford to Faringdon – Soft Sand) and Mineral Safeguarding Area (Soft Sand) (see Figure 15.1).

15.4.10 Reference to the British Geological Survey's (2024) BritPits dataset and the Saved Policies of the Oxfordshire County Council (1996) Minerals and Waste Local Plan also confirm the presence of the following mineral safeguarding sites within the EIA Scoping Boundary (see Figure 15.1):

- Oday Quarry (Sutton Wick Quarry) and plant area, and associated planning permissions (MW.0010/18, MW.0103/20, MW.0104/20, MW.0038/23, MW.0080/23, MW.0170/23 and MW.0024/24)
- Land at Sutton Wick where the principle of new sharp sand and gravel working is accepted under Saved Policy SW1 of the Oxfordshire Minerals and Waste Local Plan 1996
- Five areas of land subject to minerals ownership rights by the Church Commissioners for England; and one area of land at Thrupp Farm Quarry, Radley (i.e. which abuts the Land at Sutton Wick)

15.4.11 Notwithstanding this, a recent undecided planning application (MW.0024/24) at Oday Quarry confirms the intention to have completed extraction and restoration by 01 March 2027. This site is, therefore, likely to have been restored prior to the start of constructing the SESRO Project in circa 2030. The status of this planning application would be reviewed at the PEI Report and/or ES stage.

15.4.12 The Oxfordshire Minerals and Waste Local Plan – Part 2 Site Allocations: Preferred Options Consultation (OCC, 2020) suggests that the land at Sutton Wick is unlikely to be suitable as a future site allocation and, therefore, these minerals are unlikely to be worked / extracted.

15.4.13 This is because the land at Sutton Wick is outside of a Mineral Strategic Resource Area and would, therefore, not be in accordance with Policy M3 (Principal locations for working aggregate minerals) and Policy M4 (Sites for working aggregate minerals) of the Oxfordshire Minerals and Waste Local Plan – Core Strategy 2017.

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[26] *This section of the development study area is associated with the proposed diversion of an existing public right of way that is currently routed through a Mineral Strategic Resource Area and Mineral Safeguarding Area. This public right of way needs to be diverted to avoid a curlew nesting area, which results in the development study area negligibly encroaching within these mineral safeguarding sites (i.e. by less than 10m at this location).*

15.4.14 Furthermore, while there are five areas of land subject to minerals ownership rights within the development study area, these are not considered to be allocated mineral sites as they are not mineral deposits specifically identified in the Oxfordshire Minerals and Waste Local Plan as those that would be extracted. Again, these areas are located outside of a Mineral Strategic Resource Area which means that they are unlikely to worked / extracted for the reasons discussed in paragraph 15.4.13.

Waste transfer, treatment, recycling and recovery infrastructure capacity

15.4.15 The current availability of regional waste management infrastructure within the expansive study area is presented in Table 15-4.

Table 15-4 Total permitted throughput or capacity of transfer, treatment, metal recycling and incineration in the expansive study area, 2022

Site type	South-east (000s tonnes)	Oxfordshire (000s tonnes)
Transfer (annual throughput)		
Hazardous waste transfer stations	682	12
Household, industrial, commercial waste transfer stations	4,082	151
Non-biodegradable waste transfer stations	212	19
Treatment and metal recycling (annual throughput)		
Material recovery	2,031	314
Physical treatment	6,720	985
Physico-chemical treatment	297	6
Chemical treatment	7	0
Composting	676	107
Biological treatment	2,209	353
Metal recycling	583	18
Incineration (annual capacity)		
Hazardous waste incineration	58	0
Municipal and/or industrial & commercial incineration	3,470	326
Biomass/waste wood incineration	332	0

Source: Environment Agency, 2024.

Inert, non-hazardous, and hazardous landfill void capacity

15.4.16 For wastes which cannot be reused, recycled, or otherwise recovered, disposal to landfill would be required. The current quantities of regional (or where justified, national) waste disposal to landfill and the current landfill void capacity, within the expansive study area, is presented in Table 15-5 and Table 15-6 respectively.

Table 15-5 Waste disposal to landfill in the expansive study area, 2022

Waste classification	England (000s tonnes)	South-east (000s tonnes)	Oxfordshire (000s tonnes)
Inert	Not applicable	4,580	832
Non-hazardous	Not applicable	2,137	1,026
Non-hazardous SNRHW1	Not applicable	2,680	34
Hazardous	1,003	10	0
Total	**1,003**	**9,406**	**1,892**
Note 1 Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.			

Source: Environment Agency, 2024.

Table 15-6 Landfill void capacity in the expansive study area, 2022

Site type	England (000s tonnes)	South-east (000s tonnes)	Oxfordshire (000s tonnes)
Inert landfill	Not applicable	30,536	3,907
Non-hazardous landfill	Not applicable	14,593	1,948
Non-hazardous SNRHW	Not applicable	8,963	0
Hazardous merchant landfill	14,868	137	0
Total	**14,868**	**54,230**	**5,855**
Note 1 Converted from cubic metres through adoption of the following conversion factors: inert landfills 1.5 tonnes/m3, non-hazardous landfills 0.83 tonnes/m3 and hazardous landfills 1.5 tonnes/m3. Environment Agency (2024) also reports that an additional 11,068,894 tonnes, 2,553,859 tonnes and 343,063 tonnes of inert / non-hazardous			

Site type	England (000s tonnes)	South-east (000s tonnes)	Oxfordshire (000s tonnes)
waste was deposited in landfills in England, the south-east and Oxfordshire respectively in 2022.			

Source: Environment Agency, 2024.

Future baseline conditions

15.4.17 The demand for materials consumption and waste management, associated with the SESRO Project, would be spread over the anticipated construction period of approximately 10 years. While there would inevitably be some draw-down of available capacity as materials are consumed and waste is disposed of prior to, and during, the anticipated construction period (circa 2030 to 2040), the rate of draw-down would be dependent on external factors including government policy and market forces.

Materials availability

15.4.18 It is assumed, based on the current and emerging policy outlined in Section 15.2 of this chapter, that industry and government would ensure a steady and adequate supply of indigenous materials to meet demand throughout the lifecycle of constructing and operating the SESRO Project, while also aiming towards a more diversified supply to support the transition to a circular economy. For example, the 25 Year Environment Plan sets the target of maximising the value and benefits from resources through doubling resource productivity by 2050.

Minerals safeguarding sites

15.4.19 It is assumed that the size and location of mineral safeguarding sites would remain largely unchanged from the existing baseline conditions reported above. The locations of mineral safeguarding sites are substantially fixed given that they are determined by geology.

15.4.20 While the presence of new mineral safeguarding sites cannot be entirely ruled out at this stage, given that the Minerals and Waste Planning Authority is in the process of preparing a new Minerals and Waste Plan for Oxfordshire to 2042, there is a low likelihood of any additional mineral safeguarding sites being allocated within the development study area.

15.4.21 This assumption is made on the basis that any future allocated mineral sites would be located within Mineral Strategic Resource Areas and Mineral Safeguarding Areas, both of which are presently almost entirely absent from the development study area.

15.4.22 Furthermore, the development study area is also safeguarded in its own right for construction of a reservoir under Policies CP14 and CP14a of the Value of White Horse District Council (2019b) Local Plan 2031. It is, therefore, unlikely that the Minerals and Waste Planning Authority would designate any new allocated mineral sites within the development study area.

Inert, non-hazardous and hazardous landfill void capacity

15.4.23 Trends in waste generation and disposal, landfill void capacity, waste management, and the timeline of landfill waste diversion policies, would suggest that there is likely to be a continued demand for landfill for the foreseeable future (until at least 2050). This assumption is made with reference to the current UK policy for waste, as set out in the 25 Year Environment Plan, which aims to reach zero avoidable waste by 2050.

15.4.24 In the meantime, it is assumed that Minerals and Waste Planning Authorities would continue to plan for new landfill void capacity, both to ensure continued capacity is provided at existing landfill sites (as available void space is exhausted), but also through the permitting of new landfill sites (e.g. for backfilling and restoring former quarries). Subject to planning permission, new landfill void capacity is likely to be provided to meet any future gaps at a regional (or where justified, national) level.

15.4.25 Notwithstanding this, the average annual capacity change in landfill void capacity from 2005 to 2022 (the years for which consistent data is available from the Environment Agency (EA) has been used to estimate, in Table 15-7, the average annual landfill void capacity that may be available during the construction of the SESRO Project (expected between circa 2030 and 2040). Further information on inert, non-hazardous and hazardous landfill void capacity will be provided in the PEI Report and/or ES.

Table 15-7 Estimated average annual landfill void capacity, 2030-2040

Site type	Average annual capacity (000s tonnes per annum[1])		
	England	South-east	Oxfordshire
Inert / non-hazardous landfill	N/A	35,988	3,330
Hazardous merchant landfill	11,058	N/A	N/A

Note

[1] These estimates assume the continuation of the following average annual capacity change, in the subtraction / addition of landfill void capacity, as that reported by the EA for 2005 to 2022: England: hazardous landfill (-2.3%); South-east: inert / non-hazardous landfill (-3.1%); and Oxfordshire: inert / non-hazardous landfill (-4.3%).

Further desk study

15.4.26 As detailed in Section 15.9 of this chapter, further desk-based assessment would be required for the PEI Report and/or ES, to update the likely future baseline conditions during the anticipated construction period (circa 2030 to 2040). In accordance with the IEMA (2020) guidance, this exercise would be completed in the absence of the SESRO Project.

15.5 Potential Environmental Effects

Sensitivity of receptor

15.5.1 A summary of the provisional sensitivity of the materials and waste baseline receptors is provided in Table 15-8. Professional judgement has been applied in in order to determine the sensitivity of these receptor according to the IEMA (2020) guidance thresholds / criteria set out in Table 15-9, Table 15-10 and Table 15-11 in Section 15.6. This is based on the future baseline conditions reported in Section 0.

Table 15-8 Sensitivity of receptors

Aspect	Matters	Summary	Sensitivity
Materials	Materials availability	The key materials required for constructing / operating the SESRO Project are likely to be generally free from known stock or supply issues and would likely comprise a high proportion of sustainable features and benefits. At this stage, no planned use of substantial quantities of critical raw materials is anticipated	Low sensitivity
	Mineral safeguarding sites	There are unlikely to be any allocated mineral sites present within the development study area at the time of constructing / operating the SESRO Project.	N/A – no sensitivity criteria provided
Waste	Inert / non-hazardous landfill void capacity	The regional inert / non-hazardous landfill void capacity (without the SESRO Project) is expected to reduce very considerably (by >10%) across the construction phase / first three years of commissioning the SESRO Project. This is based on the average annual capacity change, in the subtraction / addition of landfill void capacity, reported in Table 15-7.	Very high sensitivity

Aspect	Matters	Summary	Sensitivity
	Hazardous landfill void capacity	The national hazardous landfill void capacity (without the SESRO Project) is expected to reduce very considerably (by >1%) across the construction phase / first three years of commissioning the SESRO Project. This is based on the average annual capacity change, in the subtraction / addition of landfill void capacity, reported in Table 15-7.	Very high sensitivity

Construction

Materials availability

15.5.2 Construction of the SESRO Project, as described in Chapter 2 – Project Description, would require the use of a substantial quantity of materials which would impact upon their immediate and, in the case of primary materials, long-term availability, resulting in temporary or permanent adverse impacts through the depletion of natural resources.

15.5.3 Some of these materials would originate off-site, purchased as primary construction materials and products, but some would arise on-site, particularly excavated clay from the borrow pit, and recycled aggregates from demolition / site enabling works, or recycled materials brought in from off-site, possibly from other development projects or industries (e.g. donor sites).

15.5.4 As outlined in paragraph 15.7.4, the SESRO Project has been designed with an aim to balance cut and fill quantities to avoid needing to import or export clay. However, significant quantities of other construction materials would need to be imported (e.g. rip-rap for reservoir embankment slope protection and filter / drainage layers in the reservoir embankment).

15.5.5 Potential effects could occur in instances where one or more of the materials consumed in constructing and/or operating the SESRO Project: suffers from known stock and supply issues and/or comprises little or no sustainable features and benefits compared to industry-standard materials; and represent a substantial proportion of the baseline market capacity of that material.

Mineral safeguarding sites

15.5.6 Construction of the SESRO Project would require land for both temporary construction and permanent uses. New permanent land take within, or adjacent to, mineral safeguarding sites risks impacting access to and/or sterilising these areas rendering them inaccessible for future use.

15.5.7 Sterilisation occurs when development or land-use changes take place which substantially constrain or prevent the existing or potential future use and extraction of mineral resources. This can occur through directly building over a mineral resource, or indirectly, where the presence of a development adjacent to the mineral resource makes it impractical to extract in the future.

15.5.8 Potential effects could arise in instances where one or more allocated mineral sites are substantially sterilised during the construction of the SESRO Project, and prior extraction is not possible. As discussed in Section 0 of this chapter, there are unlikely to be any allocated mineral sites present within the development study area at the time of constructing / operating the SESRO Project.

Landfill void capacity

15.5.9 Construction of the SESRO Project would generate substantial quantities of waste, including: construction, demolition and excavation wastes; and municipal solid waste. Depending on how this is managed, this may lead to impacts on the available regional (or where justified, national) waste management infrastructure through permanently occupying landfill void capacity.

15.5.10 Use of the Waste and Resource Efficiency Action Programme (2013) Resource Efficiency Benchmarks for Construction Projects would suggest that a project with an equivalent capital cost could generate between 60,000 to 330,000 tonnes of construction, demolition and excavation waste[27]. Notwithstanding this, Defra's (2023c) ENV23 – UK statistics on Waste would suggest that the majority of this could be diverted from landfill (i.e. given that 93.2% of construction and demolition waste is currently being diverted from landfill in England).

15.5.11 Potential effects could occur in instances where future inert / non-hazardous and/or hazardous landfill void capacity is expected to reduce noticeably as a result of wastes forecast to be generated across the construction phase; and where the waste generated by the SESRO Project would markedly deplete the remaining landfill void capacity.

Operation

15.5.12 The IEMA (2020) guidance specifies that the operational assessment should be assessed over the course of any one full and justifiably representative year within the first three years of commissioning.

[27] Based on the 25th and 75th percentile weight of construction, demolition and excavation waste (tonnes / £100,000) reported for 1,444 No. completed buildings and infrastructure projects.

15.5.13 The materials consumed and the waste generated during the operation and maintenance of the SESRO Project would be associated with the permanent features of the project described in Chapter 2 – Project Description[28]. Application of professional judgement to the nature of these permanent features would suggest that no significant materials consumption or waste generation is likely to occur during the first three years of operation.

15.5.14 Based on the operational nature of the SESRO Project, any annual materials consumption and/or construction and demolition waste, commercial and industrial waste, or municipal solid waste disposal from operation or maintenance is likely to be negligible. This determination has been made in the context of the IEMA guidance, the available materials and landfill capacity baseline described in Section 0 and considering the magnitude of impact criteria provided in Section 15.6.

15.5.15 It is, therefore, proposed that operational effects be scoped out of any further assessment in the PEI Report and/or ES. Nevertheless, a range of measures are proposed in Section 15.7 for the operational phase to further reduce any potential environmental effects. These measures would occur as a matter of course due to legislative and policy requirements, or normal sector practices for this aspect.

15.5.16 This assessment does not include any impacts of decommissioning the SESRO Project. The operational life of the SESRO Project is expected to be over 100 years and it is anticipated that the future materials technologies and waste management infrastructure in place to re-use, recycle, recover or dispose of waste would be substantially different to the existing baseline conditions.

15.5.17 Furthermore, it is highly unlikely that the SESRO Project would be decommissioned as the infrastructure would have become an integral part of the strategic water resources network. In the unlikely event of the SESRO Project needing to be decommissioned, this would conform to the statutory process in place at that time.

15.5.18 It is, therefore, proposed that decommissioning of the SESRO Project be scoped out of the assessment. Notwithstanding this, the inclusion of mitigation measures requiring the implementation of Circular Design Principles would ensure the consideration of durability and low maintenance of structures and components, and the recoverability of materials at end of first life.

28 These elements include: reservoir and embankments; intake/outfall and emergency discharge; access, parking, road and PRoW diversions; temporary rail siding and materials handling area; watercourse diversions and replacement floodplain storage; ancillary infrastructure; recreation; environmental proposals and utilities.

15.6 Assessment Methodology

Introduction

15.6.1 The following describes the proposed methodology for determining the significance of the effects of materials consumption, sterilisation of allocated minerals sites and waste generation and disposal during the construction of the SESRO Project (i.e. after having scoped out the operational phase). In accordance with the IEMA (2020) guidance, the significance of effects is determined by assessing the sensitivity of, and magnitude of impact on, these receptors.

15.6.2 The assessment is predicated on identifying the principal sources and quantities of construction materials, the type and quantity of waste that is expected to be generated and the timescales over which these are likely to be consumed / disposed of respectively. The SESRO Project design is at an early stage, and there is currently limited information available regarding precise material requirements and expected waste generation and disposal. As the design develops greater certainty, such information is expected to be generated. This would be outlined in the PEI Report and/or ES.

Determining sensitivity

Minerals

15.6.3 The sensitivity of materials relates to the availability of resources to be consumed during construction of the SESRO Project. The sensitivity of materials is determined by identifying where one or more of the criteria in Table 15-9 are met.

15.6.4 No sensitivity criteria are provided in the IEMA (2020) guidance for mineral safeguarding sites (i.e. on the basis that these sites are either present or absent from the development study area). Allocated mineral sites are, therefore, exclusively covered in the magnitude of impact criteria provided in Table 15-12.

Table 15-9 Sensitivity criteria for materials

Very High	Key materials required for the of the development are known to be insufficient in terms of production, supply and/or stock#, and/or comprise no sustainable features and benefits compared to industry-standard materials*
High	Key materials required for the construction of the development are forecast to suffer from known issues regarding supply and stock#, and/or

	comprise little or no sustainable features and benefits compared to industry-standard materials*
Medium	Key materials required for the construction of the development are forecast to suffer from some potential issues regarding supply and stock, and/or are available comprising some sustainable features and benefits compared to industry-standard materials*
Low	Key materials required for the construction of the development are forecast to be generally free from known issues regarding supply and stock, and/or are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials*
Negligible	Key materials required for the construction of the development are forecast to be free from known issues regarding supply and stock, and/or are available comprising a very high proportion of sustainable features and benefits compared to industry standard materials*
Notes * Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that: comprise reused, secondary or recycled content (including excavated and other arisings); support the drive to a Circular Economy; or in some other way reduce lifetime environmental impacts. # In the absence of IEMA (2020) guidance, any Critical Raw Materials (where the security of supply is at great risk) used in the development would be assigned a High or Very High sensitivity rating based on the application of professional judgment.	

Source: IEMA, 2020.

Waste

15.6.5 The sensitivity of waste relates to availability of regional (or where justified, national) landfill void capacity in the absence of the SESRO Project. This is assessed by applying the following two-step process set out in the IEMA (2020) guidance:

- The quantity of waste for disposal expected to be generated within the expansive study area (regionally or nationally) would be calculated by analysing available data, and by providing justified forecasts over the construction phase of the SESRO Project
- The quantity of forecast waste for disposal within the expansive study area (Step 1) would then be compared to the remaining landfill void capacity

(considering any consented increases in future capacity if known), to identify expected losses over the construction phase of the SESRO Project

15.6.6 The following criteria in Table 15-10 and Table 15-11 would be used to determine the sensitivity of inert / non-hazardous and hazardous landfill void capacity respectively.

Table 15-10 Sensitivity criteria for inert and non-hazardous waste landfill void capacity

Very High	Across the construction phase, the baseline / future baseline (i.e. without the development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce very considerably: (by >10%) during construction; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand
High	Across the construction phase, the baseline / future baseline (i.e. without the development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce considerably: by 6-10% as a result of wastes forecast
Medium	Across the construction phase, the baseline / future baseline (i.e. without development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce noticeably: by 1-5% as a result of wastes forecast
Low	Across the construction phase, the baseline / future baseline (i.e. without the development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce minimally: by <1% as a result of wastes forecast
Negligible	Across the construction phase, the baseline / future baseline (i.e. without the development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to remain unchanged, or is expected to increase through a committed change in capacity

Source: IEMA, 2020.

Table 15-11 Sensitivity criteria for hazardous waste landfill void capacity

Very High	Across the construction phase, the baseline/future baseline (i.e. without the development) of regional (or where justified, national) hazardous landfill void capacity is expected to reduce very considerably: (by >1%) during construction; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand

High	Across the construction phase, the baseline/future baseline (i.e. without the development) of regional (or where justified, national) hazardous landfill void capacity is expected to reduce considerably: by 0.5-1% as a result of wastes forecast
Medium	Across the construction phase, the baseline/future baseline (i.e. without the development) of regional (or where justified, national) hazardous landfill void capacity is expected to reduce noticeably: by 0.1-0.5% as a result of wastes forecast
Low	Across the construction phase, the baseline/future baseline (i.e. without the development) of regional (or where justified, national) hazardous landfill void capacity is expected to reduce minimally: by <0.1% as a result of wastes forecast
Negligible	Across the construction phase, the baseline/future baseline (i.e. without the development) of regional (or where justified, national) hazardous landfill void capacity is expected to remain unchanged, or is expected to increase through a committed change in capacity

Source: IEMA, 2020.

Determining magnitude

15.6.7 The approach and temporal scope for assessing the magnitude of impact from materials use and waste generation and disposal during the construction phase is as follows. Impacts are considered from the point at which construction site access is gained in circa 2030, through demolition, enabling works and construction, to operation in circa 2040.

Materials

15.6.8 The methodology for assessing the magnitude of impact due to consumption of material resources comprises a percentage-based approach.

15.6.9 This would be used to determine the influence of materials consumption on the baseline market capacity, during construction of the SESRO Project, in combination with the potential to sterilise one or more allocated mineral sites.

15.6.10 The assessment would be made by determining whether, through constructing the SESRO Project, the consumption of materials would result in the scenarios shown in Table 15-12.

Table 15-12 Magnitude criteria for materials

Major	One or more materials is >10% by volume of the regional* baseline availability; and/or More than one allocated mineral site is substantially# sterilised by the development rendering it inaccessible for future use.
Moderate	One or more materials is between 6-10% by volume of the regional* baseline availability; and/or One allocated mineral site is substantially# sterilised by the development rendering it inaccessible for future use.
Minor	One or more materials is between 1-5% by volume of the regional* baseline availability; and/or The development has the potential to adversely and substantially# impact access to one or more allocated mineral sites (in their entirety), placing their future use at risk.
Negligible	No individual material type is equal to or greater than 1% by volume of the regional* baseline availability.
No change	No material is required.
Notes * or where justified, national. # justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed.	

Source: IEMA, 2020.

Waste

15.6.11 The magnitude of impact due to the generation of inert / non-hazardous and hazardous waste is assessed by determining the percentage of the remaining landfill void capacity that would be depleted by waste produced during the construction phase of the SESRO Project as set out in Table 15-13 and Table 15-14 respectively.

Table 15-13 Magnitude criteria for inert and non-hazardous waste landfill void capacity

Major	Waste generated by the development will reduce regional* landfill void capacity baseline# by >10%
Moderate	Waste generated by the development will reduce regional* landfill void capacity baseline# by 6-10%

Minor	Waste generated by the development will reduce regional* landfill void capacity baseline[#] by 1-5%
Negligible	Waste generated by the development will reduce regional* landfill void capacity baseline[#] by <1%
No change	Zero waste generation and disposal from the development
Notes * or where justified, national. # forecast as the worst-case scenario, during a defined construction phase.	

Source: IEMA, 2020.

Table 15-14 Magnitude criteria for hazardous waste landfill void capacity

Major	Waste generated by the development will reduce national landfill void capacity baseline[#] by >1%
Moderate	Waste generated by the development will reduce national landfill void capacity baseline[#] by 0.5-1%
Minor	Waste generated by the development will reduce national landfill void capacity baseline[#] by 0.1-0.5%
Negligible	Waste generated by the development will reduce national landfill void capacity baseline[#] by <0.1%
No change	Zero waste generation and disposal from the development
Note # forecast as the worst-case scenario, during a defined construction phase.	

Source: IEMA, 2020.

Determining significance

15.6.12 The potential for significant environmental effects is determined by considering the magnitude of impact and the sensitivity of receptors affected, as outlined in the matrix provided in Table 15-15.

15.6.13 Effects of moderate significance and above are considered to be potentially significant. Where an effect is determined as of 'slight or moderate' significance, professional judgement would be used to determine the final significance of effect.

Table 15-15 Significance matrix

Sensitivity / value		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: IEMA, 2020.

Assessment of residual effects

15.6.14 An assessment of each residual environmental effect would be made both prior to and after the adoption of secondary and tertiary mitigation measures, in line with the methodology described in Section 15.6.

Assessment of cumulative effects

15.6.15 The approach to cumulative assessment is set out in Chapter 20 – Cumulative Effects. This includes an initial planning application search of other committed development in proximity to the SESRO Project to create an initial long list of developments (see Appendix O).

15.6.16 Given the nature of this aspect, the IEMA (2020) guidance does not set out a prescribed approach for the assessment of cumulative effects. In contrast to other environmental aspects in this EIA Scoping Report, impacts from the consumption of material resources and the generation and disposal of waste, such as the depletion of material resources and landfill void capacity, are largely dispersed, rather than affecting specific receptor(s) that are local to the SESRO Project.

15.6.17 The assessment of inter-development cumulative materials and waste effects cannot be carried out in a manner similar to other environmental aspects because there is an insufficient causal link between a committed development and its drawdown effects on materials availability and landfill void capacity at specific or shared receptors. Further commentary on this issue is provided in paragraphs 15.6.30 to 15.6.31.

15.6.18 Furthermore, this assessment cannot be carried out in a way similar to other environmental aspects due to the comparatively large spatial scope of the expansive study area. As reported in Section 0, this study area extends to the regional availability of construction materials in south-east England, or where justified, to the national level, and includes the capacity of waste management infrastructure and remaining landfill void space.

15.6.19 Minerals and Waste Planning Authorities have a statutory duty to plan for an appropriate amount of minerals and waste capacity to be available over a defined period, and to account for minerals and waste that are transferred across authority boundaries. It is neither necessary nor feasible for each committed development within the expansive study area to duplicate, in effect, the function of the Minerals and Waste Planning Authority as part of an EIA.

15.6.20 Notwithstanding this, the materials and waste assessment methodology would account for materials availability and waste generation and disposal trends driven by developments in the expansive study area. Therefore, the consideration of inter-development cumulative effects is inherent to the assessment methodology provided in Table 15-9 to Table 15-15. As such, this methodology already considers additive cumulative effects of materials consumption and waste disposal by other developments.

15.6.21 Whilst the materials and waste aspect has synergies with Chapter 14 – Geology and Soils (covering soils and potential sources of contaminated land) and Chapter 16 – Carbon and Climate Change (covering greenhouse gas emissions from the use of materials and the management of waste), intra-development cumulative effects are not possible as these aspects of the SESRO Project do not impact on the same receptors.

15.6.22 Furthermore, as there are unlikely to be any allocated mineral sites present within the development study area at the time of constructing the SESRO Project, there is no potential for intra-development cumulative effects with Chapter 17 – Communities (e.g. effects on commercial receptors / development land).

Assumptions, limitations and uncertainties

15.6.23 This assessment method provided in the IEMA (2020) guidance only covers materials and waste in solid form and does not consider any gases or liquids for the purposes of this chapter. Where relevant, these are considered in other chapters of this EIA Scoping Report, including Chapter 6 – Water Environment; Chapter 13 – Air Quality; Chapter 14 – Geology and Soils; and Chapter 16 – Carbon and Climate Change. Furthermore, the waste assessment is predicated on impacts to landfill void capacity, with liquid wastes being prohibited.

15.6.24 Materials and waste can affect the full range of environmental assessment aspects. Depending on how materials and waste are managed other environmental effects may arise from the SESRO Project (e.g. from energy consumption, greenhouse gas emissions, water consumption and pollution, dust, noise, vibration, vehicle emissions and changes to traffic).

15.6.25 Where relevant, the impacts of materials use and waste management are included in the respective chapters in this EIA Scoping Report, including Chapter 6 – Water Environment, Chapter 9 – Landscape and Visual Effects, Chapter 11 – Traffic and Movement, Chapter 12 – Noise and Vibration, Chapter 13 – Air Quality, Chapter 14 – Geology and Soils, Chapter 16 – Carbon and Climate Change and Chapter 18 – Human Health as part of the wider SESRO Project proposals (e.g. dust from materials handling as part of construction dust assessment).

15.6.26 The baseline data sources used in this EIA Scoping Report represent the most recently available information. However, there is a general lag (in years) for materials availability, mineral safeguarding sites and landfill void capacity data in the UK and conditions may have changed since publication of these data. Further desk-based assessment would be required for the PEI Report and/or ES, to establish the likely future baseline conditions during the anticipated construction period (circa 2030 to 2040).

15.6.27 Waste transfer, treatment, recycling and recovery infrastructure facilities are considered to be a beneficiary of incoming materials by driving the management of arisings up the waste hierarchy, and by facilitating a circular approach to the management of materials. While such facilities are a factor in the reduction of the magnitude of adverse impacts associated with waste generation and disposal, they are not a sensitive receptor in the same way as landfills, which are a finite resource.

15.6.28 While the existing baseline capacity and capability of waste transfer, treatment, recycling and recovery infrastructure is provided in Section 0, the future baseline conditions have not been provided. This is not required under the IEMA (2020) guidance and cannot be reliably reported at this stage. Notwithstanding this, these facilities would be considered as part of the future baseline reporting undertaken for the PEI Report and/or ES (see paragraph 15.9.2).

15.6.29 There is limited information available at this stage regarding the precise quantities of materials and waste associated with constructing and operating the SESRO Project. These limitations are typical of scoping assessments undertaken at early stages in the design lifecycle, and the information presented is considered to be proportionate.

15.6.30 It would be the Principal Contractor's responsibility to source materials and manage waste during the construction of the SESRO Project. Typically, they would look to use local material sources and waste infrastructure, wherever practicable, to reduce the environmental impact and cost of transport and support the economic well-being of local communities.

15.6.31 Procurement rules mean that it is not possible for the EIA process to identify / prescribe specific material suppliers and waste management facilities to be used during construction of the SESRO Project with any certainty, and these prevent setting a precedent that would potentially tie the Principal Contractor to exclusive arrangements with specific material suppliers and waste management facilities. This information is not currently available and is unlikely to be fully available at the point of submission of the SESRO Development Consent Order (DCO) application. As such, up and downstream environmental effects associated with the use of specific material supplies and waste facilities and their associated locations cannot be undertaken.

15.6.32 Also, the impacts from the consumption of material resources and the management and disposal of waste are largely dispersed, rather than affecting specific receptor locations. It is, therefore, not possible to assess, either qualitatively or quantitatively, the indirect environmental effects from either upstream materials extraction and production facilities, or downstream waste management and disposal facilities within the expansive study area. The exception to this is the carbon emissions that fall within the scope of Chapter 16 – Carbon and Climate Change).

15.6.33 It is, therefore, proposed that any additional indirect environmental effects associated with materials sourcing and waste disposal be excluded from any future assessment in the PEI Report and/or ES. This is based on the premise that any indirect environmental effects are too remote to be considered a likely significant effect of implementing the SESRO Project (i.e. the SESRO Project is one of many projects in the expansive study area that would use such facilities for the supply of materials and the management and disposal of waste) and because it is not possible to identify specific sources of materials or locations for waste disposal.

15.6.34 Consequently, there is considered to be an insufficient causal link between the indirect environmental effects and the SESRO Project. This is due to the following reasons: (a) the location and, therefore, the baseline environment for such facilities and their design / nature are not known, and would not be known during the course of the EIA; and (b) the indirect environmental effects cannot be apportioned across the various projects, in the expansive study area, that would utilise such facilities through a range of intricate supply chains.

15.6.35 Notwithstanding this, it is assumed that any likely significant indirect environmental effects from upstream materials extraction and production facilities, as well as downstream waste management and disposal facilities, would have already been assessed in relation to the associated sites and operations. Where necessary, these effects would have been mitigated under existing consenting regimes. These regimes include, but are not limited to, the Town and Country Planning Act 1990 (as amended), the Marine and Coastal Access Act 2009 (as amended), the Forestry Act 1967 (as amended), and the Environmental Permitting (England and Wales) Regulations 2016 (as amended).

15.6.36 Under these consenting regimes, the environmental regulator would have already set planning or permitting controls to mitigate (avoid or reduce) any likely significant effects. These controls would require or obligate particular environmental standards and mitigation at the regulated facility, covering any applicable environmental aspects and matters. It should also be noted that, while such facilities would be controlled by their own permissions and permits, these cannot guarantee that no significant effects might occur, however, they would make significant effects 'unlikely'.

15.6.37 Despite the limitations in determining material provenance and waste management methods / locations, which are commonly associated with the environmental assessment of this aspect, potential mitigation measures have been identified at this stage in Section 15.7. These measures aim to reduce the consumption of material resources, increase the use of sustainably sourced content, maximise the diversion of waste from landfill, and ensure that waste is managed in accordance with duty of care requirements.

15.6.38 Irrespective of there being no identifiable causal link, these measures and standard practices can be relied upon to further mitigate (avoid or reduce) any residual indirect environmental effects associated with materials consumption and waste generation and disposal for the SESRO Project. Furthermore, these are considered to be the only measures that fall within the influence of the SESRO Project itself (i.e. the SESRO Project cannot apply any further controls on any such upstream / downstream facilities).

15.6.39 It is also not possible to assess the materials and waste effects of downstream developments that would use the SESRO Project as a water source (e.g. pipelines outside the SESRO EIA Scoping Boundary for T2ST and SWOX). Again, this is because the location and, therefore, baseline environment for such facilities and their design / nature are not yet known such that no meaningful assessment can be undertaken. Information on these associated developments is unlikely to be fully available at the point of submission of the SESRO DCO application but will be kept under review as the assessment process progresses.

15.6.40 Nevertheless, as these schemes develop or locations are identified in the future and information on them becomes available, where practicable, they will be inherently dealt with by the materials and waste assessment methodology (as explained in paragraph 15.6.20). Again, it should also be noted that, while such schemes / facilities will be controlled by their own permissions and permits, these cannot guarantee that no significant effects might occur, however, they would make significant effects 'unlikely'.

15.7 Mitigation and Environmental Net Gain

15.7.1 Mitigation would be implemented to reduce the potential impacts associated with the consumption of material resources, sterilisation of allocated mineral sites, and the generation and disposal of waste during the implementation of the SESRO Project. There is considerable synergy between the materials and waste matters, and thus substantial overlap between the mitigation measures.

15.7.2 Minimising the consumption of material resources that suffer from known stock and supply issues; maximising the consumption of materials comprising a high proportion of sustainable features and benefits; avoiding unnecessary sterilisation of allocated mineral sites; and diverting surplus materials and waste from landfill would reduce the potential for significant effects.

15.7.3 Primary (inherent), secondary (foreseeable) and tertiary (inexorable) mitigation measures, and enhancement measures would be implemented for materials and waste in line with the definitions provided in Chapter 5 – EIA Methodology. These measures would seek to deliver outcomes that align with the waste hierarchy and the proximity principle and encourage, and evidence, transitions towards a circular economy.

Construction phase mitigation

Primary

15.7.4 The following primary mitigation measures have been included in the current preliminary design of the SESRO Project:

- Locating the SESRO Project within a development study area that has underlying Kimmeridge / gault clay bedrock geology that is suitable to construct a reservoir, thereby negating the need to import this material
- Both the upper reservoir embankment face and downstream reservoir embankment face slopes are split into three sections with differing slopes to reduce the required dam fill material quantities from that obtained with a planar slope
- The current preliminary design maintains a balance of the quantity of material excavated from the borrow pit and from stripping the dam foundation area and the quantity of material required to form the reservoir

embankment and provide landscaping around it. This avoids the need to import material for the reservoir embankment (other than that not available on the site, i.e. aggregates for rip rap, filter and drainage zones) or to export material excavated from the borrow pit
- There will be other excavation requirements, such as for tunnelling and replacement flood storage areas. As the design of these elements develops, the aim to use excavated material for environmental mitigation features (such as reservoir landscaping and noise bunds) would be maintained to avoid needing to export and dispose of material off site, or import materials for these features

15.7.5 The following primary mitigation measures are also being explored:

- Reuse of materials from site clearance – for example, material from the demolition of the existing Steventon to East Hanney Road could be reused for temporary haul roads
- Dual purpose infrastructure – there is a potential opportunity for the A415 to SESRO Project access road to also be used as an embankment for a potential flood scheme. The feasibility of which would need to be explored by a separate applicant
- Low carbon construction materials – the feasibility of using low carbon concrete and steel, and sewage sludge ash to make low carbon aggregate, is being assessed

Secondary

15.7.6 The following secondary mitigation measures would be implemented in order to avoid or reduce the potential for significant effects:

- Developing a Sustainable Procurement Plan, as part of the Construction Code of Practice (CoCP), to encourage the specification, procurement and use of sustainably, responsibly sourced, non-hazardous and circular construction materials and products, where practicable
- Undertaking a pre-demolition assessment of all existing buildings and structures to be demolished as part of enabling works. This would support the production of the Sustainable Procurement Plan and SWMP within the CoCP
- Implementing the SWMP to ensure the efficient use of material resources, minimisation of waste, and reduction in the quantity of waste disposal to landfill. A secondary objective would be to apply circular economy principles to support resource efficiency, productivity and decarbonisation

15.7.7 The Sustainable Procurement Plan and SWMP in the CoCP would include suitable targets and/or key performance indicators for material resource efficiency and waste management in line with prevailing government, industry and Thames Water targets.

Tertiary

15.7.8 The following tertiary mitigation measures would be implemented as a matter of course due to legislative and/or standard practice:

- Implementing Circular Design Principles to identify, prioritise and select opportunities to improve resource efficiency and design out waste [29]
- Complying with waste duty of care requirements for the safe management of waste to protect human health and the environment
- Managing all waste in accordance with the waste hierarchy with consideration of the proximity principle
- Obtaining all necessary waste carrier registrations; environmental permits, mobile plant deployments and/or waste exemptions
- Preparing any necessary documentation required of statutory and industry regulated codes of practice or end of life quality protocols, including for example an MMP and SRP [30] within the CoCP
- Correctly describing all waste before sending it for recovery or disposal; and carrying out characterisation testing and, where required, waste acceptance criteria testing
- Ensuring that all waste: is transported by registered waste carriers; is accompanied by waste transfer / consignment notes; and is taken to licensed, permitted or exempt facilities authorised to accept it

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[29] *Build nothing: retain (challenge the root cause of the need; explore alternative approaches to achieve the desired outcome); build less: re-use, reclaim, re-cover (maximise the use of existing assets; optimise asset operation and management to reduce the extent of new construction required); and build clever: re-think; and build efficient: optimise (embrace new construction technologies; eliminate waste).*

[30] *For example, CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice, Environment Agency (2013) Quality Protocol for the Production of Aggregates from Inert Waste, and Defra (2011) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. While CL:AIRE (2011) and Defra (2011) set out the requirements for preparing an MMP and Soil Resource Plan respectively, the preparation of these plans largely falls under the scope of Chapter 14 – Geology and Soils (i.e. as reported in the tertiary mitigation sub-section of that chapter).*

Operation phase mitigation

Primary

15.7.9 In terms of primary mitigation, suitable refuse and recycling collection systems / space would be incorporated within future iterations of the master plan to allow staff and visitors opportunities to manage their waste in line with the waste hierarchy.

Secondary

15.7.10 While it has been recommended that operational phase impacts be scoped out of the ES, on the basis of no likely significant effects having been identified, an Operational Waste Management Plan (or equivalent) would be prepared for the SESRO Project to demonstrate:

- How much operational and municipal waste the SESRO Project is expected to generate
- How and where (on-site versus offsite) operational waste will be managed in accordance with the waste hierarchy
- That the SESRO Project has adequate, flexible, easily accessible and shared storage space and collection systems
- That the SESRO Project supports the separate collection of dry recyclables (at least card, paper, mixed plastics, metals and glass), food waste and other waste
- How operational waste management will be monitored

Tertiary

15.7.11 The tertiary mitigation measures provided in paragraph 15.7.8 for construction would equally apply to operation.

15.7.12 The Environmental Permitting Regulations regulate industrial operational processes, such as water treatment works and pumping stations, to limit the generation and disposal of waste. It is anticipated that these Environmental Permits would also obligate standards throughout the operational phase of the industrial components of the SESRO Project.

15.7.13 Furthermore, it is also assumed that any operational waste from maintaining the water resource infrastructure would be managed in line with Thames Water's current Environmental Management Systems and Standard Operating Procedures (e.g. risk assessments and method statements).

Potential for environmental net gain

15.7.14 Environmental net gain (enhancement) measures would be explored throughout all phases of the SESRO Project and as an intrinsic part of implementing Circular Design Principles and developing the Sustainable Procurement Plan and SWMP. This would likely include enhancements such as:

- Recycling suitable material for construction of enhancement measures, identified by other aspect assessments, where the need for improvement has been identified (e.g. creating habitat)
- Using surplus recycled or recovered materials in community projects (e.g. utilising recycled asphalt planings and/or crushed inert waste to maintain tracks, paths or bridleways)
- Exploring opportunities to reuse temporary works and/or demolition materials and wastes in the permanent works, where practicable, subject to appropriate treatment and engineering specifications
- Investigating options to repurpose existing buildings to be demolished during construction (e.g. for site offices and construction site welfare)

15.8 Summary of Scope for the EIA

EIA scope for the preferred option

15.8.1 Table 15-16 summarises the proposed scope for materials and wastes.

Table 15-16 Summary of materials and waste matters scoped in and out of further assessment

Environmental aspect / matter		Scoped in / out	Rationale
Construction phase			
Materials	Materials availability	IN	Construction of the SESRO Project, would require the use of a substantial quantity of materials which would impact upon their immediate and, in the case of primary materials, long-term availability, resulting in temporary or permanent adverse impacts through the depletion of natural resources. While there is likely to be good availability of materials within the expansive study area, which are likely to include a proportion of sustainable features and benefits, materials consumption during construction of the SESRO Project has yet to be fully quantified

Environmental aspect / matter		Scoped in / out	Rationale
	Mineral safeguarding sites	Out	No new permanent land take would occur within, or adjacent to, allocated mineral sites during the construction of the SESRO Project. While there are currently allocated mineral sites present within the development study area, these are likely to be absent by the time of constructing the SESRO Project
Waste	Landfill void capacity	IN	Construction of the SESRO Project would generate substantial quantities of waste. Depending on how this is managed, this may lead to impacts on the available regional (or where justified, national) waste management infrastructure through permanently occupying landfill void capacity While there is likely to be sufficient landfill void capacity to accommodate construction waste from the SESRO Project, waste generation and disposal quantities have yet to be determined
Operational phase			
Materials	Materials availability	Out	While materials consumption has yet to be quantified, the application of professional judgement to the nature of the Project would suggest that there is unlikely to be any significant materials consumption during any one full / representative year within the first three years of operation
	Mineral safeguarding sites	Out	No new permanent land take would occur within, or adjacent to, allocated mineral sites during the operation of the SESRO Project. While there are currently allocated mineral sites present within the development study area, these are likely to be absent by the time of constructing the SESRO Project
Waste	Landfill void capacity	Out	While waste generation and disposal has yet to be quantified, the application of professional judgement to the nature of the project would suggest that there is unlikely to be any significant operational waste generation during any one full / representative year within the first three years of operation

Potential changes to scope and methods associated with other options

15.8.2 No potential changes to the scope and methods are expected associated with different options for key components as set out in Chapter 2 – Project Description.

15.8.3 Methods will not change and only minor differences in the use of materials and production of waste are expected (e.g. in relation to access / road diversion length or similar).

15.8.4 Notwithstanding this, any potential changes to the scope and methods associated with different options for key components would be revisited at the PEI Report and/or ES stage.

15.9 Next Steps

15.9.1 As the project definition and designs for implementing the SESRO Project progress, the information below would be included to inform the PEI Report and/or ES.

Baseline information

15.9.2 The current and likely future baseline conditions for materials, minerals safeguarding sites and waste infrastructure during the anticipated construction period (circa 2030 to 2040), which is outlined at a high level in this chapter of the EIA Scoping Report, will be updated as required in the PEI Report and/or ES.

Project information

15.9.3 The following information would be required in relation to materials to be used and waste to be produced by the SESRO Project:

- A detailed Bill of Quantities (or equivalent)
- Information on materials and products that would comprise (or incorporate) secondary or recycled content
- Information on known sustainability credentials of materials and products to be consumed (e.g. through Ecolabels or Environmental Production Declarations)
- Any planned use of ‘critical raw materials’ (materials of high importance within the UK economy where security of supply is at risk)
- The cut and fill balance; and the quantity of excavated arisings that would be reused or recycled, on or off-site
- The types and quantities of any materials that would be recovered from off-site sources for construction

15.9.4 The following information would be required in relation to waste to be produced by the SESRO Project:

- The types and quantities of construction waste to be recovered and diverted from landfill using project data or relevant statistics to make reasonable assumptions
- The types and quantities of waste to be disposed of to landfill

15.9.5 The mitigation measures and environmental enhancements provided in Section 15.7 would also be reviewed during the production of the PEI Report and/or ES.

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16 Carbon and Climate Change

16.1 Introduction

16.1.1 This chapter of the SESRO Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope in relation to carbon and climate change.

16.1.2 The Environmental Statement (ES) will assess the likely significant effects of these matters specified in The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter the 'EIA Regulations') as follows:

- Emissions of greenhouse gases (GHGs, also referred to as 'carbon'[31]) associated with the SESRO Project (i.e. the impact of the project on climate)
- The impact of climate change on the SESRO Project (i.e. the vulnerability of the SESRO Project to climate change)

16.1.3 The 'in-combination' effects from climate change (i.e. where changes in climate have the potential to exacerbate or conversely diminish the effect of an impact on another environmental aspect) are considered in this chapter (see Section 16.6).

16.1.4 Potential impacts of the SESRO project on the local micro-climate are also explored (see Section 16.5).

16.1.5 The impact of the SESRO Project on flood risk during construction and operation is addressed within Chapter 6 – Water Environment. The assessment will incorporate allowances for future climate change to determine the effect of flood-related climate impacts on receptors within the study area assessed for that aspect.

16.1.6 The carbon and climate change topics are both considered within this EIA Scoping Report chapter. It is anticipated that these may be assessed within separate chapters in the ES.

[31] *GHGs refer to the seven gases covered by the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).*

16.2 Legislation, Policy, standards and Guidance Context

16.2.1 Key policy relevant to carbon and vulnerability to climate change are set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023a). Section 4.4 of the NPS provides guidance on the assessments and planning requirements that the applicant should meet with respect to GHG emissions and climate change mitigation and includes:

- The potential impact and sources of GHGs, and the overarching UK government commitments and targets relating to net zero and carbon reduction
- The components of the assessment of GHG emissions to be included in the ES
- Advice on the identification of appropriate mitigation measures and determining the significance of effects
- The decision-making process, based on the SESRO Project's emissions compared to national carbon budgets and Nationally Determined Contribution, with GHG emissions to be reduced to as low as reasonably practical and proposed offsetting of emissions, where significant emissions are identified

16.2.2 Section 3.7 of the NPS provides guidance on how the applicant, and Secretary of State when determining an application, should implement climate change adaption into nationally significant infrastructure project applications and take into account the effects of climate change. It includes:

- Confirmation that the ES must include consideration of the vulnerability of the SESRO Project to climate change at the design, build and operational stages
- Summary of the types of climate change impacts
- Advice on the climate projection scenarios to be considered when developing adaptation measures, including the scenarios for considering safety critical elements of infrastructure projects

16.2.3 In addition to the policy set out in the NPS, regard should also be given to the relevant key legislation, policy, standards and guidance for this aspect as listed in Table 16-1.

16.2.4 A detailed summary of the legislative, policy, standards and guidance framework for this aspect, and how it accords with the SESRO Project would be provided in the Preliminary Environmental Information (PEI) Report and/or the ES.

Table 16-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Climate Change Act 2008 (as amended)
National policy
The National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023a)
United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contribution (UK Government, 2022)
UK Climate Change Risk Assessment was reported in 2022 (Defra, 2022)
National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2023)
National Adaptation Programme, Third National Adaption Programme (latest version) (Defra, 2023b)
Local policy
Local Plan 2031 Part 1 (Strategic Sites and Policies) (Vale of White Horse District Council, 2016)
Draft Vale of White Horse and South Oxfordshire Joint Local Plan 2041
Oxford Local Plan 2036 (Oxford City Council, 2020)
Thames Water and water industry policy
Our Journey to Net Zero and Beyond (Thames Water, 2021a)
Protecting our water and world, Our Climate Change Adaptation Report for 2015-2020 (Thames Water, 2021b)
Net Zero 2030 Routemap (Water UK, 2020)
The Price Review 2024 (PR24) (Ofwat, 2024)
Thames Water revised draft Water Resources Management Plan (rdWRMP24) (Thames Water, 2023b)
Revised Draft Regional Plan (Water Resources South East, 2023)
Standards and guidance
PAS 2080:2023 Carbon Management in Buildings and Infrastructure (British Standards Institute (BSI), 2023)

Relevant legislation, policy, standards and guidance
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (World Business Council for Sustainable Development and World Resources Institute, 2015)
Whole life carbon assessment for the built environment (The Royal Institution of Chartered Surveyors, 2023)
BS EN 15978 Sustainability of construction works (BSI, 2011)
Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2nd Edition (Institute of Environmental Management and Assessment (IEMA), 2022)
Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (IEMA, 2020)
National Planning Policy Guidance

16.3 Engagement

16.3.1 Engagement undertaken for scoping is summarised in Table 16-2

Table 16-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
Oxfordshire County Council (OCC), Vale of White Horse District Council (VoWHDC)	Key points raised by consultee during scoping engagement meeting held on 15 March 2024: • The SESRO Project leads to the removal of an existing solar farm affecting renewable energy generation in Oxfordshire • Impact of the disturbance/removal of soils containing sequestered carbon and change of land use, including creation of new habitats which would sequester carbon • What is the ambition for the SESRO Project with regard to net zero? Will the SESRO	The impact of the solar farm removal will be assessed (see Section 16.6). Mitigation options are being explored regarding renewable energy generation (see Section 16.7). The impact of emissions associated with land use change will be considered (see Section 16.6). The sequestration potential of created habitats and land uses will be included in the whole-life carbon assessment. The SESRO Project will be consistent with Thames Water's wider commitments to

Consultee	Comment	Response / action taken
	Project produce sufficient energy to operate on a net zero basis? The Emerging Local Plan contains net zero requirements for new buildings that may be relevant to the SESRO Project	reduce operational GHG emissions. Requirements for new buildings will be taken into account in the detailed design where relevant.
OCC	Key points raised by consultee during scoping engagement meeting held on 14 May 2024: Include consideration of the emissions route maps and carbon budgets in the Oxfordshire Net Zero Route Map & Action Plan Final Report (Future Oxfordshire Partnership, 2022)) for contextualising the SESRO project GHG emissions	Included (see Sections 0 and 16.6).

16.4 Existing Environment and Baseline Conditions

Impact on climate (greenhouse gases)

Study area

16.4.1 For the assessment of GHG emissions, the receptor is the global climate as all emissions, regardless of where they occur, contribute to the concentration of GHGs in the atmosphere and associated global warming. Therefore, there is no defined physical study area with regard to identification of, and assessment of impacts to, the receptor. Instead, the assessment will consider the potential GHG emissions from the materials and activities for the construction and operation of the SESRO Project. The GHG emission sources considered in the assessment are described in Table 16-8. Although GHG emissions will occur from activities undertaken within the EIA Scoping Boundary (e.g. combusting diesel to power construction plant), GHG emissions will also occur outside of the EIA Scoping Boundary (e.g. during the manufacture, processing and transportation of materials, or waste which could be from / to locations across the UK, or further afield).

Existing baseline

16.4.2 In 2021, UK net GHG emissions were estimated at 427 million tonnes of carbon dioxide equivalent ($MtCO_2e$)[32], with the water supply and sewerage sector estimated to have accounted for approximately 3.6 $MtCO_2e$ (i.e. approximately 0.84%) (Department for Energy Security and Net Zero, 2023a). For the Oxfordshire area, in 2021 total GHG emissions were reported as 4.3 $MtCO_2e$ (approximately 1% of UK emissions).

16.4.3 Thames Water's net operational emissions[33] for the financial year 2022/23 were 0.32 $MtCO_2e$ (Thames Water, 2023a).

16.4.4 There are existing carbon sinks and sources within the EIA Scoping Boundary which would be altered by the SESRO Project through removal or disturbance. These are included in paragraph 16.5.3 and listed as activities within Table 16-8 (e.g. existing land use and associated carbon stores or energy use and the existing solar farms which currently provides low-carbon electricity to the national grid). These will be included in the existing baseline for the site and the change in GHG emissions from the alteration to these baseline sources/sinks will be quantified as part of the assessment discussed in Section 16.7. The various land types and uses within the EIA Scoping Boundary include:

- Agricultural fields/cropland
- Grassland
- Heathland and shrub
- Areas of woodland and forest
- Rivers, streams and open water
- Human/urban uses including:
  - Allotments
  - Small air strip
  - Roads and tracks
  - Residential properties

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[32] *carbon dioxide equivalent (CO_2e) is a metric measure used to compare the emissions from various GHGs on the basis of their global-warming potential (GWP), by converting amounts of other GHGs to the equivalent amount of CO_2 with the same global warming.*

[33] *Operational emissions include the Thames Water 'appointed business' direct emissions from burning of fossil fuels, process and fugitive emissions from its water treatment, wastewater and bioresources/sludge management facilities, transport of company owned vehicles and electricity to operate facilities and head office. It also includes emissions from purchased goods and services, business travel, waste treatment etc). Emissions from capital carbon (i.e. construction and replacement of infrastructure and assets) and chemicals are not included within the operational emissions.*

- Commercial/business use (storage depot)
- Solar farms
- Electricity substation

Future baseline

16.4.5 Over time, emissions of GHGs from the majority of sources in the UK will reduce due to the efforts to achieve 'net zero' by 2050 as defined by the UK carbon budgets set in accordance with the Climate Change Act 2008. These are summarised below:

- The fourth carbon budget: 2023–2027 (defined within The Carbon Budget Order 2011) – 1,950 $MtCO_2e$ over the budget period), equivalent to approximately a 50% reduction in annual emissions from a 1990 baseline
- The fifth carbon budget: 2028–2032 (defined within The Carbon Budget Order 2016) – 1,725 $MtCO_2e$ over the budget period), equivalent to approximately a 57% reduction in annual emissions from a 1990 baseline
- The sixth carbon budget: 2033–2037 (defined within The Carbon Budget Order 2021) – 965 $MtCO_2e$ over the budget period), equivalent to an approximate 78% reduction in annual emissions from a 1990 baseline

16.4.6 The UK's total GHG emissions in 1990 were approximately 812 $MtCO_2e$ (Department for Energy Security and Net Zero, 2023b). The 2021 emissions of 427 $MtCO_2e$, shows a 47% decrease between 1990 and 2021. This consisted of a relatively steady decrease to around 2008, with a more pronounced decrease thereafter, largely through decreases in the power sector from phasing out coal and increased renewable energy production. Over the remaining period to 2050, UK GHG emissions are expected to continue to decrease towards net zero.

16.4.7 The construction phase is proposed to commence in approximately 2030 and last for 10 years, with operation commencing in approximately 2040. The anticipated construction phase coincides with a part of the fifth carbon budget (2030 – 2032) and all of the sixth carbon budget (2033 – 2037). The carbon budgets for the remaining period to the net zero target date (i.e. 2038 – 2050) have not yet been set by the UK Government.

16.4.8 The reducing trajectory of GHG emissions is also reflected in the five-yearly Oxfordshire carbon budgets developed up to 2050 for the transport, housing, commercial and industrial sectors which show a relatively constant decrease to 2040 and a less sharp decrease from 2040 to 2050 (Future Oxfordshire Partnership, 2022). These budgets were developed to inform local authorities in Oxfordshire of the recommended countywide pathway to net zero by 2050, and set a route map and related action plans. These budgets are informative, but non-statutory and not applicable to emissions from specific developments or projects.

16.4.9 The future change in net GHG emissions from the baseline will be quantified in the ES. The future baseline will be determined on the basis that the SESRO Project is not constructed (i.e. it will be based on the existing land use and other existing carbon sinks/sources, within the EIA Scoping Boundary).

Vulnerability to climate change

Study area

16.4.10 For climate vulnerability, sensitive receptors associated with SESRO are:

- Receptors associated with the construction process (e.g. working areas, compounds, the workforce, plant and machinery)
- Infrastructure and operational assets (e.g. the reservoir and embankments, pumping station, conveyance tunnels, other channels and pipelines, access roads, public access areas and public education and recreation facilities), landscaping/habitats and the workforce

16.4.11 The study area comprises the geographical area within the EIA Scoping Boundary (see Figure 1.2).

Existing baseline climate

16.4.12 Observed values for climate variables over the period 1981 – 2000 for the 25km grid square containing the EIA Scoping Boundary (HadUK gridded observations for the 25km grid square centred on E 437500, N 187500) are presented in Table 16-3 (Met Office, 2018).

Table 16-3 Observed climate variables for the SESRO project's site, 1981 – 2000

Variable	Winter	Summer
Mean air temperature (°C)	4.2	15.8
Mean maximum air temperature (°C)	7.2	20.9
Mean minimum air temperature (°C)	1.2	10.7
Mean precipitation (mm)	186*	143
Note * Autumn was wetter than winter with a mean precipitation of 206mm		

Source: Met Office, 2018.

16.4.13 The nearest weather station to the site is at Oxford. Table 16-4 summarises monthly average observations for a range of climate variables here over the period 1981 – 2010 (Met Office, undated).

Table 16-4 Average monthly observations at Oxford climate station 1981 – 2010

Month	Maximum temp (°C)	Minimum temp (°C)	Days of air frost (days)	Rainfall (mm)	Days of rainfall >1mm per day (days)
January	7.6	2.1	8.5	56.6	11.5
February	8.0	1.8	9.1	42.5	8.9
March	10.9	3.7	3.8	47.6	10.1
April	13.6	5.0	1.7	49.1	9.1
May	17.1	7.9	0.1	57.1	9.7
June	20.3	10.9	0.0	48.0	8.0
July	22.7	13.0	0.0	48.9	7.9
August	22.3	12.9	0.0	56.5	8.1
September	19.1	10.7	0.0	54.1	9.1
October	14.8	7.8	0.9	69.6	10.9
November	10.5	4.6	4.0	66.6	11.3
December	7.7	2.3	9.1	63.1	10.9
Annual	**14.6**	**6.9**	**37.1**	**659.7**	**115.5**

Source: Met Office, undated.

16.4.14 Information presented in Section 0 of Chapter 6 – Water Environment indicates that parts of SESRO within the EIA Scoping Boundary are located in an area with a high probability of river flooding (Flood Zone 3).

Future baseline climate

16.4.15 Future climate change scenarios for the UK have been modelled by the Met Office. The most recent projections, the UK Climate Projections 2018, (UKCP18), project general trends towards warmer, wetter winters and hotter, drier summers (Met Office, 2018).

16.4.16 The Representative Concentration Pathways (RCP) lead to a broad range of possible climate outcomes but are neither forecasts nor policy recommendations. RCP8.5 (the highest pathway) represents a scenario where global GHG emissions continue to rise uncontrolled, with global temperature increases exceeding 4°C by the end of the century.

16.4.17 As recommended by the NPS for Water Resources (Defra, 2023a) and the IEMA guidance (IEMA, 2020), projections for the RCP8.5 high emissions scenario have been used to understand potential future changes in key climate variables within the EIA Scoping Boundary. Information on projected climate for the 25km grid square containing the EIA Scoping Boundary (grid square centred on E 437500, N 187500) were obtained from the UKCP18 projections. Projected changes in some climate variables for the end of the 21st century (the '2090s') compared to a 1981-2000 baseline under the high GHG emissions scenario (RCP8.5) are shown in Table 16-5. The contains the 50th percentile values for each of the climate variables, as well as the 10th and 90th percentile values to represent more and less likely outcomes.

Table 16-5 Projected change in seasonal average climate for the EIA Scoping Boundary, 2090s, RCP8.5

Climate variable	Winter			Summer		
	10th percentile	50th percentile	90th percentile	10th percentile	50th percentile	90th percentile
Change in mean air temperature (°C)	+1.4	+3.4	+5.6	+3.1	+5.9	+8.8
Change in mean maximum air temperature (°C)	+1.4	+3.3	+5.3	+2.9	+6.6	+10.4
Change in mean minimum air temperature (°C)	+1.3	+3.6	+6.4	+2.9	+5.3	+7.7
Change in mean precipitation (%)	-1.4	+23.1	+53.9	-70.5	-40.5	-0.4

Source: Met Office, 2018.

16.4.18 The projections shown in Table 16-5 indicate that, by the end of the century, the average summer temperature is projected to increase by 5.9ºC (50th percentile). Mean precipitation is predicted to increase by 23% in winter and decrease by 41% in summer (50th percentile).

16.4.19 The projected change in temperatures and precipitation for the 2030s (short-term changes coinciding with expected construction of the SESRO Project) are shown in Table 16-6. These show smaller changes compared to those in Table 16-5, with a 1.4 ºC increase (50th percentile) in mean temperature during summer, a 7% increase in winter mean precipitation and a 6% decrease in summer mean precipitation (50th percentile).

Table 16-6 Projected change in seasonal average climate for the EIA Scoping Boundary, 2030s, RCP8.5

Climate variable	Winter			Summer		
	10th percentile	50th percentile	90th percentile	10th percentile	50th percentile	90th percentile
Change in mean air temperature (°C)	+0.1	+0.9	+1.7	+0.4	+1.4	+2.4
Change in mean maximum air temperature (°C)	+0.2	+0.9	+1.7	+0.2	+1.6	+2.9
Change in mean minimum air temperature (°C)	+0.03	+0.9	+1.8	+0.4	+1.2	+2.0
Change in mean precipitation (%)	-4.1	+7.2	+19.8	-28.3	-5.9	+15.7

Source: Met Office, 2018.

16.4.20 Wind speed projections from UKCP18 (Met Office, 2018) for the furthest available future period (2061-2080) were investigated. The projected wind data for the 2.2km grid (re-gridded to 5km) representative of the EIA Scoping Boundary (grid square centred on E 442500, N 192500) were obtained for the high GHG emissions scenario (RCP8.5). When considering the range of climate model projections, the data indicate the following changes arise compared to the 1981 – 2000 baseline:

- Average wind speeds are projected to decrease by 12%
- Average wind speed gusts are projected to decrease by 4%
- Magnitude wind speeds and wind gusts for extreme events are projected to decrease (11% and 5%, respectively)

16.5 Potential Environmental Effects

Impact on climate (greenhouse gases)

16.5.1 GHG emissions associated with the SESRO project could impact the global climate and climate change. It is not possible, however, to attribute the resulting impact of a certain quantity of GHG emissions to effects on the climate or climate change. The most appropriate geographic extent for assessment is at a national level (i.e. by comparing emissions against the UK carbon budgets set in accordance with the requirements of the Climate Change Act 2008) as required by the NPS for Water Resources Infrastructure (see paragraph 4.4.11 of the NPS).

16.5.2 The NPS for Water Resources Infrastructure (paragraph 4.4.11) (Defra, 2023a) also recognises that, while it is unlikely that any emissions increase from an individual development of water resources infrastructure will materially affect the government's ability to meet its emissions targets, increases in emissions could affect Thames Water's ability to deliver its contribution to the government's targets.

Construction

16.5.3 GHG emissions during construction of the SESRO project would be associated with:

- Embodied carbon (i.e. GHGs generated during the manufacture of raw materials)
- Energy consumption (e.g. petrol and diesel combustion and use of electricity) and water consumption as a result of:
  - The transportation of raw materials to the construction site
  - The transportation and disposal of waste
  - The transportation of construction workers, site staff and visitors to, from and within the construction site
  - Construction activities, construction plant, site offices and welfare facilities
- Removal of existing solar farms within the EIA Scoping Boundary, would reduce the amount of low-carbon electricity production in Oxfordshire during construction which may be displaced by electricity from other higher carbon electricity sources, increasing GHG emissions
- Emissions associated with changes in land use would include the disturbance and release of carbon stored in vegetation and soils. The SESRO Project would also potentially remove or displace existing uses and their associated energy consumption (see list of uses in paragraph 16.4.4).

Operation

16.5.4 The GHG emissions during the operation of the SESRO Project would be associated with:

- Operation of the infrastructure – through consumption of energy (e.g. through petrol and diesel combustion and use of electricity) and consumption of potable water
- Embodied carbon in materials required for maintenance, repairs, refurbishment or replacement of the SESRO Project's assets
- Energy consumption (e.g. petrol and diesel combustion and use of electricity) and water consumption for maintenance, repairs, refurbishment or replacement of assets:

  - The transportation of raw materials to the site
  - The transportation and treatment of waste generated
  - The transportation of workers to and from the site
  - The activities, construction plant, site offices and facilities
- The ongoing impact on GHG emissions as a result of the removal of the existing solar farms
- Emissions associated with land use change including emissions and changes in carbon sequestration rates and emissions resulting from the change in land use and habitats
- Energy consumption (e.g. petrol and diesel combustion and use of electricity) by utilisation of the Project, such as visitors to the recreation and educational facilities

Vulnerability to climate change

16.5.5 As identified in Table 16-5, projected changes in key climate variables over the longer term suggest that substantial changes in mean air temperature, especially during summer (5.9°C increase, 50th percentile), mean precipitation in winter (23.1% increase, 50th percentile) and mean precipitation in summer (40.5% decrease, 50th percentile) have the potential to occur in the study area by the end of the century.

16.5.6 As outlined in Table 16-6, over the shorter term, during construction of the SESRO project (around 2030-2040), considerably smaller changes in climate are projected.

16.5.7 Table 16-7 sets out how changes in temperature and precipitation could potentially impact receptors during construction and operation. The list of impacts and receptors is indicative at this stage and a more detailed identification and review of receptors and impacts would be undertaken for the assessment presented in the PEI Report and ES.

16.5.8 As discussed in paragraph 16.4.20, wind speeds are projected to decrease slightly.

Table 16-7 Potential impacts resulting from changes in climate during construction and operation

Change in climate	Receptor(s)	Potential impact
Construction		
Increased temperatures and extreme temperatures, including prolonged periods of hot weather and drought	Construction workforce Construction plant and machinery	Increased risk of health and safety impacts for construction workforce and/or overheating and failure of construction plant and machinery
Increased precipitation, including periods of intense rainfall, increased frequency and intensity of flooding	Construction site access routes	Extreme weather events or climate variations result in flooding limiting access to construction sites
	Construction areas Construction workforce Construction plant and machinery	Increased risk of flooding of construction works areas, including construction compounds, plant and machinery and associated increased risk of health and safety impacts to construction workforce
	Excavations and earthworks, including the proposed rail sidings, embankments and material storage areas formed during the construction phase	Flooding and risk of scour and erosion of earthworks, embankments and material storage areas
Operation		
Increased temperatures and extreme temperatures, including prolonged periods of hot weather and drought	Project infrastructure (embankments)	Deep cracking of clay embankment leading to seepage or failure
		Death of vegetation planted on embankment to stabilise slope
		Algal blooms potentially preventing release of water to the River Thames in times of need due to water quality issues

Change in climate	Receptor(s)	Potential impact
	Reservoir waterbody, reservoir-based equipment, operational workers and recreational users	Heatwaves and drought leading to stratification of the water body, water quality issues and blue-green algal blooms (cyanobacteria) resulting in failure of equipment and ingestion or inhalation of toxins by workers/recreational users Extreme temperatures affecting operational workers and recreational users
	Mechanical, electrical, instrumentation, control and automation (MEICA) equipment	Shut-down or breakdown of electrical equipment exposed to extreme temperatures
	Proposed habitats including wetland areas (reeds, species rich wet grassland and floodplain marsh, wet woodland), hedgerows, grasslands and woodland	Wetland areas drying out and vegetation dieback due to increased drought
Increased precipitation, including intense periods of rainfall, increased frequency and intensity of flooding	Reservoir embankment structure	Scour at the toe of the embankment caused by flood velocities
		Internal erosion of the embankment
		Erosion of outer surface of the embankment
		Groundwater flooding of reservoir foundations affecting stability
	Access roads, car parks and road drainage	Inability to access the reservoir/pumping station for emergency operations (e.g. emergency drawdown)
		Groundwater flooding affecting road stability
		External erosion of the road embankment affecting stability

Change in climate	Receptor(s)	Potential impact
		Overloading of road drainage under flood conditions preventing access/reducing capacity or causing damage
		Groundwater seepage affecting integrity of road drainage
	Intake/outfall structure	River flows beyond operating range resulting in damage to civil/mechanical/electrical equipment and/or temporary shut-down of operations
	Pumping station	Flooding of pump structures preventing pumping of flows or manual operation of pressure reducing valves for emergency drawdown
	MEICA equipment	Flooding of control facilities containing electrical equipment causing shut-down or breakdown and preventing automatic/remote control of operations
	Conveyance tunnels	Increased hydraulic loading on tunnel structure with increased groundwater levels – may affect integrity of tunnels and prevent their use
	Visitor and recreational facilities, water sports centre	Flooding and damage, preventing use
	Proposed habitats including wetland areas (reeds, species rich wet grassland and floodplain marsh, wet woodland), hedgerows, grasslands and woodland	Species changes due to inundation of water from increased rainfall, rainfall events and flooding

Micro-climate

16.5.9 The presence of a large area of water could potentially affect local micro-climate in the immediate vicinity of the reservoir in terms of summer cooling, winter warming, frost, wind and fog formation. These impacts are likely to be minimal for the following reasons:

- Occasional fog and ground frost are already evident in the area which comprises a gentle depression across the Ock Valley, and adjacent streams and the Thames Valley, where fog forms in valley bottoms during periods with stable atmospheric conditions
- The introduction of a large reservoir introduces one of the many factors that influences fog formation. However, other factors that influence fog formation are unchanged or not favourable, e.g. steady wind conditions
- The reservoir is not large or deep enough to result in impacts on micro- -climate
- The impacts of local land use changes, including the reservoir, on aspects of the micro-climate is likely to be less than the impacts of climate change on the same climate variables

16.5.10 Given the above, micro-climate effects are expected to be minimal and are proposed to be scoped out of the EIA. Nevertheless, potential impacts on fog and ice occurrence are to be explored in relation to traffic accidents in the Traffic and Movement assessment (see Chapter 11 – Traffic and Movement) at the request of highways and rail consultees.

16.6 Assessment Methodology

Impact on climate (greenhouse gases)

Assessment scope

16.6.1 The GHG assessment, and approach to mitigation, will follow the whole-life carbon principles of PAS 2080:2023, a globally applicable standard for managing carbon in buildings and infrastructure. In line with IEMA guidance, calculations of GHG emissions will use data consistent with the whole-life carbon modular approach and lifecycle stages and modules defined in BS EN 15978 (BSI, 2011). The assessment will include construction (including any demolition) and operation. The decommissioning (BS EN 15978 end of life stage, lifecycle module C) of the SESRO Project is scoped out, as discussed in Chapter 5 – EIA Methodology. GHG emissions beyond the system boundary (BS EN 15978 beyond asset life cycle, lifecycle module D) (i.e. carbon loads or benefits which are not associated with modules A, B and C) have been identified for inclusion, for example the electricity generated by the energy recovery turbines and exported to the national grid for consumption by others.

16.6.2 The lifecycle stages and modules proposed to be assessed in the EIA are set out in Table 16-8.

Table 16-8 Potential impacts resulting from changes in climate during construction and operation

Lifecycle stage	Lifecycle module	Activity	Emissions sources	Scoped in
Construction (Before use stage)	A1-A3	Raw material extraction and manufacturing of building materials	Embodied carbon in building materials	Yes
	A4	Transportation of building materials	Transportation of building materials to the site	Yes
	A5	Construction processes	Fuel use in mobile plant and equipment, potable water consumption	Yes
			Transport of construction workers, site staff and visitors to, from and within the construction site	Yes
			Transportation and disposal of waste	Yes
			Land use change. Disturbance of carbon stores (soils and vegetation)	Yes
			Impact of the removal of solar farms	Yes
Operation (Use stage)	B1	Use	Emissions from the normal use of the SESRO Project	Yes
			Impact of the removal of solar farms	Yes
			Land use change. Ongoing emissions from the change in land use and creation of the reservoir (e.g. changes in sequestration of carbon and stored carbon)	Yes

Lifecycle stage	Lifecycle module	Activity	Emissions sources	Scoped in
	B2	Maintenance	Activities and embodied carbon in maintenance materials, including preventative and planned maintenance and repair	Yes
	B3	Repair	Activities and embodied carbon in materials to repair damage over and above the regular maintenance regime	Yes
	B4	Replacement	Activities and embodied carbon in materials to replace components at the end of their life expectancy	Yes
	B5	Refurbishment	Activities and embodied carbon in refurbishment materials	Yes
	B6	Operational energy	Regulated and unregulated components of the SESRO Project’s operational energy use	Yes
	B7	Operational water	Potable water consumption on site	Yes
	B8	User’s utilisation	Energy and water consumption by members of the public using the SESRO Project for education or recreation (e.g. fuel consumed in vehicles)	Yes
D (benefits and loads beyond the system boundary)	D2	Exported utilities	Electricity exported to the national grid (surplus electricity generated by the energy recovery turbines in the conveyance tunnels) or by any other renewable energy sources	Yes

16.6.3 As discussed in Chapter 2 – Project Description, operation of the SESRO Project would require various ancillary infrastructure, including provision to enable future interconnection with other water resource projects. Where the ancillary infrastructure and utility service requirements are included within the SESRO Development Consent Order (DCO) application, the GHG emissions will be quantified in line with the lifecycle module and activities set out in Table 16-8.

16.6.4 For the purposes of the assessment, the SESRO Project's infrastructure is assumed to have an operational lifetime of 60 years, although it is likely to extend beyond this. Therefore, operational GHG emissions will be estimated over a period of 60 years from the opening year, anticipated to be 2040. GHG emissions associated with the SESRO Project after this point are excluded. In summary, the assessment will consider the construction phase 2030 – 2040, and operational phase 2040 – 2100.

Characterising impacts and effects

16.6.5 Appropriate carbon calculation methods, models and techniques will be used to quantify the GHG emissions for the sources listed in Table 16-8. These will generally rely on quantifying the activity and multiplying this by the relevant carbon emissions factor. The latest available information on the detailed design and construction methodologies at the time will be used as the basis of the calculations. Appropriate and widely accepted industry standard emission factors for construction materials, activities and energy use/consumption would be used. Supplier specific emissions data could be utilised for certain materials or activities in place of generic industry emissions factors where available and suitably robust. Emissions associated with land use and sequestration will also rely on appropriate emission factors for stored carbon and emissions for the various land use types. Details on the methodology, activity data and carbon factors used for each emission source will be discussed with the appropriate consultees during engagement and also provided in the ES.

Determining significance

16.6.6 There is no set significance thresholds for carbon. IEMA guidance (IEMA, 2022) indicates that the crux of significance is not whether a project emits greenhouse gasses, nor the magnitude of emissions, but whether the project contributes to reducing emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050 (see section 6.2 of the IEMA guidance).

16.6.7 The adoption of a net zero target does not mean that consent cannot be granted for development that will increase GHG emissions; rather, as set out in paragraph 4.4.15 of the NPS for Water Resources Infrastructure (Defra, 2023a), the increase in GHG emissions from a project can only be a reason to refuse consent if the increase in GHG emissions would have a material impact on the ability of the Government to meet its carbon reduction targets.

16.6.8 The Government has adopted carbon budgets to meet the target of net zero by 2050. Thus, a proposed development which is compatible with the 2050 target and interim carbon budgets is consistent with the approach to addressing the adverse effects of climate change. This aligns with the approach to significance set out by IEMA guidance (IEMA, 2022).

16.6.9 In the light of the above, an assessment will be made, based on professional judgement, as to whether GHG emissions from the SESRO Project could have a material impact on the ability of the UK Government to meet its carbon reduction targets (and would, therefore, potentially be significant). As noted in paragraph 16.5.2, it is unlikely that any emissions increase from an individual development will materially affect the government's ability to meet its emissions targets. The determination of significance would also consider whether the SESRO Project is in line with existing and emerging policy requirements for carbon emissions reduction, Thames Water's own climate change policy and Water Resources Management Plan (Thames Water, 2023b), and the extent to which the SESRO Project reduces carbon as far as reasonably practicable. Supplementary analysis of the relevant emissions against local or alternative carbon budgets or targets (Future Oxfordshire Partnership, 2022) and comparison to emissions trajectories for different sectors will be undertaken where appropriate.

16.6.10 Table 16-9 sets out effect significance descriptions from IEMA (2022) which will be used for the assessment. In line with general EIA practice, effects that are deemed to be 'significant' are those where the magnitude is moderate or major. Magnitudes of minor or negligible are generally considered to represent an effect that is 'not significant'.

Table 16-9 Proposed significance criteria

Magnitude	Assessment criteria
Major Adverse	A Project's greenhouse gas impacts are not mitigated or are only compliant with do-minimum standards set through regulation and do not provide further reductions required by existing local and national policy for projects of the type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero
Moderate Adverse	A Project's greenhouse gas impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of the type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero

Magnitude	Assessment criteria
Minor Adverse	A Project's greenhouse gas impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of the type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero
Negligible	A Project's greenhouse gas impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of the type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions
Beneficial	A project's net greenhouse gas emissions are below zero, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact

Source: IEMA, 2022.

Assessment of cumulative effects

16.6.11 The assessment of inter-development cumulative effects cannot be carried out in a process similar to other environmental aspects because there is no causal link between the location of GHG emissions and their impacts arising in the atmosphere. This limitation has been recognised by IEMA (IEMA, 2022). Because of this, and as it is necessary to consider GHGs in the context of a trajectory compliant with the planetary limits for GHG emissions. the best available benchmarks are the carbon budgets to achieve net zero by 2050. These targets are inherently cumulative as they consider emissions from all sources across the economy including future emissions from new developments. The significance criteria to be adopted for the assessment (see Table 16-9) account for the need to align with a trajectory to be net zero compliant and, therefore, consider the potential cumulative effect of GHG emissions on the global atmosphere and climate. Therefore, no separate cumulative GHG assessment with other developments is proposed.

16.6.12 There are no intra-development cumulative effects as no other environmental aspects impact on the global climate receptor.

Assumptions, limitations and uncertainties

16.6.13 There is inherent uncertainty in estimating GHG emissions from infrastructure projects due to the developing maturity of carbon accounting practices and the associated data on carbon factors. There is also uncertainty associated with the level and detail of project design information available at different stages within a project's lifecycle, which could lead to scope uncertainty (e.g. not all emission sources being captured) or assumptions being required to fill gaps in design data. Where assumptions are required to undertake the assessment, these will be reported in the ES and include a summary of their likely impact on the estimates.

16.6.14 The temporal scope of the assessment includes a construction phase extending to approximately 2040, and an operation phase that extends to the end of the century. There is inherent uncertainty in how the representative carbon factors will change over the full temporal scope. Therefore, assumptions will be required on the use of carbon factors in future years, and these will be detailed in the ES. For example, there are scenarios for expected changes in the carbon intensity of grid electricity, as published at the national level by the UK government. For other activities, such as the future decarbonisation of key materials, construction practices and others, professional judgement will be used to determine how future decarbonisation will need to be considered. This is due to future uncertainties of the pace of decarbonisation of key materials and construction/operational practices which rely on global supply chains.

16.6.15 It is not possible to assess the effects of downstream developments that would use the SESRO Project as a water source (e.g. pipelines outside the SESRO EIA Scoping Boundary for T2ST and SWOX). This is because the location and, therefore, their design / nature are not yet known such that no assessment can be undertaken. Information on these associated developments is unlikely to be fully available at the point of submission of the SESRO DCO application. It should also be noted that, while such facilities will be controlled by their own permissions and permits, these cannot guarantee that no significant effects might occur, however, they would make significant effects 'unlikely'.

Vulnerability to climate change

Assessment scope

16.6.16 The temporal scope for the assessment of the SESRO Project's vulnerability to climate change will consider climate change up to the end of the century (consistent with the assessment of GHGs). Climate projections for the high emissions (i.e. RCP8.5) scenario at the 50% probability level, will, therefore, be used to represent potential changes in climate over the long term (as summarised in Table 16-5). Although some of the SESRO Project's assets will have longer operational lifetimes, the UKCP18 projections extend only to the end of this century (up to the 2080s or 2090s depending on the resolution of the climate projections datasets used for the assessment).

16.6.17 Lower likelihood, worst case climate projection data and relevant climate extremes projection data will be considered for assessment of elements of the SESRO Project which are critical to operational safety. For example, the high emissions (i.e. RCP8.5) scenario at the 90% probability level would be used as a sensitivity test for those safety critical elements such as the reservoir embankments, access, tunnels, pumping station, intake/outfall structure and the waterbody.

16.6.18 The assessment of the vulnerability of the SESRO project to climate change will focus on potential impacts associated with projected changes in temperature and precipitation. Given the relatively small projected decreases in wind speeds on average, it is proposed that this is scoped out from further assessment. Appropriate mitigation measures would be included in the design to address risks associated with high winds, such as wave effects causing erosion of the inner face of the reservoir embankment (see Table 16-15).

16.6.19 Potential impacts during construction are scoped out from further assessment. Table 16-6 indicates that projected changes in key climate parameters in the short-term are relatively minor. The potential impacts listed in Table 16-7 would be unlikely to be of sufficient magnitude to lead to a significant effect and will be managed through the adoption of best practice construction management techniques and design of working areas, compounds and related infrastructure. Consideration and management of flood risk to construction activities is also provided in Chapter 6 – Water Environment.

Characterising impacts and effects

16.6.20 For operational impacts, IEMA (2022) sets out a risk assessment method where vulnerability is assessed based on the potential for climate impacts (as set out in Table 16-7 to occur and their impact magnitude (i.e. the severity of the disruption should the impact occur). The vulnerability assessment methodology can be summarised into the following steps:

- Identifying potential climate change risks to the SESRO Project's receptors
- Assessing these risks (taking account of primary mitigation)
- Developing further mitigation measures to reduce impacts (if required)

16.6.21 Table 16-10 provides the criteria to be used to assess the likelihood of each climate change risk to the SESRO project during operation.

Table 16-10 Likelihood categories for the identification of climate change related risk

Likelihood category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the project (60 years) e.g. approximately annually, typically 60 events
High	The event occurs several times during the lifetime of the project (60 years) e.g. approximately once every five years, typically 12 events
Medium	The event occurs limited times during the lifetime of the project (60 years) e.g. approximately once every 15 years, typically 4 events
Low	The event is only likely to occur once during the lifetime of the project (60 years), e.g. once in 60 years
Very Low	The event is unlikely to occur during the lifetime of the project (60 years)

Source: IEMA, 2022.

16.6.22 Table 16-11 provides the impact magnitude criteria to be used to assess each climate risk to the SESRO Project.

Table 16-11 Impact magnitude criteria for risks as a result of climate change

Impact magnitude	Description
Very large adverse	Site-wide disruption/loss of function and usability that is permanent or irreversible and disruption to regional water supplies
Large adverse	Site-wide disruption/loss of function and usability lasting more than one week, with potential disruption to regional water supplies
Moderate adverse	Partial site-wide disruption/loss of function and usability lasting more than one day and less than one week, with limited disruption to regional water supplies
Minor adverse	Partial site-wide disruption/loss of function and usability lasting less than one day
Negligible	Disruption to site is negligible causing no disruption in function and usability

Source: Adapted from IEMA, 2022.

Determining significance

16.6.23 The significance of each climate change risk will be assessed by combining the likelihood and magnitude scores using the matrix provided in Table 16-12.

Table 16-12 Effect significance scoring matrix

Measure of impact magnitude		Measure of likelihood				
		Very low	Low	Medium	High	Very high
	Negligible	NS	NS	NS	NS	S
	Minor adverse	NS	NS	NS	S	S
	Moderate adverse	NS	NS	S	S	S
	Large adverse	NS	S	S	S	S
	Very large adverse	NS	S	S	S	S

Note

NS = Not Significant, S = Significant.

Source: IEMA, 2022.

Assessment of cumulative effects

16.6.24 The assessment of vulnerability to climate change considers the resilience of the project elements (i.e. the physical assets that form a project) to climate change. There are no combined effects from other nearby developments which can directly alter the magnitude of the projected climate changes which form the basis of the assessment. Therefore, there are no anticipated significant inter-development cumulative effects with regard to climate change impacts to the SESRO Project's receptors.

In combination climate impacts

16.6.25 In combination climate impacts (ICCIs) refer to the combined impacts of climate change on environmental receptors assessed for other environmental aspects. An ICCI assessment will be undertaken to consider the extent to which climate change could worsen a potential effect on receptors associated with other aspects by altering the future baseline (i.e. whether the receptor's susceptibility and vulnerability and/or their value/importance changes based on future climate projections). It will also consider if the effectiveness of proposed mitigation (and resulting residual effects) would be altered due to the combined impact with climate change, where these are not already considered as part of the assessment of climate vulnerability described above.

16.6.26 The assessment of ICCIs will adopt a similar approach to that specified for assessing climate vulnerability of the SESRO Project. However, the study area will be the study area defined for each environmental aspect.

16.6.27 The first stage will be to determine the likelihood of potential ICCIs occurring for each environmental aspect and screen out environmental aspects where ICCIs are unlikely. The second stage would determine the consequences of the likely ICCIs and determine the significance of effect based on each aspects assessment criteria.

16.6.28 The ICCI assessment would be undertaken in coordination with the relevant environmental discipline specialists to understand the likelihood, consequence and significance of ICCIs, and would predominantly be based on professional judgement.

16.6.29 The receptors to be considered for the ICCI assessment would be determined at the PEI Report /ES stage, once likely effects have been identified for each environmental aspect.

Assumptions, limitations, and uncertainties

16.6.30 There is inherent uncertainty in the UKCP18 climate projections as they are models representing a range of potential future climate outcomes which rely on many variables. The climate projections set out in Section 0, and the more detailed climate projection data to be presented in the ES, will be based on the RCP8.5 scenario. This represents the most conservative, highest-impact scenario.

16.6.31 There is also uncertainty associated with the level and detail of project design information available at different stages in the project lifecycle. Where design information is not finalised, appropriate assumptions will be made based on industry benchmarks and professional judgement.

16.7 Mitigation and Environmental Net Gain

16.7.1 In line with the principles of reducing whole-life carbon and the carbon reduction hierarchy of PAS 2080 (BSI, 2023), the SESRO project seeks to reduce carbon in the earliest stages, where there is the greatest potential for reduction, and also explore options for mitigation across all stages. The aim is to reduce GHG emissions to as low as reasonably practicable. An initial list of measures is set out below for both construction and operation. The SESRO Project will actively seek to reduce whole-life carbon emissions at every stage of development and support water industry net zero operational ambitions.

Impact on climate (greenhouse gases)

Construction phase mitigation

Primary

16.7.2 Primary mitigation measures include:

- Optimising the cut and fill balance. Any surplus material excavated from the borrow pit not used for the embankment would be used for landscape fill
- Importing bulk construction materials (e.g. sand, gravel and riprap) by rail which is more efficient than delivery by road

Secondary

16.7.3 Secondary mitigation measures being explored are set out below. This list is not exhaustive and other practicable options will be investigated as part of the ongoing design and EIA process:

- Use of lower-carbon fuels and alternative construction plant to reduce GHG emissions. The energy consumption/fossil fuel use for the excavation and formation of the reservoir has been identified as a major source of emissions and is a key area for mitigation going forward
- Use of automated plant (e.g. conveyors) to increase the efficiency of material movement across the construction site
- Low carbon construction materials. (e.g. use of low carbon concrete and steel and options to use substitute materials for aggregates, such as sewage sludge ash)
- Reuse of materials from site clearance to reduce amounts of materials to be imported during construction (e.g. to form temporary haul roads)

16.7.4 These measures would be captured through the design process or included within a Carbon Management Plan for the SESRO Project within the Code of Construction Practice (CoCP).

16.7.5 The Carbon Management Plan will also include measures to reduce GHG emissions during construction to be implemented by the Contractor, for example:

- Training of plant operatives in fuel efficient driving techniques or use of appropriate technology on construction vehicles (e.g. stop – start)
- Monitoring of fuel and energy use on site
- Procuring locally sourced materials, where reasonably practicable, to reduce transportation emissions
- Careful consideration of material quantity requirements to avoid over-ordering and generation of waste materials, while also reducing transportation-related emissions

- Consideration of renewable and/or low carbon energy sources to power construction compounds
- Methods for reducing GHG emissions from the transport of materials and construction workers (linking to relevant plans such as a Construction Travel Plan, or similar). These are discussed in Chapter 11 – Traffic and Movement

Operation phase mitigation

16.7.6 In line with the Thames Water pledge for operational emissions to be net zero by 2030 (and consistent with the carbon reduction principles of PAS 2080), the SESRO Project will aim to reduce carbon as far as practicable during operation, as follows:

Primary

16.7.7 Potential primary mitigation measures include:

- Consideration of incorporating hydropower turbines in the conveyance tunnels to generate renewable energy when water is released from the reservoir to the River Thames
- Sizing of the intake pumps optimised for most efficient use

Secondary

16.7.8 Secondary mitigation measures being explored include:

- Low carbon power and decarbonised electricity procurement
- Real time water quality monitoring to optimise the use of the air diffuser network and sweetening flow pump
- Design of visitor and education centres with net zero carbon objectives
- Active travel provision and provision of electric vehicle charging at the visitor centre and main car parks
- Investigate the feasibility of renewable energy options on-site
- Planting and nature-based solutions providing carbon sequestration. This includes creation of wetland and woodland habitats
- Developing operational plans to operate the SESRO project and undertake the required inspections and maintenance efficiently to reduce GHG emissions
- Implementing wider organisational measures from the Thames Water net zero route map (Thames Water, 2021a) relevant to the operation of the SESRO Project (e.g. use of electric vehicles for the operational fleet and supply chain)

Vulnerability to climate change

Construction phase mitigation

16.7.9 Although effects during construction are scoped out from further assessment, mitigation measures will be included as best practice during construction. These would be based on up-to-date design and construction standards and good engineering practice and included in the CoCP for implementation by the contractor. Specific flood risk mitigation is set out in Section 6.8 of Chapter 6 – Water Environment.

Tertiary

16.7.10 Examples of mitigation measures to reduce the vulnerability of the construction works and workers to climate change include:

- Proactively manage work patterns / automation to avoid human exposure to extreme temperatures and, where this is not possible, the provision of appropriate personal protective equipment (PPE) and facilities (e.g. cool rooms and shade)
- Design of site access routes, construction compounds and embankments or structures to protect against high rainfall and flooding events (e.g. drainage capacity allowing for climate change, use of permeable surfaces)
- Appropriate storage, protection and bunding of potential contaminants against high rainfall and flooding events
- Storage of topsoil and other bulk materials in appropriate locations to reduce risks from flooding
- Undertaking inspections of material stockpiles, structures, embankments and work areas during and following extreme weather events
- Use of weather forecasting and flood alert services to plan construction works
- Temporary suspension of works where required and allowance for this in the construction programme (i.e. for periods of extreme temperature or prolonged periods of heavy precipitation)

Operation phase mitigation

16.7.11 The potential climate change impacts to the SESRO Project during operation are listed in Table 16-6. Mitigation would be considered during all design stages to reduce the potential for significant disruption to operation, in line with the aims of the Thames Water Climate Change Policy (Thames Water, 2023c).

Primary

16.7.12 The primary mitigation measures set out below reflect the potential options that could be embedded in the design and will be investigated as the design progresses.

16.7.13 Potential mitigation measures to address the risks from increased summer temperatures and extreme high temperatures, including prolonged periods of hot weather and droughts are set out in Table 16-13.

Table 16-13 Potential mitigation for increased summer temperatures, extreme high temperatures, prolonged periods of hot weather and droughts

Receptor(s)	Potential impact	Potential mitigation
Development infrastructure such as the embankment structure	Deep cracking of clay embankment leading to seepage or failure	Freeboard on top of structural clay embankment Inclusion of a geogrid system supporting the pavement sub-base Vegetation cover on the outer face of the embankment
Reservoir waterbody, equipment, operational workers and recreational users	Algal blooms preventing release of water in times of need	Air diffusers, jets and recirculation to prevent thermal stratification and promote mixing of the water in the reservoir
	Heatwaves and drought leading to blue-green algal blooms resulting in failure of equipment and ingestion or inhalation of toxins by workers/users	Water quality sampling equipment and telemetry relaying data Automatic warning systems should no data be available to indicate safe water use conditions
MEICA equipment	Shut-down or breakdown of electrical equipment exposed to extreme temperatures	Air conditioning in place to control inside air temperatures, resilience of power supply systems
Habitats created as part of the Master Plan	Wetland areas drying out and vegetation dieback due to increased drought	Designing habitats / landscaping to be resilient to drought and heat. Design of wetland areas to retain water even when the reservoir water levels drop during drier periods. Selection of plant and tree species. Inspection and maintenance of habitat and landscaped areas, with provision for replanting where necessary

16.7.14 Potential mitigation measures to address the risks from increased precipitation, including intense periods of rainfall, increased frequency and intensity of flooding are set out in Table 16-14. As well as those listed in Table 16-14 which address specific potential impacts, the design of the SESRO Project has considered projected climate change for the embankment height and freeboard and sizing of the conveyance tunnels to achieve the required flows for all operating conditions. This has been informed by hydrological modelling which includes climate change scenarios.

Table 16-14 Potential mitigation for increased precipitation, intense periods of rainfall and frequency and intensity of flooding

Receptor(s)	Potential impact	Potential mitigation
Embankment structure	Scour at the toe of the embankment caused by flood velocities	Scour protection based on modelling of flood velocities
	Internal erosion of the embankment	Inclusion of a chimney drain (sand/gravel) within the embankment
	Erosion of outer surface of the embankment	Suitable surface water drainage on the outer slope of the reservoir embankment
	Groundwater flooding of reservoir foundations affecting stability	Groundwater drain to manage the groundwater flows around the reservoir embankment
Access roads and road drainage	Inability to access the reservoir/pumping station for emergency operations (e.g. emergency drawdown)	Road level above flood levels to maintain safe, passable access in the event of extreme flooding.
	Groundwater seepage affecting road stability	Groundwater drain to manage groundwater table
	External erosion of the road embankment affecting stability	Erosion prevention measures and road drainage
	Overloading of road drainage under flood conditions preventing access or causing damage	Drainage capacity to accommodate flood flows.
	Groundwater seepage affecting integrity of road drainage	Groundwater drain to manage groundwater table

Receptor(s)	Potential impact	Potential mitigation
Intake/outfall structure	River flows beyond operating range resulting in damage to civil/mechanical/electrical equipment and/or temporary shut-down of operations	Hydraulic gates operation Electrical equipment installed above flood levels which include allowance for climate change Protection of mechanical equipment from debris
Pumping station	Flooding preventing pumping of flows or manual operation of pressure reducing valves for emergency drawdown	Locating pumping station above flood levels which include allowance for climate change
MEICA equipment	Flooding of primary control facilities electrical equipment causing shut-down or breakdown, and preventing automatic/remote control of operations	Facilities located above flood levels (which include allowance for climate change) to maintain operation during flood conditions.
Conveyance tunnels	Increased hydraulic loading on tunnel structure with increased groundwater levels – may affect integrity of tunnels and prevent their use	Groundwater drain to manage groundwater table
Visitor and recreational facilities, water sports centre	Flooding and damage, preventing use	Facilities and access located above flood levels (which include allowance for climate change), drainage design
Habitats created as part of the Interim Master Plan	Species changes due to inundation of water from increased rainfall, rainfall events and flooding	Design of landscaping and habitat areas to consider increased rainfall and rainfall events and include sufficient drainage. Inspection and maintenance of habitat and landscaped areas, with provision for repairs and replanting where necessary

16.7.15 Potential mitigation measures to address the risks from periods of high wind speed are set out in Table 16-15.

Table 16-15 Potential mitigation for high wind speeds

Receptor(s)	Potential impact	Potential mitigation
Embankment structure	Elevated wind speeds leading to increased wave effects and wave height could cause erosion of the inner face	Inclusion of rip rap on the inner face of the embankment Freeboard height of the embankment above maximum water level to consider wave effects

Secondary

16.7.16 Appropriate operational management of potential climate change impacts will be required. For example, through operational plans including details of inspections, maintenance and monitoring of the key receptors accounting for projected changes in climate.

Potential for environmental net gain

Impact on climate (greenhouse gas emissions)

16.7.17 Given the anticipated GHG emissions involved with the construction and operation of the SESRO Project, it is unlikely that the SESRO project would achieve a position of net gain for GHG emissions within the temporal scope of the assessment. However, GHG emissions could be considerably reduced through the potential mitigation measures set out previously in this section. This includes some of the measures which reduce emissions or generate renewable energy to the national grid such as:

- Potential use of hydropower turbines to generate electricity
- Potential installation of renewable energy sources
- Habitat creation and woodland planting to maximise the sequestration of carbon within the EIA Scoping Boundary

16.8 Summary of Scope for the EIA

EIA scope for the preferred option

16.8.1 Table 16-16 summarises the proposed scope for the assessment of the two matters of carbon and climate change.

Table 16-16 Summary of climate change matters scoped in and out of further assessment

Environmental matter		Scoped in/out	Rationale
Impact on climate (greenhouse gas emissions)			
Construction phase GHG emissions (lifecycle modules A1 – A5)		IN	A whole-life carbon assessment is required to determine carbon emissions and identify suitable mitigation measures to reduce carbon as far as reasonably practicable.
Operation phase GHG emissions (lifecycle modules B1 – B8, D2)		IN	
Vulnerability to climate change			
Impacts during construction phase		Out	Projected changes over the short term are minimal and would be controlled through appropriate construction mitigation and management plans
Impacts during operation phase	Projected changes in temperature, dry periods, precipitation, extreme events and flooding	IN	These impacts could lead to potentially significant effects unless adequately addressed or controlled through design or other mitigation measures
	Projected changes in wind speed	Out	Projected changes in wind speed are relatively small and potential impacts can be addressed through the proposed design measures
In combination climate assessment during construction phase		Out	Projected changes over the short term are minimal and would be controlled through appropriate construction mitigation and management plans
In combination climate assessment during operation phase		IN	Required to identify potentially significant effects
Micro-climate			

Environmental matter	Scoped in/out	Rationale
Potential changes to local temperatures, and winds during construction and operation phases	Out	Effects likely to be minimal
Potential changes to frost and fog during construction phase	Out	Effects likely to be minimal
Potential changes to frost and fog during operation phase	IN	Included in the Traffic and Movement Assessment

Potential changes to scope and methods associated with other options

16.8.2 At this stage, based on professional judgement, it is considered that the scope and methods associated with the assessment of likely significant effects are unlikely to change between the different design options from those proposed in this chapter.

16.9 Next Steps

16.9.1 In preparation for the PEI Report, it is anticipated that the following tasks would be undertaken:

- Work with the project design team to calculate GHG emissions as the design develops
- Further investigation of potential carbon reduction mitigation measures and opportunities for use of renewable energy
- Update baseline environment and climate projection data
- Work with the project design team to determine potential climate change impacts and design mitigation measures
- Progress coordination with environmental aspects on ICCIs

16.10 References

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17 Communities

17.1 Introduction

17.1.1 This chapter presents the proposed scope and methodology for the aspect of Communities for the SESRO Environmental Impact Assessment (EIA). The aim of this chapter is to:

- Identify the relevant residential, community, commercial, walking/cycling/horse riding (WCH) provisions, and economic receptors that could potentially be impacted by the construction and operation of the SESRO Project
- Evaluate potential construction and operation impacts and identify those that may lead to significant effects on Communities
- Outline the proposed scope of work and assessment methodology for effects on Communities (accessibility, land take, amenity and economic) associated with the SESRO Project

17.1.2 Effects on amenity for residential, community, and commercial receptors can occur from a range of potential sources such as noise, traffic, dust, and/or loss / creation of recreational land. The assessment of amenity effects on receptors will, therefore, rely on the conclusions of other relevant aspect assessments (Traffic and Movement, Air Quality, Noise and Vibration, and Landscape and Visual) and consider whether there are additional effects on residential, community and commercial receptors as a result of the interaction between, and cumulation of, these impacts. Economic effects such as direct employment and change in economic activity associated with project expenditure will be discussed at a local authority and regional level.

17.1.3 This chapter should be read in conjunction with the following aspect chapters:

- Chapter 7 – Aquatic Ecology
- Chapter 9 – Landscape and Visual Effects
- Chapter 11 – Traffic and Movement
- Chapter 12 – Noise and Vibration
- Chapter 13 – Air Quality
- Chapter 18 – Human Health

17.1.4 An Equalities Impact Assessment would be carried out separately from EIA and, therefore, is not covered within the Communities chapter.

17.2 Legislation, Policy, Standards an Guidance Context

17.2.1 The following elements from the Department for Energy, Food and Rural Affairs' (Defra) National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023) are relevant to the Communities assessment:

- Paragraph 4.13.3 requires applicants to *'consider how the impacts of the infrastructure during construction and operational phases, such as job creation and increased spending in local economies, visual impacts, and traffic and transport may affect local communities and amenities'*
- Paragraph 4.13.4 requires applicants to have a baseline that reflects the socio-economic conditions of the areas surrounding the SESRO Project
- Paragraph 4.13.5 covers examples of types of socio-economic impact that may be assessed:
  - 'the creation of jobs and training opportunities
  - the provision of educational and visitor facilities
  - the impact of the proposed new facility on tourism, local businesses or local services
  - opportunities to provide a direct water supply to local business water users'
- Paragraph 4.13.6 highlights that 'socio-economic impacts may be linked to other impacts, for example the visual impact or an individual's perception of a development. It may also have an impact on the local economy and local businesses. Where such impacts are relevant to the development, an applicant should include them in their assessments'
- Paragraph 4.13.7 confirms that cumulative impacts on communities should be assessed
- Paragraph 4.13.8 highlights that applications for reservoirs must be supported by a recreational amenities statement outlining details of, and justifying, any amenities to be provided including associated recreational or educational amenities. Note, a recreational amenities statement will be included with the Development Consent Order (DCO) application, outlining any associated recreational or education amenities

17.2.2 The SESRO Project would have regard to relevant legislation, policy, standards and guidance for this aspect as listed in Table 17-1.

17.2.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the SESRO Project would be provided in the Preliminary Environmental Information (PEI) Report and/or Environment Statement.

Table 17-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Environmental Protection Act 1990
The Marine Works (Environmental Impact Assessment) (Amendment) Regulation 2017
Section 2 to 5 of the Water Industry Act 1991
National policy
National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2023)
Consultation version NPPF (Ministry of Housing, Communities and Local Government, 2024)
Standards and guidance
The Additionality Guide (Homes and Communities Agency, 2014)
HM Treasury 'The Green Book' (HM Treasury and Government Finance Function, 2024)
Institute of Environmental Management and Assessment (IEMA) Socioeconomic Impact (IEMA, 2014)
IEMA Socio-economic Impact Assessment (IEMA, 2021)
Design Manual for Roads and Bridges (DMRB): LA 112 Population and Human Health (Standards for Highways, 2020a)
DMRB: LA 104 Environmental Assessment and Monitoring (Standards for Highways, 2020b)

17.2.4 The documents above provide a framework used to structure the methodology, assessment, and mitigation within the Communities assessment.

17.3 Engagement

17.3.1 Table 17-2 summarises the key comments and actions from the EIA Scoping Technical Liaison Groups (TLGs) on communities and health.

Table 17-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
Planning officers (Vale of White Horse District Council (VoWHDC) and Oxfordshire County Council (OCC))	Asked for details on commitments from Thames Water on elements such as local employment, involving local schools, colleges, apprenticeships	These elements will be discussed as the design progresses
Oxfordshire Local Enterprise Partnership (OxLEP)	Advised that they produce community employment plans for projects in Oxfordshire. These provide recommendations for projects to follow, such as prioritising employment of long-term unemployed individuals and offering apprenticeships for local people	The SESRO Project team will engage with OxLEP to understand their priorities and plans and discuss opportunities for collaboration
OCC	The OCC Planning Lead enquired about the commitments on local employment and indicated the importance of hiring the required workforce for the SESRO Project from within Oxfordshire, where feasible	An employment and skills strategy will be developed as part of the full Environmental Statement. This will include local employment opportunities from the SESRO Project
OCC	Queried whether benefits arising from the SESRO Project would include the recreation and education centre	The positive impacts (benefits) relating to the recreation and education centre will be covered by the Communities assessment. Benefits relating to recreation and education will also be estimated as part of a Benefits Assessment separate to a the EIA
OCC	Queried whether there would be missed opportunities associated with the old Wiltshire and Berkshire canal and what EIA scoping might do in respect of that	These factors are considered in other elements of the SESRO Project development such as optioneering/alternatives assessment and design, not EIA

17.4 Existing Environment and Baseline Conditions

Study areas

17.4.1 The assessment will consider study areas taking account of the scale of SESRO's potential effects on communities in Oxfordshire. The majority of potential effects relating to accessibility and land take will be within the EIA Scoping Boundary for SESRO (which lies primarily within the Vale of White Horse district with parts in the east within South Oxfordshire district) but other effects may occur further away. An example could be displaced traffic causing a reduction in accessibility on the local road network. The study areas for assessment of each of the four environmental matters: accessibility, land take, amenity, and economics, are defined below:

- Accessibility:
  - A 500m buffer surrounding the EIA Scoping Boundary for SESRO, as defined by the DMRB LA112 2020 (Standards for Highways, 2020a)[34]. This will be referred to as the 500m study area. The 500m buffer may increase or decrease based on the likelihood of significant effects occurring. This is possible given that there are settlements that are outside 500m of the EIA Scoping Boundary (e.g. Abingdon or Marcham) but where residents may still be affected in terms of accessibility
  - In addition, a wider area aligning with impacts identified by the Traffic and Movement assessment (Chapter 11), to be confirmed at the EIA stage. These impacts will reflect impacts outside of the 500m area, such as those arising from displaced traffic. For baseline data collection, a buffer of 10km surrounding the EIA Scoping Boundary has been used to reflect the wider area for the Traffic and Movement assessment. This will be referred to as the 10km study area. See Figure 11.1 for the Traffic and Movement study area that informs this 10km study area
- Land take:
  - Same study area as for accessibility

[34] *It is recognised that the SESRO Project is a non-linear infrastructure scheme but in the absence of guidance for this specific type of project, the approach will draw on the principles of DRMB and adapt those that are relevant to the context of this Project.*

- Amenity:
  - Study areas will align with other disciplines that inform the amenity assessment: Traffic and Movement, Air Quality, Noise and Vibration, and Landscape and Visual. See Figure 11.1 for the Traffic and Movement study area
- Economic:
  - The study area for economic effects will be at local authority (Vale of White Horse) or county (Oxfordshire) level depending on the data availability for relevant indicators

Desk-based assessment

17.4.2 Desk-based assessments have been undertaken using Office for National Statistics (ONS) Census Data (ONS, 2021), Ordnance Survey (OS) Maps (OS, 2023a), and Addressbase Plus[35] (OS, 2023b).

Population and community overview

Community profile

17.4.3 Vale of White Horse is one of the five Local Authority Districts (LAD) in the county of Oxfordshire. The district is largely rural with scattered villages and towns. Vale of White Horse lies south-west of Oxford, with the northern boundary following the River Thames. The population is predominantly white (90.7%), specifically white British (82.9%) and white other (6.7%). The rest of the population is 4.1% Asian, 2.5% Mixed, 1.6% Black and 1.1% 'Other'.

17.4.4 South Oxfordshire LAD lies to the south of Oxford. The population is predominantly white (93.1%) with the rest of the population is 2.9% Asian, 2.3% Mixed, 1% Black and 0.8% 'Other'.

17.4.5 There are three major settlements fully encompassed within the 10km study area: Abingdon, Didcot and Wantage. Abingdon is located north-east of the EIA Scoping Boundary for SESRO, with a population of 33,175 (Nomis, 2021). Didcot lies to the south-east of SESRO, with a population of 32,183 (Nomis, 2021). Lastly, Wantage is located to the south-west, with a population of 13,106 (Nomis, 2021).

[35] AddressBase Plus is a database produced by the OS which gives the most up to date, accurate information relating to addresses, properties and land areas.

17.4.6 The south of Oxford is also within the 10km study area. In 2021, 54% of Oxford's total population was White British, 17% were from a white but non-British ethnic background, and 29% of residents were from a black or minority ethnic group (Oxford City Council, 2024).

17.4.7 Smaller settlements within the 10km study area include (but are not limited to): Drayton, East Hanney, Steventon, Garford, Marcham, Frilford, Culham, Denchworth, Grove, Hendred, Rowstock, Marcham Mill, Tubney, Fyfield, Chassey Bassett, Kingston Bagpuize, Cothill, Wootton, Appleton, Northmoor, Standlake, Cumnor, Henwood, Suningwell, Bayworth, Kennington, Sanford on Thames, South Hinksey, Radley, Nuneham Courtenay, Berinsfield, Clifton Hampden, Dorchester, Long Wittenham, Brightwell-cum-Sotwell, North Moreton, South Moreton, West Hagborne, East Hagborne, Upton, Chilton, West Ilsley, Farnborough, Letcombe Bassett, Letcombe Regis, Childrey, Sparsholt, West Challow, Goosey, Stanford in the Vale, Hatford, Kingston Bagpuie, Hinton Waldrist, and Buckland.

17.4.8 Key community receptors within the 10km study area include (but are not limited to): Abingdon Community Hospital, Church Street Practice (healthcare centre), Didcot Community Hospital, Wantage Community Hospital, Nigel Eady Community Woodland, Steventon Allotments, Drayton Copse (greenspace), St Micheals CofE Primary School, St James Church of England Primary School, Thameside Primary School, Carswell Community School, Didcot Primary Academy, Aureus Primary School, Charlton Primary School, Stockham Primary School. There are a number of leisure facilities in each of the larger settlements and small places of worships in most settlements.

17.4.9 Notable community assets within the10km study area include Frilford Health Golf Club, Abingdon Airfield, Oxford Sailing Club and greenspaces including Abbey Meadows (park and meadow), Ashdown (National Trust), Wayland's Smithy (historic landmark), Segsbury Camp (historic landmark), Badbury (National Trust), Oxford Sailing Club, Linear Fisheries, Harcourt Arboretum (University of Oxford), Pendon Museum, Didcot Railway Centre.

Demographic overview

17.4.10 There are approximately 559,659 people residing in the Lower Layer Super Output Areas (LSOAs) within the 10km study area (refer to Appendix Table 29 in Appendix L).

Walking, cycling and horse riding provisions

17.4.11 Table 17-3 shows the WCH provisions within the 10km study area.

Table 17-3 Walking, Cycling, and Horse Riding provisions within 10km study area

Provision	Description
Public rights of way (PRoW)	34 PRoW within the EIA Scoping Boundary for SESRO and over 2500 PRoW within the 10km study area
National Cycle Network (NCN) Route	NCN Route 5 runs north-south past the Abingdon Sewage Treatment Works (STW) within the EIA Scoping Boundary through Abingdon NCN Route 544 runs east-west, from Didcot to Wantage, to the south of the site
National Trails	The Thames Path runs along the eastern side of the River Thames within the EIA Scoping Boundary close to the intake/outfall options on the east bank of the river The Ridgeway Runs to the south and east of the EIA Scoping Boundary

Source: OS Maps (2023a).

Commercial and economy overview

Commercial profile

17.4.12 SESRO is located primarily on agricultural land. There are three solar farms in close proximity to the EIA Scoping Boundary: Steventon Solar Park in the south-east of the SESRO site, Landmead solar farm to the north-west and Hill Farm Solar Park to the south. There are small independent and industrial businesses along Hanney Road and a larger industrial facility to the south of Hanney Road (Steventon Depot). Landmead Farm Airstrip is situated north of Landmead Solar Farm. The Great Western Main Line railway runs east to west across the study area to the immediate south of SESRO and major roads nearby are the A415 to the north, A338 to the west and A34 to the east.

Employment

17.4.13 Appendix Table 30 in Appendix L shows that LSOAs within the 10km study area have an above average employment rate of 96.75%. This is 0.02% above Oxfordshire (96.73%) and 1.72% above England (95.03%).

17.4.14 Gross median weekly pay (2023) in Vale of White Horse is £730. This is £2 higher than Oxfordshire (£728) and higher than England (£683). South Oxfordshire gross median weekly pay is £818. The average total annual household income for Middle Layer Super Output Areas (MSOAs) within the 10km study area is £60,754. This is higher than Oxfordshire which is £60,551 annually, and significantly higher than England at £46,933 annually.

Economy

17.4.15 Gross Value Added (GVA) is a measure of economic productivity showing the contribution of an area to an economy. It measures how much value is generated by an area – comparing costs to output. It can also be measured at a per head rate to take account of the population. Appendix Figure 3 in Appendix L shows that professional, scientific and technical activities has had the largest growth in Oxfordshire from 1998-2022 increasing 382%. The second largest growth was in Human Health and Social Work activities at 292%, followed by education at 269%.

Further desk study and survey

17.4.16 The baseline will be developed as follows:

- **Surveys**: A triangulation will be undertaken to proportionately validate the identified range of receptor assets. This will involve desk-based research identifying a range of receptors and subsequent in-person validation for a selection of key receptors. The community assessment will also draw on findings from other environmental surveys set out for other aspects in this EIA Scoping Report
- **Non-Motorised Users surveys:** These surveys will be undertaken for PRoW in relation to the Traffic and Movement aspect of the EIA
- **Desktop Study**: The Communities assessment will be informed by further desktop study. Population profiles of each study area will be developed based on study of ONS census data, and the most recent available relevant local authority data. This data will be analysed at a more granular level (e.g. ward level) to help further establish and understand localised socio-economic profiles

17.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

17.5.1 The key Communities receptors are residential, community, commercial, WCH provision and economic receptors. Receptors to be considered include:

- **Residential receptors**: private property and housing including gardens, private drives, and land allocated for housing
- **Community receptors**: community land (e.g. common land, village greens, open green space, allotments, sports pitches) and assets (e.g. village halls, education facilities, religious facilities, medical facilities)
- **Commercial receptors**: existing employment sites, land allocated for business and development land
- **WCH provision**: national routes, regional routes, local trails and PRoW

- Economic receptors:
  - **Employment:** level of unemployment will be measured
  - **Local/regional economic activity**: local or regional GVA will be measured
  - **Skills:** proportion of population with qualifications will be measured
  - **Accommodation:** depending on the size, phasing and management of the construction workforce required for the SESRO Project, receptors such as the local housing market and tourism accommodation may be affected
  - **Public services:** health, education and emergency services (fire, ambulance, and police) may be affected by a temporary increase in population associated with the construction workforce required for the SESRO Project. Operation period impacts of workforce and visitors will also be considered

Potential environmental effects

Construction

17.5.2 The following potential Communities effects due to construction of the SESRO Project have been identified:

- Temporary or permanent amenity effects to community, residential or commercial receptors (including development and commercial land) due to increased noise, visual effects, air quality, traffic either singly or in combination
- Temporary or permanent closure or diversions to WCH provision
- Temporary or permanent impacts on access to residential, community and commercial receptors (including development and commercial land)
- Temporary or permanent land take and associated impact on community and residential receptors, including on provision of greenspace and community land. Also, temporary or permanent land take and associated impacts on commercial receptors (including development and commercial land)
- Temporary employment effects arising during the construction stage – including direct, indirect and induced employment
- Temporary or permanent effects on the local economy from changes to economic investment in the region – including potential increase in GVA
- Temporary or permanent skill or educational effects arising from construction – including training and experience for the local/regional population
- Temporary effects on the housing market and temporary accommodation (tourism)
- Temporary effects on public services (education, health and emergency)

- Temporary or permanent in-combination effects

17.5.3 It is considered that all the potential effects listed above should be scoped into the EIA and, as such, no potential communities effects due to construction have been scoped out.

Operation

17.5.4 The following potential Communities effects due to operation of the SESRO Project have been identified:

- Permanent amenity effects to community, residential or commercial receptors (including development and commercial land), due to increased noise, visual effects, air quality, traffic singly or in combination
- Permanent closure or diversions to WCH provision
- Permanent impacts on access to residential, community and commercial receptors (including development and commercial land)
- Permanent land take and associated impacts on community and residential receptors including provision of greenspace and community land. Also land take and associated impacts on commercial receptors (including development and commercial land)
- Permanent employment effects from operation on the local/regional population
- Permanent effects on the local economy from changes to economic investment in the region – including potential increase in GVA
- Permanent skill or educational effects arising from operation – including training and experience for the local/regional population
- Permanent effects on accommodation
- Permanent effects on public services
- Temporary or permanent amenity effects from the potential breeding of flies associated with the introduction of a large body of water
- Temporary or permanent in-combination effects

17.5.5 It is considered that all the Communities effects due to operation of the SESRO Project listed above should be scoped into the EIA with the exception of two, as detailed below, which will be scoped out:

- Permanent effects on public services – It is expected that the number of workers directly relating to the operation of the reservoir and associated facilities delivered by the SESRO Project will be relatively small compared to the construction period
- Temporary or permanent amenity effects from flies breeding in the reservoir and wetlands – Concerns associated with non-biting flies swarming at reservoirs have been raised at public consultation events for the SESRO Project. However, complaints records for Thames Water clean water facilities have indicated that complaints regarding flies are very rare

(at the time of writing, since the 2020-21 reporting year (inclusive), there have been five telephone and two written complaints regarding flies received across Thames Water's entire clean water estate) and, while issues can occur, they are sporadic, temporary and localised. Fly swarms may occur during warm weather near still water where the flies hatch out and form mating swarms (see Chapter 7 – Aquatic Ecology). Swarms do not generally occur far from the breeding location and tend to form around either tall or bright structures. At SESRO, as the reservoir embankments and associated planting will be the tallest structures in the local landscape, fly swarms generated at the reservoir are unlikely to move far beyond them and the tops of the embankments are several hundred metres away from sensitive residential areas. Those swarms forming around wetland habitats associated with the watercourse diversions and replacement floodplain storage may be closer to residents but are unlikely to generate fly swarms any worse than flies around existing watercourses. In any case, tree planting between wetlands and residential areas is likely to reduce the likelihood of swarms moving into residential areas. Given the context of the SESRO Project, distant from existing sensitive receptors and that swarms are temporary and short-lived, it is considered that significant amenity effects associated with flies are unlikely and this aspect has, therefore, been scoped out of the EIA

17.5.6 Table 17-5 provides a summary of the potential impacts proposed to be scoped in or out of further assessment together with the rationale for the decision.

17.6 Assessment Methodology

Introduction

17.6.1 The Communities assessment examines four different types of potential effects:

- Accessibility
- Land take
- Amenity
- Economic (split into economic activity, employment, skills, accommodation and public services)

17.6.2 The following steps are to be undertaken to assess accessibility, land take, and economic effects. The steps are repeated for each of these effects:

- Identify receptors from each key group of receptors (residential, community, commercial, WCH and economic)
- Assign sensitivity to receptors in accordance with criteria
- Assess magnitude of effect on each receptor. This is assessed for each individual effect – accessibility, land take and economic

- Assess significance of potential effect for each receptor. This is assessed for each individual effect – accessibility, land take and economic
- Consider mitigation techniques / actions planned for the SESRO Project and how they may affect / address any potential effects for identified receptors. This is assessed for each individual effect – accessibility, land take and economic
- Conclude likely residual effect of the SESRO Project for each sensitive receptor. This is assessed for each individual effect – accessibility, land take and economic

17.6.3 Assessment of amenity effects follows a similar approach but the magnitude of effect is determined by a review of other assessments (Traffic and Movement, Air Quality, Noise and Vibration and Landscape and Visual) assessments. The receptors affected by amenity effects include residential, community and commercial. The combined significance will be determined using professional judgement.

17.6.4 The following guidance has been used to inform the methodology outlined in this Communities EIA scoping chapter:

- IEMA Socio-economic Impact (IEMA, 2014)
- IEMA Socio-economic Impact Assessment (IEMA, 2021)
- DMRB LA 112 Population and Human Health (Standards for Highways, 2020a)
- DMRB LA 104 Environmental Assessment and Monitoring (Standards for Highways, 2020b)

Characterising impacts and effects

17.6.5 The methodology for Communities assessment involves identifying receptors, assigning sensitivity, assessing magnitude of effect and significance, taking into consideration mitigation and concluding residual impact. This is the same for both construction and operation.

Accessibility assessment

17.6.6 Accessibility relates to the ability of users to access commercial land (including agricultural) and properties, community land and assets, recreational resources and residential properties. Reduced accessibility can result in community severance i.e. a reduction in the ability of community members to move around their community to access facilities and resources.

17.6.7 The accessibility assessment will draw on the outputs of the Traffic and Movement assessment to determine how changes in traffic flows, parking provision, public transport services and WCH provision may impact the ability of users to access commercial and community assets in the 10km study area. The needs of different user types will be considered (e.g. older people, young people, disabled people), as well as the type of facility (e.g. hospitals or employment hubs) and whether there are alternative facilities available.

17.6.8 Geographic Information Systems (GIS) mapping will be used to inform the magnitude of effect on receptors. By observing a receptor's location in relation to the EIA Scoping Boundary it is possible to determine the extent of change in accessibility. For example, a key link (road or PRoW) between a receptor (e.g. school) and residents may be altered. The Master Plan and/or most up to date design document would be used to confirm the level of change that is reasonable to expect for users of the community or commercial receptor.

Land take assessment

17.6.9 Direct land take impacts can lead to a temporary or permanent restriction in the ability of a user to use a property or facility, in turn this can affect the operation and commercial viability of that property or facility.

17.6.10 Community receptors to be considered in the land-take assessment include community land and assets such as parks and PRoW as well as residential receptors such a residential land, including gardens, paths and driveways within the EIA Scoping Boundary for SESRO. Commercial receptors to be considered in the land-take assessment include agricultural land, commercial land and assets such as car parks, businesses and industrial complexes within the EIA Scoping Boundary for SESRO.

17.6.11 GIS will be used to inform the magnitude of effect on a receptor. By observing a receptor's location, extent of land ownership and the EIA Scoping Boundary for SESRO it is possible to conclude the extent of land take expected. Research into individual receptors will be undertaken and confirmation will be sought on the design and potential mitigation measures proposed in relation to each instance of direct land take. This will assist in determining impact magnitude. Where feasible, this will be done through desktop study and in collaboration with relevant disciplines. However, potential engagement with affected business and property owners, or further research such as benchmarking with other projects, may be required to allow for a more accurate assessment of potential change.

Amenity assessment

17.6.12 Amenity is defined as any public benefits or contribution that can enhance the quality of life for a community. Amenity can, therefore, affect how people perceive their community, land and assets. Disturbance, for example, in the form of increased air pollution or traffic noise associated with construction could affect amenity. Community receptors such as hospitals and schools may be particularly sensitive to changes in amenity due to the nature of these facilities and the people who use them. Commercial receptors can also be affected by a change in amenity as this could be a feature of a commercial property that make it more attractive to potential customers, buyers or tenants; for example, a hotel that boasts a particularly good view. Residential receptors can also be affected.

17.6.13 The amenity assessment will draw on the outputs of other relevant assessments – namely Traffic and Movement, Air Quality, Noise and Vibration and Landscape and Visual to ascertain if reported significant impacts could result in an overall amenity effect for residential, community and commercial receptors.

17.6.14 Impacts on receptors from these different assessments will be examined and, if they combine in a way that relates to amenity, then it will be discussed in the Communities assessment. Professional judgement will be used when combining the different assessment outputs.

Economic assessment

17.6.15 Economic impacts include changes in employment (and resulting impact on the economy) and in economic activity associated with SESRO Project expenditure. Note that losses of businesses within the SESRO site would be covered by the land-take assessment which considers the potential loss of viability of businesses.

Change in economic activity

17.6.16 Project expenditure can result in an increase in economic activity. This can be measured as GVA from the project expenditure and will be presented against both the regional (Oxfordshire) and national economies.

17.6.17 To estimate the potential change in economic activity, a certain proportion of the SESRO construction expenditure will be spent within the UK economy, therefore, leakage from the UK economy and industrial multipliers can be estimated to produce an overall GVA figure associated with the construction period. The SESRO operation period will also create economic activity. Baseline data will be obtained from ONS on GVA and industrial multiplier benchmarks available from both the ONS and UK Government Blue Book (ONS, 2024). These would be used to estimate the additional activity generated by the SESRO Project expenditure and put the change in the context of current economic activity.

Change in employment

17.6.18 Construction and operation of the project will result in direct, indirect and induced changes in employment. Direct employment relates to the individuals employed as part of the construction or operation of the project. This then creates indirect employment through subsequent expenditure with other companies downstream or upstream of SESRO, for example increased employment at a cement company supplying material to the SESRO Project. This can be estimated by using SESRO employment estimates and then the ONS' estimates of industry employment multipliers. Induced employment is created by employees spending their money in the local economy, again determined through ONS' estimates of industry employment multipliers. These effects will be presented in the context of the local and regional economy.

17.6.19 The SESRO Project may result in community or commercial facilities ceasing operations due to being within the EIA Scoping Boundary for SESRO. This will be covered by the Land take assessment in relation to impacts on individual businesses. The economic assessment will include consideration of potential subsequent negative impacts on employment from a facility ceasing operations. Estimation of this effect will depend on current levels of employment across the affected community or commercial facilities and the potential impact of SESRO, which could result in facilities moving from their original site to another location or ceasing operations altogether.

Skills

17.6.20 The construction process will employ a variety of workers in different professions. It is likely that workers will be upskilled through the SESRO Project, either through direct initiatives, like apprenticeships, or general experience acquired on a large-scale infrastructure project. Training and upskilling provides a benefit to individuals and to the economy for the local and regional authorities.

17.6.21 The SESRO Project may result in community or commercial facilities ceasing operations due to being within the EIA Scoping Boundary for SESRO. This will be covered by the land take assessment in relation to impacts on individual businesses. It is possible that skills may be lost through the aforementioned ceasing of operations for facilities in the area, both through workers (of varying levels of skill) leaving the area and through lack of development of future workers' skills.

17.6.22 The estimation of change in skills will depend on commitments or assumptions on local employment associated with the SESRO Project's construction and operation and the utilisation of members of society that otherwise would not be employed. These commitments or assumptions will be made at the Environmental Statement stage. These will allow estimates to be produced on the number and type of jobs produced by the SESRO Project. The change in skills from the baseline skill level will then be represented by an uplift in the skill level of individuals involved in these roles.

Accommodation

17.6.23 Depending on where the construction workforce comes from, some workers may temporarily relocate to the local area during the construction period. This could have an impact on the availability of accommodation, in turn affecting the local housing market and sectors like tourism and hospitality. The extent of the impact would depend on the size, phasing and management of the construction workforce as well as the availability of bedspaces in the local housing market and temporary accommodation (such as hotels, B&Bs). Construction workforce numbers and accommodation arrangements are subject to design and agreements that would be established later in the design process; therefore, an assessment of the impact on the wider accommodation market will be undertaken as part of the EIA at the appropriate stage.

Public services

17.6.24 As above, some workers may temporarily relocate to the local area during construction. This could have an impact on the availability of public services if the demand increase experienced from construction workforce (and their families) exceeds available supply. The public services that will be examined for baseline supply include education, health, and emergency services. Again, expected construction workforce relocating to the local area during construction is subject to design and agreements that would be established later in the design process and, therefore, an assessment on the impact of public services will be undertaken as part of the EIA at the appropriate stage.

Determining the sensitivity of receptors

17.6.25 After identifying receptors using map analysis in the relevant study area, receptors will be assigned a sensitivity based on size/scale, potential alternatives, level of use and susceptibility to impacts. Professional judgement and experience will be employed to determine the type of receptor / facility and level of use. Section L4 in Appendix L presents different types of receptors and associated levels of sensitivity.

- Residential receptors are classified as high sensitivity
- Community receptors are classified individually based on the number of users of the facility, the level of use and the number of alternatives available
- Commercial receptors are classified based on size and potential alternatives for employment
- WCH receptors sensitivity is classified based on type of path (national, regional, and local), frequency of use, nature of use (recreation or commuting), connectivity to assets (residential, community or commercial), users (e.g. older individuals, children, or people with disabilities) and crossings of transport infrastructure
- Economic receptors (such as employment or public services) are classified depending on their local performance relative to regional or national averages

Determining magnitude

17.6.26 Magnitude of impact can be influenced by, but is not limited to, the extent or scale of the change, its duration, and whether the impact is direct or indirect. The magnitude of accessibility, land take, employment and economic activity impacts on receptors is determined using the magnitude criteria shown in Section L.5 in Appendix L.

17.6.27 Magnitude of impact for the economic assessment of skills, accommodation, and public services will be assigned using professional judgement and will follow the same magnitude scorings as seen in Appendix L (major, moderate, minor, negligible or no change).

17.6.28 Magnitude of impact for amenity assessment will draw on the magnitude of impact outputs of other relevant assessments – namely Traffic and Movement, Air Quality, Noise and Vibration and Landscape and Visual, to ascertain if reported significant effects could result in an overall amenity effect for residential, community and commercial receptors. Impacts on receptors from these different assessments will be examined and, if they combine in a way that relates to amenity, then this will be discussed in the Communities assessment. Professional judgement will be used in combining different assessments outputs.

Determining significance

17.6.29 For the land take, accessibility and economics assessment, the ‘significance of effects’ matrix, Table 17-4, will be used to determine the significance of effect from the combination of sensitivity classification and magnitude of impact on each receptor.

Table 17-4 Significance of effects

		Magnitude			
		Negligible	Minor	Moderate	Major
Sensitivity	Low	Negligible	Negligible / slight	Slight / moderate	Moderate
	Medium	Negligible / slight	Slight	Moderate	Moderate / major
	High	Slight	Slight / moderate	Moderate / major	Major

Source: DMRB LA 104 (Standards for Highways, 2020b).

17.6.30 For the amenity assessment, effects will be assessed for individual receptors by using the significance matrix reported in the relevant aspect chapters and determining a 'combined significance' by professional judgement and experience. The amenity assessment will take into consideration any mitigation measures associated with those aspects.

17.6.31 Note, it is recognised that the use of the significance matrix will not be feasible for those disciplines with an assessment methodology that does not produce outputs in terms of sensitivity, magnitude or significance or magnitude (for example dust and noise). For these disciplines, professional judgement will be used.

Assessment of residual effects

17.6.32 Where a significant effect is found, mitigation measures will be incorporated in order to prevent, reduce, or remediate the identified significant effects. An assessment of residual effects will be undertaken, taking into account the application of mitigation measures, to determine which (if any) significant effects remain.

Assessment of cumulative effects

17.6.33 Intra-development cumulative effects are integral to Communities assessment. The amenity assessment methodology describes the relationship with between Communities and other aspect assessments: namely Traffic and Movement, Air Quality, Noise and Vibration, and Landscape and Visual.

17.6.34 Intra-development cumulative effects between effects discussed in the Communities chapter (for example, land take and accessibility) will be assessed using professional judgement. This will determine whether the effects are additive, for example two minor effects accumulating to a significant effect.

17.6.35 Inter-development cumulative effects will be considered in the Chapter 20 – Cumulative Effects.

Assumptions, limitations, and uncertainties

17.6.36 The following limitations and assumptions are noted:

- AddressBase Plus data, produced by the OS, has and will be used to identify receptors. This has been verified where feasible by desk-based reviews and site surveys; however, 100% accuracy cannot be guaranteed
- The assessment of amenity effects is reliant on the assessments presented in Chapter 9 – Landscape and Visual, Chapter 11 – Traffic and Movement, Chapter 12 – Noise and Vibration and Chapter 13 – Air Quality. The limitations and assumptions presented in these chapters are, therefore, relevant to the assessment of community amenity effects

- A triangulation to confirm the identified range of receptor assets has not yet been undertaken. This will be done in the next stage of assessment

17.7 Mitigation and Environmental Net Gain

17.7.1 It is anticipated that primary mitigation measures will be applied across the relevant disciplines related to amenity effects (Landscape and Visual, Traffic and Movement, Noise and Vibration and Air Quality) and will reduce potential impacts on Communities. Please refer to the relevant chapters in relation to associated mitigation.

Construction phase mitigation

Primary

17.7.2 Accessibility may be affected by construction and, therefore, diversions will be implemented for PRoW to ensure a degree of accessibility is maintained. PRoW will be reinstated or replaced on completion of construction. The operational mitigation section below discusses the extent to which PRoWs will ultimately be improved.

Secondary

17.7.3 There is currently no commitment for secondary mitigation measures relating to Communities but agreements could take place in the DCO development stage depending on need and feasibility. This could be, for example, the recruitment of a community liaison officer that ensures local concerns are recognised and discussed.

Tertiary

17.7.4 There are currently no identified tertiary mitigation measures relating to Communities.

Operational phase mitigation

Primary

17.7.5 Primary mitigation measures in relation to Communities have been embedded throughout the SESRO Project Master Planning process. The iterative design development undertaken to date has considered the potential for the SESRO Project to deliver environmental gain and enhance social value. As well as providing a resilient water supply for the south-east, the reservoir would also provide opportunities to create new leisure and recreation facilities. These features, embedded in the preliminary design, are expected to improve the wellbeing of local communities and tourists and leave lasting legacy education, recreation, community, and amenity benefits. The SESRO Project will include provision for the following features, which will provide community benefits:

- The Interim Master Plan incorporates access for local communities and visitors to new high-quality green space associated with the reservoir, via a network of PRoW and permissive paths including access for walkers / wheelers, cyclists and horse-riders
- New active travel provision for walkers / wheelers and cyclists is proposed along the Steventon to East Hanney road diversion, which is not a feature of the existing road. The new route, therefore, has the potential to be used by cyclist for commuting, leisure and other travel purposes. Similarly, the main route to the reservoir would provide additional access
- Natural trails, a visitor centre, cafés, a water sports centre, recreational lakes and an education centre are proposed in the Interim Master Plan. The reservoir itself could provide for a range of non-motorised water-based recreational activities, such as angling and/or sailing (supported by a small number of electric motorised craft for access and safety)
- Landscape and habitat creation to enhance biodiversity and green space amenity

17.7.6 Additionally, mitigation measures proposed within the other relevant EIA aspects will reduce potential operational impacts on communities. Please refer to the relevant chapters in relation to associated mitigation.

Secondary

17.7.7 There is currently no commitment for secondary mitigation measures relating to Communities but agreements could take place in the DCO development stage depending on need and feasibility. This could be, for example, a form of community engagement such as ensuring educational and recreational opportunities are disseminated across the community in an accessible, multi-format approach; virtually, leaflets, braille, multi-languages. Specific mitigation, management and monitoring recommendations will be developed and reported on in the full assessment.

Tertiary

17.7.8 There are currently no identified tertiary mitigation measures relating to Communities.

Potential for environmental net gain

17.7.9 Overall, the SESRO Project presents an opportunity for provision of high quality green and blue space for visitors to enjoy in a recreational capacity, providing wellbeing benefits for local communities and tourists and increasing accessibility. A recreational amenities statement will be included with the DCO application, outlining any associated recreational or education amenities.

17.8 Summary of Scope for the EIA

EIA scope for the preferred option

17.8.1 A summary of assessment aspects scoped in are presented in Table 17-5.

Table 17-5 Summary of environmental matters scoped in and out of further assessment

Environmental matter	Scoped in / out	Rationale
Construction phase		
Accessibility	IN	SESRO construction could affect the ability of users to access commercial facilities, community facilities, recreational resources and residential properties
Land take	IN	SESRO construction could involve temporary and permanent direct land take impacts on residential, community and commercial receptors
Amenity	IN	SESRO construction could affect amenity of residential, community and commercial receptors
Employment	IN	SESRO construction will employ a workforce and, therefore, impact on the economy
Economic activity	IN	The change in economic activity resulting from the expenditure associated with infrastructure projects such as SESRO can be large enough to impact on GVA of the local and regional economy
Skills	IN	SESRO construction will employ a workforce which will upskill people
Accommodation	IN	A proportion of SESRO's construction workforce may temporarily move to the local area during the construction period. This could have an impact on availability of different types of accommodation, in turn affecting the local housing market and sectors such as tourism
Public services	IN	A proportion of SESRO's construction workforce may temporarily move to the local area during the construction period. This

Environmental matter	Scoped in / out	Rationale
		could have an impact on the availability of public services and the local population's ability to access them
Operational phase		
Accessibility	IN	SESRO operation could affect the ability of users to access commercial facilities, community facilities, recreational resources and residential properties
Land take	IN	SESRO operation could involve temporary and permanent direct land take impacts on residential, community and commercial receptors
Amenity	IN	SESRO operation could affect amenity of residential, community and commercial receptors. Note that potential amenity effects relating to flies during operation has been scoped out as significant amenity effects associated with flies are unlikely primarily given distances between the reservoir and residential areas and fly swarming behaviour (see paragraph 17.5.5 for further detail)
Employment	IN	SESRO operation will employ a workforce and, therefore, impact on the economy
Economic activity	IN	Operation of the reservoir and operational activity of the SESRO Project will facilitate economic activity and support economic growth
Skills	IN	SESRO operation could provide educational opportunities for the local population
Accommodation	IN	SESRO operation could attract people to the area. This may affect availability of accommodation
Public services	Out	No expected impact during operation given relatively small workforce. Visitors to SESRO will pose no additional requirement on public services than a visit to any other facilities in the area

Potential changes to scope and methods associated with other options

17.8.2 The Communities assessment has been scoped in line with the preferred option. Different options would not alter the methodology but may slightly alter the geographic scope of the assessment.

17.9 Next Steps

17.9.1 The next steps for undertaking the Communities assessment include the following:

- Further granular data collection to inform the baseline
- Undertake triangulation informed by the baseline data
- Undertake further engagement with stakeholders (including potentially affected businesses)
- Utilise outputs from consultation
- Use further desktop research and outputs from relevant disciplines to inform the development of socio-economic profiles across the relevant locales

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18 Human Health

18.1 Introduction

18.1.1 This chapter presents the proposed Environmental Impact Assessment (EIA) scope and methodology for the aspect of Human Health for the SESRO Project.

18.1.2 The scoping exercise has considered the likelihood of significant population health effects arising from the following stages of the SESRO Project:

- Construction activities, such as potential impacts on people from construction plant emissions and activities, as well as impacts of traffic management and diversions
- Operation, such as impacts on health from changes to recreational areas and the quality of placemaking

18.1.3 Where there are interrelationships between Human Health and other EIA aspects, these have been referred to in relation to the potential scope of impacts on Human Health. In particular, the following aspects have been referred to:

- Chapter 6 – Water Environment
- Chapter 9 – Landscape and Visual Effects
- Chapter 10 – Historic Environment
- Chapter 11 – Traffic and Movement
- Chapter 12 – Noise and Vibration
- Chapter 13 – Air Quality
- Chapter 14 – Geology and Soils
- Chapter 15 – Materials and Waste
- Chapter 16 – Carbon and Climate Change
- Chapter 17 – Communities
- Chapter 19 – Major Accidents and Disasters

18.1.4 This scoping chapter uses various terms relating to Human Health. The key terms and their definitions are set out in the glossary in the Human Health Appendix O.

18.2 Legislation, Policy, Standards and Guidance Context

18.2.1 The following elements from the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food, and Rural Affairs (Defra), 2023) are relevant to the Human Health assessment:

- Paragraph 3.12.1 highlights that water resources infrastructure can have direct impacts on health due to matters such as traffic, noise, vibration, air quality, light, community severance and polluting water discharges. Therefore, in order to identify and set out the assessment of any likely significant human health impacts, it is acknowledged that the assessments of these different environmental aspects within the EIA need to align

- Paragraph 3.12.2 underlines the need to consider indirect human health impacts, including, for example access to public services, local transport, or the use of open space. This paragraph also highlights the potential for indirect positive health impacts, including increased employment and new recreational activities
- Paragraph 3.12.3 states that: *'Where the proposed project has likely significant environmental impacts that would have an effect on human population or health, the applicant should identify and set out the assessment of any likely significant health impacts'*
- Paragraph 3.12.4 notes that impacts on human health may affect people cumulatively, and that potential cumulative impacts on health should be considered. This paragraph also states that applicants should identify measures to: *'avoid, reduce or compensate for adverse health impacts and seek enhancement opportunities as appropriate'*
- Paragraph 4.10.6 and 4.10.8 both note the relationship between greenspace/ open space and human health, through benefits such as improving mental health, physical health and social wellbeing

18.2.2 Note, Human Health impacts, in regard to other environmental aspects discussed within the NPS are denoted, where appropriate, in the relevant aspect chapter.

18.2.3 In addition to the policy set out in the NPS for Water Resources Infrastructure, the SESRO Project would also have regard to the relevant key legislation, policy, standards and guidance for this aspect as listed in Table 18-1.

Table 18-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Construction Design and Management Regulations 2015 (The Construction (Design and Management) Regulations 2015)
National policy
National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2023)
Health in All Policies (HiAP) from the World Health Organisation (WHO) (WHO, 2014)
Standards and guidance

Relevant legislation, policy, standards and guidance
Institute of Environmental Management and Assessment (IEMA) Guide to: Effective Scoping of Human Health in Environmental Impact Assessment (Pyper, 2022a)
The IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b)
Human Health: Ensuring a high level of protection. A reference paper on addressing Human Health in Environmental Impact Assessment as per EU Directive 2011/92/EU amended by 2014/52/EU (Cave, 2020)
Institute of Public Health's Health Impact Assessment (HIA) Manual (Pyper, Cave, Purdy, & McAvoy, 2021)
HIA in spatial planning (Chang, Sharpe, Stimpson, Petrokofsky, & Netherton, 2020)
International Association of Impact Assessment, International Best Practice Principles for Health Impact Assessment (Winkler, et al., 2020)

18.2.4 The legislation and key policies listed above aim to avoid disbenefits whilst looking to optimise benefits associated with Human Health with regard to development and, in some cases, more specifically water resource infrastructure.

18.3 Engagement

18.3.1 The engagement information shown in Table 18-2 was derived from the SESRO Noise and Air Quality, Socio-Economic and Traffic EIA Scoping Technical Liaison Groups (TLGs) undertaken in March 2024 and engagement with the Local Resilience Forum. Engagement with the Local Resilience Forum (8 May 2024) included NHS Buckinghamshire, Oxfordshire, and Berkshire West Integrated Care Board, Red Cross, Oxfordshire County Council (OCC), Oxford Health, South Central Ambulance Service, Buckinghamshire County Council (BCC), Bucksfire and the UK Health Security Agency (UKHSA). The SESRO Project was outlined to attendees as well as the Thames Water revised draft Water Resources Management Plan and operational practices were explained by Reservoir Managers. The objective was to introduce the project to blue light services and resilience planners in the Thames Valley. Further engagement associated with Human Health will be undertaken following the EIA Scoping Report to develop an understanding of local needs and community health profiles.

18.3.2 Further engagement is to be undertaken with the following stakeholders: cabinet members for healthy communities and community wellbeing at Vale of White Horse District Council (VoWHDC) and South Oxfordshire District Council (SODC) and relevant integrated care boards including National Health Service (NHS) Buckinghamshire, Oxfordshire and Berkshire West.

Table 18-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
OCC	The healthy place shaping team at OCC discussed the incorporation of Human Health in the EIA in substitution for a HIA. Advising on whether a rapid assessment can be taken, or a full assessment is needed in relation to human health	Discussions determined that the Human Health chapter will stand as a replacement for the HIA
OCC	OCC explained the role of the Oxfordshire Local Enterprise Partnership and the aim to create growth and employment for Oxfordshire with any projects in the area. OCC were interested in how Thames Water and SESRO could contribute towards these aims	Thames Water highlighted how the benefits associated with Socio-Economic, Community and Human Health should be brought out through the EIA process and explained and presented in relation to impacts upon the relevant receptors. These benefits should be coming through, and although it may not necessarily be possible to state specifically what the benefits are likely to be at the EIA scoping stage, it is important to work with OCC to make sure we are increasing the potential benefits The crossover between Human Health benefits with the benefit assessment and EIA were considered to increase Human Health benefits where feasible Regarding EIA scope, identifying these cross-over areas to benefits ensured the scoping of health determinants was well-informed to identify potential benefits and prevent disbenefits being overlooked

18.4 Existing Environment and Baseline Conditions

Study areas

18.4.1 The EIA Scoping Boundary for SESRO is predominantly within the VoWHDC area with a slight incursion into the SODC area on the eastern bank of the Thames where options for intake/outfall structures are present. The following study areas have been used for baseline data in respect of Human Health:

- 5km buffer for health receptors
- District level and wider region boundaries (Vale of White Horse (VoWH) and South Oxfordshire (SO), Oxfordshire County (OC), south-east England and England) for baseline health conditions and comparison purposes

18.5 Baseline Surveys and Desk-Based Assessment

18.5.1 Sources used to undertake the desk-based assessment are:

- Office for National Statistics (ONS) Census Data (ONS, 2021)
- Office for Health Improvements and Disparities (OHID) (OHID, 2024)
- Index of Multiple Deprivation (IMD) (Ministry of Housing, Communities and Local Government, 2019)
- Active Lives Survey (Sport England, 2022)
- British Heart Foundation Statistics (British Heart Foundation, 2019)
- ONS Wellbeing Survey (ONS, 2022)
- NHS Mental Health Statistics from the England Briefing Paper 22/23 (NHS, 2023)
- Adult Psychiatric Morbidity Survey 2014 (NHS, 2016)
- AddressBase Plus (Ordnance Survey, 2024)

18.5.2 No surveys have been undertaken to date in relation to Health. Note, further desk studies and surveys to be undertaken for the full EIA are set out in paragraph 18.5.26.

Demographic overview

18.5.3 Table 18-3 summarises the demographic profile of VoWH and SO, with data for south-east England and England presented for comparison.

Table 18-3 Vale of White Horse and South Oxfordshire Population and Age

Area	Population density (persons per km2)	Total population	Median Age Category	Proportion of population in age group (%)			
				Age 0-14	Age 15-19	Age 20-64	Age 65+
Vale of White Horse (81 LSOAs*)	240.5	138,911	Aged 40 to 44 years	17.86%	5.29%	57.08%	19.77%
South Oxfordshire (89 LSOAs*)	219.7	149,078	Aged 40 to 44 years	17.34%	5.12%	57.02%	20.52%
South-east England	486.5	9,278,066	Aged 40 to 44 years	17.42%	5.65%	57.48%	19.45%
England	433.5	56,490,048	Aged 40 to 44 years	17.42%	5.70%	58.47%	18.41%
Note *LSOA - Lower layer Super Output Area.							

Source: ONS Census Data 2021 (ONS, 2021), and OHID (OHID, 2024).

18.5.4 The data shows that, compared to the region and nation, VoWH and SO are not densely populated, with the population density 50.6% and 54.8% lower than south-east England respectively. In terms of age categories, for all ages groups under the age of 19, VoWH and SO approximately fall in line with the regional and national values. VoWH and SO have a higher proportion of individuals aged 65+ and a lower proportion of individuals aged 20-64 compared to the regional and national average.

Deprivation

18.5.5 The Oxfordshire Health and Wellbeing Strategy (Oxfordshire Health and Wellbeing Board, 2023) considers tackling deprivation as a key building block to healthy lives.

18.5.6 The IMD provides a measure of relative deprivation. Table 18-4 sets out the overall deprivation decile for VoWH and SO, as well as deciles for several contributing key factors: income, employment, education and crime. The decile, ranked between one and 10, indicates where the location ranks with regard to deprivation - one being within the 10% most deprived areas of England and Wales and 10 being within the 10% least deprived areas of England and Wales.

Table 18-4 Deprivation in Vale of White Horse and South Oxfordshire

Area	Overall Deprivation Decile	Income Deprivation Decile	Employment Decile	Education Decile	Crime Decile
Vale of White Horse	7	7	7	6	7
South Oxfordshire	9	8	9	7	8

Source: IMD (Ministry of Housing, Communities and Local Government, 2019).

18.5.7 Income deprivation is one factor within the IMD dataset and is presented as a proportion of the population experiencing deprivation relating to low income. VoWH ranks within decile 7 for Income deprivation, indicating the top 40% across England and Wales for least deprived in terms of income. This is the same for employment and crime deciles. In terms of education, the rank falls to 6. SO ranks within decile 8 for income deprivation, indicating the top 30% across England and Wales for least deprived in terms of income. SO also ranks in decile 8 for crime, decile 7 for education and decile 9 for both employment and overall deprivation, this indicates that overall, SO is in the 20% least deprived areas across England and Wales and is less deprived compared to the VoWH.

Population health indicators

18.5.8 Table 18-5 sets out selected population health indicators for VoWH and SO.

Table 18-5 Life expectancy, physical activity and disability for Vale of White Horse and South Oxfordshire

Area	Life expectancy at birth (2017-2019)		Physically active adults (%) (2022 / 23)	Physically fairly active adults (%) (2022 / 23)	Physically inactive adults (%) (2022 / 23)	Disability under Equality Act 2010 (%)
	Females	Males				
Vale of White Horse	85.33	82.56	65.9%	12.9%	21.2%	14.68%
South Oxfordshire	85.63	82.18	67.3%	14.3%	18.4%	14.02%
South-east	84.27	80.79	66.2%	11.6%	22.2%	16.13%
England	83.37	79.76	63.4%	10.9%	25.7%	17.30%

Source: ONS Census Data 2021 (ONS, 2021), Active Lives Survey (Sport England, 2022), and OHID (OHID, 2024).

18.5.9 Life expectancy for VoWH and SO is above the England average. In terms of disability, VoWH and SO have a lower proportion of disabled individuals (14.68% and 14.02% respectively) compared to both the regional and national values. In terms of physical activity, SO has the highest proportion of individuals who are physically active, both VoWH and SO have higher proportions of physically active adults compared to the regional and national values.

18.5.10 Data derived from the Oxfordshire Health and Wellbeing Strategy (Oxfordshire Health and Wellbeing Board, 2023) states that, in Oxfordshire, 17% of adults do less than 30 minutes activity each week, while almost half of Oxfordshire's children are not doing the recommended levels of physical activity. This is lowest among people living in areas of greatest deprivation.

18.5.11 Table 18-6 shows deaths by heart and circulatory disease and stroke and coronary heart disease.

18.5.12 Deaths are considered preventable if, in the light of the understanding of the determinants of health at the time of death, all or most deaths from the underlying cause could potentially be avoided by public health interventions (ONS, 2015).

Table 18-6 Types of death and preventable death across Vale of White Horse and South Oxfordshire

Area	Heart and circulatory disease death rate (2019-2021)		Stroke death rate (2019-2021)		Coronary heart disease death rate (2019-2021)		Preventable Deaths, all ages (2018-2020)
	AS death rate*	*ASDR** Rank*[36]	*AS death rate*	*ASDR Rank*	*AS death rate*	*ASDR Rank*	*Rate per 100,000*
Vale of White Horse	180.7	275	44.7	221	69.0	275	100.3
South Oxfordshire	173.3	285	45.3	214	63.8	284	104.5
South-east	229.4	N/A	47.3	N/A	79.7	N/A	171.8
England	249.4	N/A	50.6	N/A	95.8	N/A	153.3

Notes
*AS - Age Standardised.
**ASDR - Age standardised death rate.

Source: ONS Census Data (ONS, 2021), OHID (OHID, 2024), and British Heart Foundation Death Statistics (British Heart Foundation, 2019).

18.5.13 Across the three types of death rate, VoWH ranks (ASDR Rank) 221 for strokes and 275 for both heart and circulatory disease and coronary heart disease; out of 418 local authorities across the UK. On the other hand, SO ranks 214 for strokes, 284 for coronary heart disease and 285 for heart and circulatory disease; out of 418 local authorities across the UK. A higher rank indicates fewer deaths. VoWH and SO have a lower preventable death rate compared to the regional average, suggesting that access to public health services and the interventions across VoWH and SO are high.

[36] The ASDR Rank ranks local authorities from 1 to 418. With 1 being the highest death rate.

Mental health and wellbeing

18.5.14 The ONS measures subjective wellbeing based on four questions included in the Integrated Household Survey (ONS, 2022), which offers the largest pool of UK social data after the census. The four questions are:

1. Overall, how satisfied are you with your life nowadays?
2. Overall, how happy did you feel yesterday?
3. Overall, how anxious did you feel yesterday?
4. Overall, to what extent do you feel the things you do in your life are worthwhile?

18.5.15 Responses are given based on the strength of emotion on a scale of zero to 10 (where zero is 'not at all satisfied or happy or anxious or worthwhile' and 10 is 'completely satisfied or happy or anxious or worthwhile'). Table 18-7 presents the scores reported for satisfaction, happiness, anxiety and worthwhile.

18.5.16 People with higher wellbeing have lower rates of illness, recover more quickly, stay well for longer and generally have better physical and mental health (Plymouth Health and Wellbeing Board, n.d.).

Table 18-7 ONS Wellbeing Indicators for Vale of White Horse and South Oxfordshire

Area	Self-reported wellbeing (2021 / 22)			
	Satisfaction score (Out of 10)	Worthwhile score (Out of 10)	Happiness score (Out of 10)	Anxiety score (Out of 10)
Vale of White Horse	7.72	7.74	7.43	3.20
South Oxfordshire	7.83	7.82	7.50	3.52
England	7.54	7.78	7.45	3.13

Source: ONS Wellbeing Survey (ONS, 2022).

18.5.17 The data displayed in Table 18-7 shows that for all four wellbeing indicators, VoWH and SO are approximately in line with the England average. For SO, the life satisfaction score is slightly above the England average and the anxiety score is also slightly above the England average.

18.5.18 Table 18-8 provides mental health indicators in relation to Talking Therapies for Anxiety and Depression (TTAD).

Table 18-8 Selected Mental Health Indicators for Oxfordshire

Area	TTAD Referral rate per 1,000 (2022 / 23)	% adults in contact with mental health services (2022 / 23)	% children in contact with mental health services (2022 / 23)
Oxfordshire	27.6	3.9	8.7
England	38.8	5.5	8.4

Source: NHS Mental Health Statistics from the England Briefing Paper 22/23 (NHS, 2023).

18.5.19 The data in Table 18-8 shows that the TTAD referral rate per 1,000 individuals is considerably lower in Oxfordshire compared to the national rate. The percentage of adults in contact with mental health services is also considerably lower compared to England overall. However, the percentage of children in contact with mental health services is slightly higher in Oxfordshire.

18.5.20 Table 18-9 indicates the common mental health disorders (CMD) across south-east England and nationally.

Table 18-9 Common Mental Health Disorders, south-east England

Area	% CMD in men (2014)	% CMD in women (2014)	% CMD overall (2014)
South-east	9.7	17.6	13.6
England	13.1	20.8	17.0

Source: Adult Psychiatric Morbidity Survey 2014 (NHS, 2016).

18.5.21 Table 18-9 shows that the percentage of CMD in men is not only significantly lower compared to women, but also lower in the south-east compared to the national average. The percentage of CMD in women is also lower in the south-east. Overall, the south-east region appears to have a lower overall CMD percentage compared to the national average.

18.5.22 Table 18-10 indicates that the suicide rate in VoWH is slightly lower than the regional and national rate per 100,000 individuals. The suicide rate for SO is below the regional and national rate.

Table 18-10 Suicide Rate for Vale of White Horse and South Oxfordshire

Area	Suicide rate (per 100,000) (2020-22)
	All persons
Vale of White Horse	10
South Oxfordshire	7.7
South-east	10.4
England	10.3

Source: ONS Census Data (ONS, 2021).

18.5.23 The Oxfordshire Health and Wellbeing Strategy have incorporated immediate actions to 'explore more advanced research methods for identifying people at greater risk of suicide' (Oxfordshire Health and Wellbeing Board, 2023).

Healthcare facilities

18.5.24 Primary care facilities are present across the 5km study area as set out in Table 18-11.

Table 18-11 Healthcare Facilities within 5km of the EIA Scoping Boundary

Type of Healthcare Facility	Number within 5km of the EIA Scoping Boundary
Professional Medical Service	5
Care / Nursing Home	23
Health Care Services	4
Hospital	2
Dentist	17
General Practice Surgery / Clinic	11
Health Centre	3
Pharmacy	11
Hospital / Hospice	13
Total Healthcare Facilities within 5km	**89**

Source: AddressBase Plus (Ordnance Survey, 2024).

18.5.25 The most prevalent healthcare facility is care/nursing homes and least prevalent is hospitals. The two hospitals are Abingdon Community Hospital and Wantage Community Hospital.

Further desk study and survey

18.5.26 The baseline will be developed in more detail to focus on the health determinants and population groups likely to be significantly affected by the SESRO Project, as well as the health outcomes associated with the types of impact outlined in this EIA Scoping Report. The baseline Human Health study area will be defined by the maximum extent of the study area used across relevant disciplines. This will be reviewed when more design information is available to ensure the maximum extent across the relevant disciplines is applied to the Human Health baseline study area.

- **Surveys:** It is not proposed to undertake any specific technical surveys for the Human Health assessment; walkover surveys of key areas will be undertaken, where relevant, to better understand the local context, such as presence of antisocial behaviour, access to open space and likely routes to health facilities or schools. The Human Health assessment will draw on relevant findings from other environmental surveys identified elsewhere in this EIA Scoping Report to inform the understanding of baseline environmental, community and socio-economic conditions. For example, surveys undertaken for the Traffic and Movement assessment (Chapter 11) regarding public rights of way (PRoWs) will provide information on provision and access to active travel and relate to the Human Health benefits derived from active travel and green/blue space
- **Desktop Study:** The Human Health assessment will be informed largely by desktop study. Health profiles of each community within the study areas will be developed based on desktop study of public health data held by OHID, the ONS and by the relevant local authorities
- **Literature Review:** A literature review will be undertaken to explore the links between Human Health and green/blue space; more specifically reservoirs, where feasible
- **Local Policies and Health Strategies:** Further analysis of national and local policy and health strategies will be undertaken. Strategies to be reviewed include; Oxfordshire Health and Wellbeing Strategy (Oxfordshire Health and Wellbeing Board, 2023), Vale of White Horse Active Communities Strategy (White Horse District Council, 2022) and the Get Oxfordshire Active Movement (Move Together, n.d.)
- **Determinants of health:** Baseline data on the environmental, social and economic determinants of health will be collected by other aspects. This will provide the Human Health assessment with relevant information

including existing biophysical health determinants, community assets relevant to health and local labour market conditions

- **Future Baseline:** When determining the baseline for the Human Health assessment, potential changes, with regard to the future baseline scenario, will be considered alongside changes in future baselines of other aspect chapters and will also include factors such as:
  - Population growth
  - Age demographics
  - Death rates
  - Obesity Rates
  - Provision of healthcare facilities
  - Expertise/availability of specialist healthcare services

18.6 Sensitive Receptors and Potential Environmental Effects

Potential environmental effects

18.6.1 Pre-application activities and consenting, construction, and operation of the Project create potential health impacts through activities having direct/indirect impact pathways on health determinants. For example, construction activities generate dust, this impacts on amenity and creates a potential health impact in terms of major chronic diseases including cardiovascular disease.

18.6.2 Appendix M shows the Human Health determinants informed by (Pyper, Cave, Purdy, & McAvoy, 2021) that have been scoped in or out of the full assessment, alongside relevance to the SESRO Project. The key Human Health determinants detailed in Appendix M are listed below:

- Healthy Lifestyles
- Safe and Cohesive Communities; Housing, Built Environment, Transport, Community Safety, Community Identity
- Socioeconomic Conditions; Education, Socioeconomic Status
- Environmental Conditions; Climate Change, Air Quality, Water, Soil, Noise and Radiation
- Health and Social Care Services
- Wider Societal Benefits

Potential effects during design and pre-application activities

18.6.3 There is opportunity during the design process to consider community safety and security, climate change resilience, accessibility and inclusive design. Effective design has the potential to result in positive health impacts, such as creating environments that support more walking and cycling, social interaction and access to green space.

18.6.4 The approach to consultation and engagement with local communities throughout the pre-application and construction stages of the SESRO Project has the potential to mitigate potentially adverse effects on mental wellbeing by providing people with clear, accurate information and opportunities to have their say on the proposals. On the other hand, consultation and engagement can derive disbenefits for local individuals through mental stress from lack of understanding and fear of development, concern that their views are not being considered and concerns over how the project will impact their lifestyles.

Potential effects during construction

18.6.5 During construction there is potential for noise, dust, pollution, impacts on views and general disruption to traffic and pedestrian routes that could affect local amenity and lead to public concern, as well as direct impacts on individuals and population health, such as mental health.

Potential effects during operation

18.6.6 During operation there is potential for beneficial Human Health outcomes as a result of increased access to green and blue space, recreational and educational facilities. For example, there may be improved infrastructure to support physical activity, social interactions and placemaking. However, there is also potential for adverse health effects, for example disruptions to routes which may impact access to healthcare services.

18.7 Assessment Methodology

Introduction

18.7.1 The Human Health assessment will be fully integrated into the ES, rather than provided as a standalone Health Impact Assessment (HIA). The overall approach to the Human Health assessment will follow the key steps set out in Figure 18.1.

18.7.2 For the assessment methodology, potential long-term impacts on people from pre-application activities and consenting, such as consultation and engagement, will be incorporated into the construction stage due to the interrelation between such impacts and the construction methodology.

18.7.3 The key guidance and standards denoted within Table 18-1 are relevant to Human Health and will be considered within the assessment process.

18.7.4 Human Health based standards for environmental determinants such as air pollution, land contamination and noise will also be considered in light of judgements of significance to Human Health.

Human health evidence and literature review

18.7.5 The assessment will be supported by a literature review of evidence for links between large infrastructure projects, specifically water-based infrastructure projects, similar in nature to SESRO, and Human Health. The literature review will use evidence compiled by public health stakeholders, such as Spatial Planning for Health – an evidence resource for planning and designing healthier places (Public Health England, 2017). The literature review will seek out peer reviewed literature and systematic reviews where available. Systematic reviews provide a summary of all the literature available on a particular topic which meet pre-defined eligibility criteria, which will generally be based on date, geography and integrity of the source. The criteria will also be defined based on robustness of the data and the strength of linkage between Human Health and reservoirs.

18.7.6 The literature review will not be exhaustive but will aim to present the current scientific consensus on links between health determinants and health outcomes in relation to developments similar to SESRO.

Qualitative assessment

18.7.7 It is unlikely that there will be a reliable means of quantifying the health impacts from the data available and size of population likely to be exposed to impacts. Further information regarding this limitation is set out in paragraph 18.7.26. Therefore, the assessment will comprise a qualitative description of the health effects associated with changes in determinants of health caused by the SESRO Project, guided by the assessment criteria set out in the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b) and supported by expert interpretation of evidence from the literature review.

Other environmental aspects

18.7.8 Where relevant, the other aspects scoped into the EIA Scoping Report will be used to inform the Human Health assessment. The Human Health assessment will take the results of these assessments and present the evidence in terms of likely health outcomes at population level and the distribution of impacts within the population, to consider potential issues of health inequalities.

18.7.9 The Communities assessment (see Chapter 17) will inform the understanding of likely significant effects on employment and various community assets, including schools and health facilities. Again, the Human Health assessment will take the results from these assessments and set out the likely effects in terms of population health outcomes.

Figure 18.1 Human health assessment methodology

Characterise population

Identify population potentially exposed to impacts of Proposed Scheme	Develop a health profile of the population to take account of health and socio-economic characteristics	Identity vulnerable groups within the population which may have increased susceptibility to certain health impacts

Identify baseline health determinants

Obtain data on quality of biophysical, social and economic environmental conditions	Identify assets important to community health and wellbeing

Identify and assess potential impacts on determinants

Identify how the Proposed Scheme could impact on baseline health determinants	Estimate the scale (magnitude) of impact from the Proposed Scheme and the characteristics of the impact (i.e. whether it is permanent or temporary, widespread or localised etc.)

Identify potential health effects

Identify associated health outcomes, based on literature review of health research	Estimate what proportion of the community is likely to be affected	Consider potential differences in outcomes between vulnerable groups and general population	Consider whether health inequalities may be widened or narrowed by impacts

Identify mitigation and enhancement measures

Identify measures which could reduce negative health impacts and/or improve health outcomes and/or reduce health inequalities

Conclude assessment

Describe likely residual health outcomes associated with impacts of the Proposed Scheme	Conclude as to whether the outcomes, on the whole, would be beneficial or adverse and the likely significance level	Conclude as to whether health inequalities are expected to be widened or narrowed by the impacts

Impact interactions

18.7.10 The source-pathway-receptor model discussed in Pyper 2022a and health determinants presented in Appendix M touch on some of the potential pathways between the SESRO Project and Human Health. Considering a source-pathway-receptor relationship, there are several broad sources of potential health impacts from the SESRO Project that could relate to multiple health determinants. For example, an impact in relation to improved access to green and blue space can be associated with Human Health determinants/aspects such as: physical and mental wellbeing, placemaking and social interactions and education.

Characterising impacts and effects

18.7.11 The impacts across construction and operation will be assessed at a local level, with the lowest feasible spatial area used. Determinants of Human Health identified as relevant to both construction and operation are set out below, with more detail regarding justifications for scoping in or out detailed in Appendix M. The health determinants are split into the following sections:

- Healthy Lifestyles
- Safe and Cohesive Communities - Housing, Built Environment, Transport, Community Safety, Community Identity
- Socio-economic Conditions - Education, Socio-economic status
- Environmental Conditions - Climate Change, Air Quality, Water, Soil, Noise, Radiation
- Health and Social Care Services
- Wider Societal Benefits - Infrastructure (in relation to Energy, Transport, Waste Management, Water, Communication and IT), Economic, Climate Change, and Natural Environment

18.7.12 The health determinants scoping approach provided in Appendix M results in impacts of certain aspects, such as Climate Change, being considered from multiple perspectives; local environmental conditions and wider societal benefits. Given these perspectives could observe different impacts resulting from climate change, this may be reflected in differing scoping statuses of the health determinants.

18.7.13 The following determinants of Human Health identified as relevant to construction are scoped in:

- Active Travel and Physical Activity
- Open Space, Leisure and Play (including access to green space)
- Residential segregation and the outdoor environment as well as the loss of existing housing and land

- Transport Modes, Accessibility and Connectivity including severance, public transport and emergency response
- Access, quality and/or capacity of key amenities; community services, shops, retail food resources, financial, commercial services, education facilities, (including consideration of adult skills development and employment) and healthcare and social services (including preparedness for emergency scenarios)
- Community safety with regard to spatial planning, injury risk, waste management, risk of major accidents, crime, flood risks
- Community identity, visual landscape and townscape, in-migration and lighting
- Socioeconomic status with regard to procurement and investment, health inequalities i.e. poverty and social health gradient
- In terms of environmental conditions, these include air quality including dust and particulates, mobilisation of historic pollution, food resources in relation to agricultural land quality)and safety, noise and vibration (plant, processes and vehicle disturbance) and electromagnetic field perception of risk
- In terms of wider societal benefits; energy, transport, waste management and water infrastructure, economics and the natural environment

18.7.14 The following determinants of Human Health relevant to operation are scoped in:

- Transport Modes, Access and Connections including severance, public transport and emergency response
- Active Travel and Physical Activity as well as health promotion
- Open Space, Leisure and Play (including access to green space) as well as sensory/ mobility considerations to enhance inclusivity and the indoor environment
- Community cohesion, social isolation and residential segregation
- Access, quality and/or capacity of key amenities: community services, shops, retail food resources, financial, commercial services and education facilities (including consideration of adult skills development and employment)
- Community identity, visual landscape and townscape, in-migration and lighting within as well as social networks and culture
- Socioeconomic status with regard to procurement and investment, health inequalities i.e. poverty and social health gradient
- In terms of environmental conditions: Climate change via extreme weather, heat stress and flood risk and exposure to food, water and vector borne infection or toxins, drinking water and bathing water (capacity, access and/ or quality), noise (plant, processes and vehicular disturbance) and electromagnetic field perception of risk

- In terms of wider societal benefits: energy, transport, and water infrastructure, economics and the natural environment

18.7.15 The following determinants of Human Health have been scoped out of the EIA Scoping Report, as significant effects on each determinant are not expected. This is due to expected mitigation measures, irrelevance to the SESRO Project, the expected scale of impact not being and/or the relevant discipline scoping chapter having scoped the issue out:

- Substance misuse, problem gambling, communicable illness and diet
- Housing determinants with regard to dwelling mix, social housing, affordability and adaptations
- Economic/employment determinants with regard to safeguarding and modern slavery, recruitment and retention of staff, population out-migration, working conditions, displacement, labour productivity and economic loss
- Social determinants with regard to transitional arrangements for education and family structures
- Wider health determinants with regard to food production, malnutrition and exacerbation of chronic conditions
- Wider societal benefits from communication and IT infrastructure and climate change. These impacts are not expected to be significant
- Air quality with regard to plant, process and vehicle emissions and odour and radiation in regard to risk of new ground pollution, actual risk of electromagnetic fields and ionising radiation

Determining the sensitivity of receptors

18.7.16 The determination of sensitivity for the population groups likely to be affected will be guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b). Based on this guidance, the judgement of sensitivity involves the consideration of several factors such as deprivation levels, health profile, inequalities, levels of dependency and community outlook (for example, if there is widespread public concern); as shown in Table 18-12.

Table 18-12 Health Sensitivity Criteria

Category / Level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories). The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):
High	***High levels*** of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt
Medium	***Moderate levels*** of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt
Low	***Low levels*** of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt
Very low	***Very low*** levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt

Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b).

18.7.17 Further baseline assessment will be undertaken to establish the likely presence of vulnerable groups within the study area. Engagement will be undertaken with the Directors of Public Health and representatives from the integrated care boards in the relevant authorities for the SESRO Project, to obtain further evidence and to aid with the understanding of key health issues in the local area. The distribution of health impacts within the population will be considered as part of the health assessment to allow a judgement on whether health inequalities are expected to widen or narrow due to the SESRO Project.

Determining magnitude of impact

18.7.18 The determination of magnitude will be guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b); as shown in Table 18-13. Determining magnitude requires a judgement on the likely level of exposure, duration and frequency of an impact on a health determinant. It also considers the severity of the health outcome, for example, whether associated outcomes relate to a change in mortality, morbidity, or quality of life. Reversibility of the associated health outcomes is also considered.

Table 18-13 Health Magnitude Methodology Criteria

Category / Level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories) The narrative explains that the population or sub-population's magnitude of change due to the project is driven by (select as appropriate):
High	***High exposure*** or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/ injury outcomes; majority of population affected; permanent change; substantial service quality implications
Medium	***Low exposure or medium scale***; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications
Low	***Very low exposure or small scale***; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	***Negligible exposure or scale;*** very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication

Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b).

Determining significance

18.7.19 The determination of significance in the health assessment will be guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment, using the significance matrix in Table 18-14 alongside guidance relating to judgement of significance in relation to public health (Pyper, 2022b). The IEMA Guidance states the following:

'The matrix is only a tool to assist with judgement, there are not clear cut-off points between categories and terminologies, for example the point at which an impact changes magnitude category is a professional judgement and should be supported by evidence and justification.'

Table 18-14 Significance of effects

		Sensitivity			
		High	Medium	Low	Very Low
Magnitude	High	Major	Major / Moderate	Moderate / Minor	Minor / Negligible
	Medium	Major / Moderate	Moderate	Minor	Minor / Negligible
	Low	Moderate / Minor	Minor	Minor	Negligible
	Negligible	Minor / Negligible	Minor / Negligible	Negligible	Negligible
Note *Note, for matrix results which have dual classification, i.e. Moderate/ Minor, expert judgement and support from relevant health representatives will be sought to ensure the correct overarching category is decided.					

Source: Based on (Pyper, 2022b).

18.7.20 The judgement requires the consideration of a range of information such as:

- Scientific literature
- Baseline conditions for the population
- Health priorities in the study area
- Consultation on the SESRO Project for the option(s) under consideration
- Regulatory standards in England and health policy context in the study area and England

18.7.21 Effects assessed as Moderate or Major significance are considered significant. Support from the Directors of Public Health and Integrated Care Boards will be sought in interpreting significance, taking account of the local health policy and priorities of the area.

Assessment of residual effects

18.7.22 As the SESRO Project progresses and the EIA is undertaken, mitigation measures regarding Human Health will be identified and residual effects determined taking that mitigation into account.

Assessment of cumulative effects

18.7.23 Inter-development cumulative effects will be addressed within Chapter 20 - Cumulative Effects.

18.7.24 Intra-development cumulative effects may arise if a combination of two or more of the following issues result in impacts on health: Water Environment, Landscape and Visual Effects, Air Quality, Materials and Waste, Carbon and Climate Change, Noise and Vibration, Major Accidents and Disasters, Traffic and Movement, Communities and Historic Environment.

18.7.25 Human Health assessment inherently considers the intra-development cumulative effects of other aspects on Human Health as a result of in-combination effects. Human Health impacts are unlikely to result in intra-development effects on other assessment aspects.

Assumptions, limitations, and uncertainties

18.7.26 The Human Health assessment will consider health effects and data relating to population health. The aggregated data and statistics used to support the assessment cannot be used to make inferences about the health of specific individuals within the communities assessed, as individual genetics, medical histories, sensitivities, exposures and other circumstances can vary considerably from the average.

18.7.27 There are difficulties in estimating the level of exposure of the population to impacts on certain health determinants. For example, it is difficult to ascertain what proportion of their lives each individual within a given population spends in a place that is exposed to the impact and also whether individuals have been exposed to other factors associated with a given health outcome.

18.7.28 Health data is not always available for the desired geographical scale or time periods of most relevance to the EIA process. Geographic or temporal limitations in the data obtained will be set out in the full assessment where relevant.

18.7.29 Limitations encountered and uncertainty in the assessment results will be set out in the Environmental Statement.

18.8 Mitigation and Environmental Net Gain

18.8.1 Where likely significant health effects are identified, mitigation measures will be proposed, where practicable, to reduce adverse effects. Enhancement measures will also be identified to increase opportunities for positive Human Health outcomes. Mitigation measures will be embedded into the preliminary project design or secured through Development Consent Order requirements. The health assessment will take account of all committed mitigation and enhancement measures, including measures resulting from other aspect assessments. Note, as stated in paragraph 18.7.2, potential long-term impacts on people from pre-application activities and consenting, such as consultation and engagement, will be incorporated into the construction stage.

Construction phase mitigation

Primary

18.8.2 It is anticipated that primary mitigation measures in relation to Human Health will be applied across all relevant disciplines. For example, the Traffic and Movement assessment will consider mitigation measures in respect of potential negative impacts on road traffic risks as a result of construction routes/road works.

Secondary

18.8.3 The recruitment of a community liaison officer, along with other mitigation measures set out in the Community assessment (see Chapter 17) to mitigate impacts on local communities will help reduce impacts on mental health and wellbeing, such as those mental health impacts associated with timely information and uncertainties surrounding the SESRO Project. Where construction activities may limit opportunities to access physical activity, active travel routes would be diverted to ensure alternative active travel routes and physical activity outlets are available.

18.8.4 Construction activities can have impacts on social participation, social exclusion and community severance. Mitigation measures with regard to severance will be determined by the Traffic and Movement assessment (Chapter 11).

Tertiary

18.8.5 Standard environmental controls and management practices during construction would reduce the likelihood of issues such as dust or pollution incidents. Refer to the relevant aspect chapters for mitigation for key environmental issues of air quality, land contamination, noise and water quality.

Operational phase mitigation

Primary

18.8.6 It is anticipated that primary mitigation measures in relation to Human Health during operation will be applied across all relevant disciplines. For example, the Traffic and Movement assessment (Chapter 11) will consider mitigation measures in respect of potential negative impacts on local amenities arising from changes in road networks.

Secondary

18.8.7 Additional measures could be in the form of community engagement such as ensuring educational and recreational opportunities are disseminated across the community in an accessible, multi-format approach; virtually, leaflets, braille, multi-languages. How such additional measures, to ensure potential Human Health benefits, are equally distributed across the community from the SESRO Project will be explored further in the full assessment.

18.8.8 Specific mitigation, management and monitoring recommendations will be developed and reported on in the full assessment.

Tertiary

18.8.9 Human Health tertiary mitigation measures will be driven by measures undertaken across other relevant disciplines, i.e. Communities, Traffic and Movement, Noise and Vibration.

Potential for environmental net gain

18.8.10 Environmental net gain with regard to Human Health is expected to derive from the increased provision of green and blue space, recreational and educational facilities and active travel opportunities inherent to the SESRO Project. This is expected to result in:

- Improved mental wellbeing; social interactions, access to green and blue space, placemaking opportunities
- Improved physical wellbeing; active travel, physical activity
- Increased environmental awareness and access to nature

18.8.11 Other health benefits may be derived from other topics such as increased provision and security of water resources.

18.8.12 Potential environmental net gain directly associated with Human Health will be assessed in the EIA, through utilising literature and datasets alongside modelling and data from other assessment chapters to understand the Human Health benefits that can be derived.

18.9 Summary of Scope for the EIA

EIA scope for the preferred option

18.9.1 While likely significant health effects relating to wider determinants of health have been identified in the scoping exercise, the impacts on many of these health determinants will be addressed within other EIA aspect assessments. The scope of the Human Health assessment will, therefore, draw on the findings of several other aspect assessments, but present the findings in terms of how the impacts are likely to affect population health outcomes. For certain health determinants, design information is not yet available, so these aspects have been scoped in to ensure potential health impacts are captured. The scope of the health assessment is summarised in Table 18-15. Note, the requirement for any health assessment specific surveys will be determined through specific engagement on assessment methodologies with public health consultees. The assessment will draw on the findings of other aspect assessments within the EIA, some of which will involve survey work.

Table 18-15 Summary of health determinant matters scoped in and out of further assessment

Matter	Scoped in / out	Rationale
Construction phase		
Healthy Lifestyles	IN	The SESRO Project may have temporary disbenefits on the provision and access to green and blue spaces during the construction stage
Safe and cohesive communities: Housing	IN	The SESRO Project will require temporary and permanent closure and diversion of travel networks which may impact residential segregation. There is limited design information available, and so this indicator is scoped in for construction and operation to ensure a robust assessment
Safe and cohesive communities: Built environment	IN	The results of relevant environmental aspect assessments have informed this scoping. For all built environment health determinants, construction impacts are scoped in
Safe and cohesive communities: Transport	IN	The results of Chapter 11 – Traffic and Movement have informed this scoping. Refer to Chapter 11 – Traffic and Movement for further context

Matter	Scoped in / out	Rationale
Safe and cohesive communities: Community safety	IN	Community safety has been scoped in with regard to security, emergency response and crime for construction. However, safeguarding and modern slavery has been scoped out, informed by Thames Water's honest and ethical behavioural policy
Safe and cohesive communities: Community identity	IN	In terms of safe and cohesive communities: community identity, it is expected that the SESRO Project will have significant impacts on population in-migration, visual landscape and lighting and social networks. However, no significant effects are anticipated in regards to population out-migration, as such this is scoped out for construction
Socio-economic conditions: Education	IN	Socio-economic conditions: education is scoped in due to the potential impact of the SESRO Project on access to education receptors. Further information regarding accessibility will be drawn from the Traffic and Movement and Community assessments
Socio-economic conditions: Socio-economic status	IN	Socio-economic conditions: Socio-economic status is scoped in for both construction and operation as informed by Chapter 17 – Communities. Working conditions and family structure are scoped out for construction
Environmental conditions: Climate change	Out	Chapter 16 – Carbon and Climate Change considers potential impacts of extreme weather regarding health and safety risk to construction workers and visitors. This has been scoped out of the construction stage as this can be managed via standard construction practices
Environmental conditions: Air quality	IN	Environmental Conditions: Air Quality is scoped into the full assessment by dust emissions during construction. Refer to Chapter 13 – Air Quality for context
Environmental conditions: Water	IN	The results of Chapter 6 – Water Environment have informed this scoping, drinking water quality is scoped out for both construction and operation in the Human Health chapter as it is not commented on within the Water

Matter	Scoped in / out	Rationale
		Environment assessment. Bathing water quality is scoped in for both construction and operation. Refer to Chapter 6 – Water Environment for further context
Environmental conditions: Soil	IN	Environmental Conditions: Soil is scoped into the full assessment in regard to risk of new ground pollution, mobilisation of historic pollution and food resources and safety for construction only. Refer to Chapter 6 – Water Environment and Chapter 14 – Geology and Soils for further context
Environmental conditions: Noise	IN	Environmental Conditions: Noise and vibration are scoped into the full assessment. Refer to Chapter 12 – Noise and Vibration for further context
Environmental conditions: Radiation	IN	Electro-magnetic fields, understanding of risk (risk perception) is scoped into the assessment due to the scale of diversions and new services where perception of risk with regard to Human Health is of concern. Electro-magnetic fields actual risk, ionising actual risk and ionising risk perception are scoped out for construction
Health and social care services	IN	The impact of the SESRO Project on health and social care services is scoped in for the construction stage
Wider societal benefits	IN	Wider societal benefits of the SESRO Project on Human Health are scoped in and are to be informed by the relevant environmental aspect assessments and the design team
Operation		
Healthy Lifestyles	IN	The SESRO Project is expected to have significant effects on healthy lifestyles through the following: increased provision of, access, accessibility and safety of blue and green space. This will result in direct impacts on the provision of, and access to, recreational facilities and opportunities. This will also result in direct impacts on levels of physical activity and the potential increased use of active travel

Matter	Scoped in / out	Rationale
Safe and cohesive communities: Housing	IN	The SESRO Project is expected to have significant impacts on indicators that contribute to safe and cohesive communities: housing. The SESRO Project will increase community cohesion whilst reducing social isolation through increase social participation opportunities across the local area, with outlets including educational hubs and nature trails. Due to the nature of the SESRO Project, it may have a significant impact on the outdoor environment in relation to safety, flood risk, property and open space provision. Other relevant aspect assessments will be used to inform the full assessment
Safe and cohesive communities: Built environment	IN	The results of relevant environmental aspect assessments have informed this scoping. For all built environment health determinants, operational impacts are scoped in
Safe and cohesive communities: Transport	IN	The results of Chapter 11 – Traffic and Movement have informed this scoping. Refer to Chapter 11 – Traffic and Movement for further context
Safe and cohesive communities: Community safety	IN	Community safety has been scoped in with regard to security, emergency response and crime for operation. However, safeguarding and modern slavery has been scoped out, informed by Thames Water's honest and ethical behavioural policy
Safe and cohesive communities: Community identity	IN	In terms of safe and cohesive communities: community identity, it is expected that the SESRO Project will have significant impacts on visual landscape and lighting and social networks. However, no significant effects are anticipated with regards to population out-migration and this is scoped out for operation
Socio-economic conditions: Education	IN	Socio-economic conditions: education is scoped in due to the anticipated impact of the SESRO Project on new public education facility provisions. Further information regarding accessibility will be drawn from the

Matter	Scoped in / out	Rationale
		Traffic and Movement (Chapter 11) and Communities (Chapter 17) assessment.
Socio-economic conditions: Socio-economic status	IN	Socio-economic conditions: Socio-economic status is scoped in for both construction and operation as informed by Chapter 17 – Communities. Procurement and investment, working conditions and family structure are scoped out for operation
Environmental conditions: Climate change	IN	Environmental Conditions: Climate Change is scoped into the full assessment regarding extreme weather and exposure to food, water and vector borne diseases or toxins for the operation stage only. Refer to Chapter 16 – Carbon and Climate Change for context
Environmental conditions: Air quality	Out	Environmental Conditions: Air Quality is scoped into the full assessment by dust emissions during the construction stage only. Refer to Chapter 13 – Air Quality for context
Environmental conditions: Water	IN	The results of Chapter 6 – Water Environment have informed this scoping, drinking water quality is scoped out for operation in the Human Health chapter as it is not commented on within the Water Environment assessment. Bathing water quality is scoped in for operation. Refer to Chapter 6 – Water Environment for further context. Drinking water quantity or access is scoped in for operation due to it being one of the strategic aims of the SESRO Project
Environmental conditions: Soil	IN	Environmental Conditions: Land contamination linkages remaining at operation stage is possible. Refer to Chapter 14 – Geology and Soils for further context
Environmental conditions: Noise	IN	Environmental Conditions: Noise and vibration are scoped into the full assessment. Refer to Chapter 12 – Noise and Vibration for further context
Environmental conditions: Radiation	IN	Electro-magnetic fields, understanding of risk (risk perception) is scoped into the assessment due to the scale of diversions and new services where perception of risk with

Matter	Scoped in / out	Rationale
		regard to Human Health is of concern. Electro-magnetic fields actual risk, ionising actual risk and ionising risk perception are scoped out for operation
Health and social care services	IN	The impact of the SESRO Project on health and social care services is scoped out for the operation stage
Wider societal benefits	IN	Wider societal benefits of the SESRO Project on Human Health are scoped in and are to be informed by the relevant environmental aspect assessments and the design team

Potential changes to scope and methods associated with other options

18.9.2 The Human Health assessment has been scoped in line with the preferred option on Human Health. Different options would not alter the methodology but might slightly alter the geographic scope of the assessment.

18.10 Next Steps

18.10.1 Key milestones are listed below:

- Further stakeholder consultation and engagement as denoted in paragraph 18.3.2
- Construct an evidence base and carry out a literature review
- Collate further and more granular baseline data to construct Human Health profiles for key communities
- Derive relevant Human Health outputs from relevant aspect assessments and surveys
- Using inputs from relevant aspects alongside health data, assess the impacts on Human Health for the key receptors and health facilities across the study area
- For potential disbenefits identified, establish a health strategy in order to mitigate, manage, monitor and evaluate Human Health disbenefits as well as seeking to optimise the Human Health benefits
- To increase Human Health benefits, the Master Plan and preliminary design, relating to Human Health design objectives, will be reviewed continuously alongside EIA outputs informing the design on an iterative basis

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19 Major Accidents and Disasters

19.1 Introduction

19.1.1 This chapter considers whether potential significant adverse effects could occur associated with the SESRO project resulting in, or from, a major accident or disaster. As such, both the vulnerability of the Project to a major accident or disaster, and the potential for the Project to cause a major accident or disaster, are discussed and their inclusion within the Environmental Impact Assessment (EIA) determined.

19.1.2 Major accidents and disasters represent significant events that can have immediate or delayed severe impacts on human health, welfare, and the environment that would necessitate extensive resources beyond those of the SESRO project to manage.

19.1.3 The Institute of Environmental Assessment and Management (IEMA) have prepared a Primer to guide the assessment of this aspect in EIA - Major Accidents and Disasters in EIA (IEMA, 2020) (hereafter referred to as 'the Primer'). Page 3 of the Primer provides the following definitions:

'A major accident is an event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives (i.e. contractors) to manage. Major accidents can be caused by disasters resulting from both man-made and natural hazards'.

'A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident'.

19.1.4 This assessment considers the occurrence of extreme and highly unlikely incidences. As such, whilst this chapter draws on baseline information relevant to other environmental aspect chapters in this EIA Scoping Report, it considers scenarios that would not reasonably be covered by the other environmental aspect assessments. This chapter should be read in conjunction with the following aspect chapters:

- Chapter 2 – Project Description which describes the Project
- Chapter 6 – Water Environment for risks such as the development of algal blooms, inland flooding and groundwater levels
- Chapter 11 – Traffic and Movement for risks such as accidents involving pedestrians, traffic accidents and rail accidents

- Chapter 14 – Geology and Soils for risks such as mobilisation of contamination
- Chapter 16 – Carbon and Climate Change for risks associated with climate change
- Chapter 18 – Human Health for health risks

19.2 Legislation, Policy, Standards and Guidance Context

19.2.1 The inclusion of major accidents and disasters in the EIA process for the nationally significant infrastructure planning regime is required by law under Infrastructure Planning (EIA) Regulations 2017 (the EIA Regulations 2017).

19.2.2 Schedule 4, Paragraph 8 of the EIA Regulations 2017 requires:

'A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.' (UK Government, 2017)

19.2.3 The underlying objective is to ensure that appropriate precautionary actions are taken for developments which: '…*because of their vulnerability to major accidents and/or natural disasters (such as flooding, sea level rise, or earthquakes), are likely to have significant adverse effects on the environment*' (Paragraph 15, European Union Directive 2014/52/EU).

19.2.4 The National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023) outlines key safety principles for water infrastructure projects. It mandates consultation with relevant bodies such as local authorities and the Health and Safety Executive (HSE) on safety matters.

19.2.5 Reservoirs must comply with the Reservoirs Act 1975, requiring the appointment of qualified civil engineers and notification to the Environment Agency. Structural safety should not be compromised for other design considerations. The Reservoirs Act 1975 stipulates the risk assessment process and safeguards to be followed in the design process to ensure dams and reservoirs are built safely.

19.2.6 Water companies are empowered by the Water Industry Act 1991 to implement by-laws addressing operational safety, access, and security. These include the Security & Emergency Measures Direction (SEMD) a statutory document produced under the provisions of Section 208 of the Water Industry Act 1991. It places upon Water Companies the requirement to *'keep under review and revise such plans as it considers necessary to ensure the provisions of essential water supply … at all times'*.

19.2.7 In addition to the policy set out in paragraphs 19.2.1 to 19.2.6, the SESRO Project will also have regard to the relevant key legislation, policy and guidance for this aspect as listed in Table 19-1.

19.2.8 A detailed summary of the legislative, policy and guidance framework for this aspect, and how the SESRO Project accords with it will be provided in the Preliminary Environmental Information (PEI) Report and/or Environmental Statement (ES).

Table 19-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
Water Resources Act 1991
Control of Major Accidents Hazard Regulations 2015
Construction (Design and Management) Regulations 2015
Health and Safety at Work Act 1974
The Management of Health and Safety at Work Regulations 1999
The Civil Contingencies Act 2004
National policy
National Planning Practice Guidance: Water supply, wastewater and water quality (UK Government, 2019)
National Planning Policy Framework (MHCLG, 2023)
Local policy
South Oxfordshire Local Plan 2011-2035 (South Oxfordshire District Council 2020)
Local Plan 2031 (Vale of White Horse District Council 2019)
Standards and guidance
Institute of Environmental Management and Assessment Major Accidents and Disasters in EIA: A Primer (IEMA, 2020)

19.3 Engagement

19.3.1 Limited engagement has been undertaken in relation to this aspect so far. A meeting was held with representatives from National Highways, the Local Highway Authority and Network Rail on 12 June 2024 during which it was agreed that the risks of fog and ice should be scoped into the Major Accidents and Disasters assessment, given that the risks could potentially result traffic accidents which could be considered as a major accident or disaster. Various engagement has taken place for the other environmental aspects and details of this engagement are provided with Chapters 6 to 18 and 20. Correspondence has also been exchanged with the Environment Agency (EA) regarding the approach to embankment breach analysis, but no response has been received so far.

19.4 Existing Environment and Baseline Conditions

19.4.1 The baseline conditions have been established through a review of:

- Information on the historical and current land use of the EIA Scoping Boundary (Google, 2024)
- Thames Valley Community Risk Register (Thames Valley Local Resilience Forum, 2022)
- International Federation of Red Cross website (IFoRC, 2024)
- National Risk Register (NRR) (United Kingdom Government, 2023)
- National Risk Register of Civil Emergencies (Cabinet Office, 2017)
- HSE's COMAH 2015 Public Information Search engine (HSE, 2015)
- Information contained within other matter chapters as mentioned in paragraph 19.1.4

19.4.2 The EIA Scoping Boundary encompasses a total area of approximately 2,400ha comprising flat agricultural land which is bisected by hedgerows and ditches with the occasional small woodland copse. The EIA Scoping Boundary is also interspersed with isolated houses and farmsteads with a small industrial area in the south associated with Steventon Depot.

19.4.3 The Childrey Brook and River Ock run immediately north of the EIA Scoping Boundary, whilst the A34 dual carriageway is immediately to the east, the Great Western Main Line railway is immediately to the south and the A338 immediately to the west. The nearest centres of population are Marcham to the north, Drayton to the east, Steventon to the south-east and East Hanney to the south-west.

19.4.4 Further information on the SESRO Project and context is provided in Section 1.5 of Chapter 1 – Introduction, whilst further detailed information regarding baseline and specific receptors is provided in the aspect chapters (Chapters 6 to 18).

19.4.5 Future baseline is not anticipated to differ materially from the current baseline with regards to the vulnerability of the SESRO Project to the risk of major accidents and disasters once the reservoir is in operation other than in relation to climate change, however, this will be assessed in detail within the PEIR and/or ES once the design has been further developed.

19.5 Study Areas

19.5.1 The study area for assessment of major accidents and disasters is not defined in any guidance.

19.5.2 Given that the SESRO Project comprises a 2,400ha reservoir development, and that different accidents and disasters can happen at varying scales, a single study area cannot be defined. Thus, a number of study areas have been used to screen for potential receptors based on study areas associated with other environmental aspects or using professional judgement in relation to study areas for major accidents and disasters that are not covered by other assessments. For example, major accidents and disasters relating to flood risk would apply downstream of SESRO, the risk of traffic accidents relate to the wider road network potentially affected by traffic generated by the Project and risks associated with failure of infrastructure associated with SESRO could affect the water supply for London and South East.

19.5.3 The study areas that have been considered to identify receptors are as follows:

- For water, see Chapter 6 – Water Environment and Chapter 7 – Aquatic Ecology
- For biodiversity, see Chapter 7 – Aquatic Ecology and Chapter 8 – Terrestrial Ecology
- For infrastructure, see Chapter 11 – Traffic and Movement
- For land contamination, see Chapter 14 – Geology and Soils
- For health care and disease, see Chapter 18 – Human Health
- For residential areas, see Chapter 17 – Communities, Chapter 13 – Air Quality and Chapter 12 – Noise and Vibration
- For historic assets, see Chapter 10 - Historic Environment
- For Climate, see Chapter 16 – Carbon and Climate Change
- Specific industrial sites that are within and closest to the EIA Scoping Boundary were considered and include:
  - Steventon Substation located within EIA Scoping Boundary
  - Harwell Atomic Energy Authority and Harwell Control of Major Accident Hazards (COMAH) facility located over 4km to the south-east and,
  - Atomic Weapons Establishment (AWE) establishment at Aldermaston located approximately 30km to the south-east

- The nearest operational airfields were considered for risks involving aircraft flying over the SESRO Project, these are all located within a 17km radius and comprise:
  - Abingdon Airfield located less than 500m to the north
  - Royal Air Force (RAF) Benson located approximately 12km to the east
  - RAF Brize Norton located approximately 16km to the west and,
  - Oxford Airport located over 17km to the north

19.6 Potential Risks that could Result in a Major Accident and Disaster

19.6.1 An initial hazard and identification assessment using professional judgement in consultation with the design engineers and Thames Water was carried out, to establish the vulnerability of the SESRO Project to major accidents and disasters.

19.6.2 The probability of each hazard occurring and the consequence/effect if one did occur were assessed to determine whether they could be classed as major events.

19.6.3 In accordance with the categories defined in the National Risk Register (HM Government, 2023), the following event categories were considered:

- Human, animal and plant health
- Natural and environmental
- Geological
- Hydrological
- Engineering
- Industrial accidents
- Accidents
- Terrorism/civil unrest/public disorder

19.6.4 Each of the eight event categories defined in paragraph 19.6.3 were considered to define a long-list of potential risks which could occur as a result of, or affect, the SESRO Project. The risks were also assessed as to whether they could ultimately result in a major event. Each event category, and the most likely associated potential risks arising from each event category, are presented on Figure 19.1.

Figure 19.1 Potential risks arising as a result of / or that may affect the SESRO Project

19.7 Assessment Methodology

Charactering significant effects

19.7.1 In accordance with the IEMA Primer, a significant environmental effect associated with Major Accidents and Disasters has the potential to cause *'loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration'* and would require a response beyond existing facilities or resources available within the Project (IEMA, 2020, p. 6).

Selection of risks requiring assessment (long-list)

19.7.2 A review of the 'long list' of risks, as set out in Figure 19.1, was undertaken to determine if any of the events presented a significant risk.

19.7.3 The review considered the SESRO Project's location and intended use and was undertaken using the methodology set out in the following guidance:

- IEMA Major Accidents and Disasters in EIA: A Primer (IEMA, 2020)
- International Federation of Red Cross website (IFoRC, 2024)
- National Risk Register (NRR) (United Kingdom Government, 2023)
- Thames Valley Community Risk Register (Thames Valley Local Resilience Forum, 2022)

19.7.4 Professional judgement has been applied when considering the environmental constraints in the area and the nature of the SESRO Project.

Selection of risks requiring assessment (short-list)

19.7.5 The long-list was refined using the following questions (based on IEMA, 2023): Would each of the events / risks:

- pose a specific risk to the SESRO Project?
- require a level of response outside of the resources of the SESRO Project, for example, from the emergency services?
- Is the SESRO Project a source of hazard that could result in a major accident and/or disaster and is there a pathway to cause a significant effect to a receptor?
- Does the SESRO Project interact with any external hazard (such as a terrorist attack or extreme weather event)? If yes, does the presence of the SESRO Project increase the risk of that hazard occurring at its source?
- If an external man-made or natural hazard occurred, would the presence of the SESRO Project increase the risk of a significant effect occurring?

- Do existing design measures or legal requirements, codes and standards adequately control the potential major accident and/or disaster or will it be adequately covered/assessed by another assessment aspect?

19.7.6 Events/risks which could affect other developments in the area but would not affect the SESRO Project, as well as those already addressed by existing or standard controls, have been scoped out along with low-consequence (regardless of likelihood) events; high-likelihood, high-consequence events that should be designed out in any case and any hazards for which there is no credible source-pathway-receptor linkage.

19.7.7 If mitigation proposed either as part of the SESRO Project design (primary mitigation) or legislation and standards (tertiary mitigation) would apply that would prevent or reduce the risk to a level that is not likely to cause a significant effect, then the events were scoped out. However, where mitigation would not reduce or remove the major/significant risk to a level that is not likely to cause a significant effect, then the event has been scoped into the EIA.

19.7.8 The results from the initial review are presented in Table 19-2.

19.7.9 In summary, the results of the detailed assessment of the following events / risks and associated mitigation measures will be included within the Major Accidents and Disasters ES chapter:

- Animal strike (including bird strike)
- Water supply (various factors)
- Emergency drawdown on the River Thames

19.7.10 Other events / risks that will be considered in the ES outside the Major Accidents and Disasters ES chapter are as follows:

- Healthcare (i.e. potential for algal blooms), inland flooding and groundwater levels (flooding) will be considered in the Water Environment aspect (see Chapter 6 – Water Environment)
- Mobilisation of contamination will be considered in the Geology and Soils aspect (see Chapter 14 – Geology and Soils) and,
- Traffic accidents, rail accidents, accidents involving pedestrians and severe weather events (fog and ice) will be considered in the Traffic and Movement aspect (see Chapter 11 - Traffic and Movement)

Table 19-2 Initial review of risks of major accidents and disasters (Long List)

Accident / disaster risk category and event type	Location risk*	Land use risk**	Is a major accident or disaster likely?	Relevant to construction phase	Relevant to operational phase	Further consideration required?	Rationale
Human, animal and plant health							
Animal strike (including bird strike)	No	Yes	Yes	Yes	Yes	Yes	Animal strike by vehicles is possible during construction and operation of the SESRO Project which could result in a road traffic accident. Bird strike on aircraft is possible during operation as the SESRO Project is located near Brize Norton, Oxford Airfield and Abingdon Airfield and aircraft currently fly over SESRO Project area (including helicopters from RAF Benson. Best practice measures will be put in place to avoid animal strike such as internal speed limits on the road infrastructure. These measures will be specified in the separate Safety Management Plan. SESRO, once operational, is expected to attract waterfowl and while aircraft overflying the SESRO Project will have their own protocols to avoid bird strike, it cannot be completely ruled out and could result in a major accident or disaster. Therefore, this risk has been scoped into the EIA and will be assessed under the Major Accidents and Disasters aspect
Insect infestation/disease	No	Yes	No	Yes	Yes	No	Insect breeding will occur due to the presence of open stagnant water. Disease vectors such as the malaria carrying *anopheles* mosquito or dengue fever carried by Tiger mosquitoes, amongst others, could spread northwards into the UK due to climate change and potentially breed at SESRO Project. However, this event is not considered to be a major accident or disaster specifically related to the SESRO Project as mosquitos would be attracted to all potentially habitable waterbodies over a wide area on a regional or national basis, not just the SESRO reservoir and wetlands, and any health risks would be addressed by public health organisations. Given the wider implications well beyond SESRO Project, this risk has been scoped out of the EIA
Healthcare	No	Yes	Yes	No	Yes	Yes	There is potential for the development of algal blooms (including toxic blue-green algae). The development of algal blooms is a common issue with open water. This could result in health risks to workers and users of the reservoir during operation from contact with contaminated water. The presence of algal blooms within the reservoir could also prevent the release of water into the River Thames affecting water supply (see below). The preliminary design of the SESRO Project includes a mixing system to manage the risk and maintain water quality within the reservoir. Given that potential for algal blooms within the reservoir cannot be completely ruled out, and this risk could result in a major accident or disaster, this risk is scoped into the EIA and assessed under the Water Environment aspect (see Chapter 6 – Water Environment). Chapter 16 - Carbon and Climate Change and Chapter 17)
Water supply affected (various factors)	No	Yes	Yes	No	Yes	Yes	The presence of algal blooms could result in the reservoir becoming non-operational for a time and water would need to be supplied from other sources, resulting in the potential over-abstraction from ecologically sensitive chalk streams. The preliminary design of the SESRO Project includes a mixing system to manage the risk and maintain water quality and the SESRO reservoir will not be the only available water supply source.

Accident / disaster risk category and event type	Location risk*	Land use risk**	Is a major accident or disaster likely?	Relevant to construction phase	Relevant to operational phase	Further consideration required?	Rationale
							The failure of critical infrastructure of SESRO Project(such as the outlet and inlet and the Water Treatment Works (WTW)) would also affect water supply to Southern Water and customers in London and could result in a disaster if the infrastructure was out of action for a long period of time. Cyber attack or poisoning/contamination of the WTW could also result in failure of the water supply. Should the operation of the reservoir be affected for a long period of time this could result in a major disaster, as above. Appropriate measures will be put in place to reduce the probability of risks occurring, but the risk cannot be completely ruled out. Given there is the potential for water supply to be affected which could result in a major disaster, this risk has been scoped into the EIA and will be assessed under the Major Accidents and Disasters aspect
Natural and environmental							
Severe weather events (heatwaves, drought, rain, low temperatures, heavy snow, ice, hail, lightning, high winds, tornado and fog)	Yes	Yes	No	No	Yes	No (heatwaves, drought, rain, low temperatures, heavy snow, hail, lightning, high winds, and tornado) Yes (ice and fog)	Tornados are not common within the UK and, therefore, are not anticipated to occur, and the Project is not at any greater risk to rain, low temperatures, heavy snow, hail than anywhere else in the UK. Severe weather events such as high winds would create waves which could potentially damage the reservoir and associated infrastructure. If there were extended periods (lasting years) of drought or heatwaves this could result in the embankment clay drying out. However, these weather events together with rain, low temperatures, heavy snow, hail would not compromise the integrity of the thick embankments to the level where they could fail or leak Traffic accidents can be influenced by weather including the incidence of fog that can affect visibility, and freezing conditions that affect vehicle traction and stopping distances. The area currently experiences fog and, introducing a reservoir changes the land use, which may alter the incidence of fog in future. The reservoir will not increase the frequency of icy conditions and recent trends show a decline in frost days and cold weather due to climate change Current traffic accident data for Oxfordshire cite poor visibility due to rain, sleet, snow or fog in just 1-2% of accidents, so fog contributes to a small number of accidents across the county. The reservoir is not likely to increase fog on the A34 as it is approximately 900m from any proposed open water, a considerable distance away from any potential local micro-climate impacts from the reservoir. Nevertheless, other local roads closer to the reservoir could potentially be affected by changes in fog incidence Given the above, the risks associated with heatwaves, drought, rain, low temperatures, heavy snow, hail, lightning, high winds and tornado have been scoped out of the EIA. Fog and ice will be assessed within Traffic and Movement aspect at the request of the Traffic and Movement consultees (see Chapter 11 – Traffic and Movement). Note that risks to workers and visitors from high temperatures are to be dealt with under the Carbon and Climate Change and Human Health aspects
Geological							
Landslides/mass movements	Yes	No	No	Yes	No	No	This risk is possible during construction due to the excavations required and the formation of the embankments. However, construction methods will be specified to mitigate the risk

Accident / disaster risk category and event type	Location risk*	Land use risk**	Is a major accident or disaster likely?	Relevant to construction phase	Relevant to operational phase	Further consideration required?	Rationale
							of landslips and mass movement occurring. These measures will be set out in the Safety Management Plan. Given this risk will be mitigated it has been scoped out of the EIA
Sinkholes	Yes	No	No	No	No	No	This risk is not considered possible given the underlying clay geology
Ground hazards/mobilisation of contamination	Yes	No	Yes	Yes	No	Yes	Sources of contamination are likely to be present across the SESRO Project EIA Scoping Boundary particularly in relation to the rail line to the south, and agricultural businesses. Contamination survey and assessment will be undertaken prior to Development Consent Order submission and remediation of contamination will be undertaken prior to / during construction, as appropriate. Given the potential for contamination across the EIA Scoping Boundary this risk has been scoped into the EIA and will be assessed under the Geology and Soils aspect (see Chapter 14 – Geology and Soils)
Hydrological							
Inland flooding	Yes	No	No	Yes	Yes	Yes	The preliminary design of the SESRO Project will ensure the probability of this risk occurring is unlikely and will be in accordance with EA requirements to not make flooding worse than at present. However, inland flooding could result in a major accident or disaster. Changes to inland flood risk that could occur from changes to the flooding characteristics or hydrology of waterways directly affected by the Project has, therefore, been scoped into the EIA and will be assessed via Flood Risk Assessment (FRA) under the Water Environment aspect (see Chapter 6 – Water Environment).
Emergency drawdown to the River Thames	No	Yes	Yes	No	Yes	Yes	Should an emergency drawdown event occur, then it could have an impact on the River Thames, potentially resulting in flooding. Given that this risk would only occur in an emergency and would be considered a major disaster, it has been scoped into the EIA and will be assessed under the Major Accidents and Disasters aspect drawing on the FRA associated the Water Environment aspect (see Chapter 6 – Water Environment)
Engineering							
Reservoir/dam collapse	No	No	No	No	Yes	No	There is a high degree of legislative protection for reservoir structures under the Reservoirs Act 1975 and an extremely high level of expertise and experience is needed to oversee their design and construction. Current practice for the design of any structures with higher consequences of failure, such as dams, are subject to detailed independent design and construction quality checking. The design of the reservoir will follow international best practice and current engineering standards and will be in accordance with the design requirements set out in the Reservoirs Act 1975. The dam design will develop as the site investigation, trial embankment and earthworks progress during construction. The parameters and dimensions of the design will only be finalised towards the mid-point of construction. The Flood Plan for the SESRO Project can only be definitively produced once the design has been finalised Specifically in relation to reservoir/dam collapse and emergency drawdown the SESRO Project is designed as a non-impounding fully bunded reservoir constructed by excavating

Accident / disaster risk category and event type	Location risk*	Land use risk**	Is a major accident or disaster likely?	Relevant to construction phase	Relevant to operational phase	Further consideration required?	Rationale
							clay from within the EIA Scoping Boundary and using it to construct a zoned embankment dam. The reservoir will store water above and below existing ground level The SESRO Project is being developed to design out all credible and significant embankment failure modes and this type of embankment design is well understood. Dam failure is very rare, particularly in the UK, which has had specific legislation for reservoir safety since 1930 (reservoir safety in England and Wales is now managed in accordance with the Reservoirs Act 1975) The SESRO Project's preliminary design includes internal zoning and drainage to mitigate the risks of internal erosion and stability issues, and its non-impounding design means that, unlike most dams which are constructed to impound natural watercourses, it is not at risk from extreme floods. These features mean it is expected to be a very safe reservoir. However, in line with current guidance, it will include emergency drawdown infrastructure to reduce the water level in the reservoir sufficiently rapidly if dam stability is compromised for any reason, by discharging water quickly to the River Thames The Reservoirs Act 1975 requires continuous supervision of large high-consequence reservoirs alongside regular independent inspection of reservoir structures and these roles are carried out by experienced reservoir engineers who must first be appointed to appropriate reservoir 'panels' by the UK government. The Reservoirs Act 1975 also now requires that reservoir owners and operators produce and maintain emergency response plans. Part of this process is understanding the potential impact of embankment failure The EA has developed the Reservoir Flood Mapping (RFM) Specification (which is not published publicly) for assessment of reservoir failure impact and publishes reservoir flood maps for all existing reservoirs in the UK based on this approach. It is noted that the flood mapping analysis does not inform the design of the reservoir embankment itself, which will be designed in accordance with international best practice. Furthermore, the Reservoirs Act 1975 does not require these plans to be developed during the design phase In context of the above regulatory regime the risk of embankment breach is highly unlikely, and any residual risk is adequately controlled and managed through other prevailing legislation, codes and standards, and, therefore, has been scoped out of the EIA
Building fire/failure	No	Yes	Yes	No	Yes	No	Fires or failures may occur within proposed buildings such as visitor facilities, club houses, the WTW, pumping station, education facilities etc. However, Design Fire Strategies, or equivalent will be subsequently prepared, which will include relevant fire and safety measures, therefore, this risk has been scoped out of the EIA
Critical infrastructure failure/utilities failure not associated with the SESRO Project	Yes	No	Yes	Yes	No	No	There are a number of services, including overhead and underground, which cross the SESRO Project EIA Scoping Boundary, and would need diverting. The services, where necessary, will be diverted prior to the construction of the SESRO Project. All relevant best practice, controls and good design and construction methods will be adhered to during the diversion work. Once the diversions have been completed the SESRO Project would not have an impact on infrastructure or utilities, therefore, this risk has been scoped out of the EIA

Accident / disaster risk category and event type	Location risk*	Land use risk**	Is a major accident or disaster likely?	Relevant to construction phase	Relevant to operational phase	Further consideration required?	Rationale
Critical failure of the existing electrical substation (Steventon)	Yes	No	No	Yes	Yes	No	The SESRO Project will require some works to connections to the existing Steventon sub-station to facilitate service diversions. However, the works will utilise standard best practice and be undertaken by an appropriately qualified company so the is unlikely to result in a major accident or disaster or cause critical failure of the existing substation. Therefore, this risk has been scoped out of the EIA
Ground instability	Yes	No	No	Yes	Yes	No	There is little risk of ground instability as the design of the SESRO Project is formed of very gently sloping stable ground. The SESRO Project would include the excavation of a borrow pit within the centre of the reservoir but the maximum slopes of this will be gentle (at 1(V):7(H)) and their stability will be checked as part of the preliminary design of the reservoir. Foundation stability under the reservoir embankment is covered under ‘reservoir/dam collapse’ above. Stability of the embankment foundation will be assured through design by specialist engineers following international best practice, with both design and construction completed under appropriate technical supervision, as stipulated by the Reservoirs Act 1975. Thus, this risk has been scoped out of the EIA
Groundwater levels (flooding)	Yes	No	Yes	Yes	Yes	Yes	While there is relatively little groundwater present within the SESRO EIA Scoping Boundary due to the primarily clay geology, the SESRO Project has the potential to affect existing groundwater flows and levels in some non-clay strata, given the excavations required and build-up of the embankments. Given that the SESRO Project could an impact on existing groundwater levels and flows and, therefore, flood risk, this risk has been scoped into the EIA and will be assessed under the Water Environment aspect (see Chapter 6)
Industrial Accidents							
Defence / military accidents (UXO)	Yes	No	Yes	Yes	No	No	There is potential for UXO across the EIA Scoping Boundary from previous military uses. As part of standard construction practice, UXO UXO clearance would be undertaken before works are carried out (within the EIA Scoping Boundary), as necessary. Given that UXO surveys will be undertaken prior to works commencing to clear working areas of UXO and survey teams / construction workers will be given toolbox talks on what to do should UXO be found, this risk has been scoped out of the EIA
Industrial sites (Control of Major Accident and Hazards (COMAH) / Major Accident Control Regulations (MACR))	Yes	No	No	Yes	Yes	No	The risk of a COMAH incident occurring is low, given the distance between the SESRO Project and the nearest COMAH facility (Harwell Atomic Energy Authority) (over 4km to the south-east) and the prevailing wind direction is likely to blow any plumes in a north-easterly direction away from the SESRO Project. The same applies to the atomic weapons establishment (AWE) at Aldermaston, given the distance to the reservoir (approximately 30km to the south-east) this risk is unlikely to apply. Furthermore, Harwell Atomic Energy Authority and AWE Aldermaston have stringent processes/measures in place to prevent or manage incidents. Given the above this risk has been scoped out of the EIA
Accidents							
Traffic accidents	Yes	Yes	Yes	Yes	Yes	Yes	There is potential for an increase in traffic accidents as the SESRO Project is expected to lead to an increase in vehicle flows during both construction and operation. The incidence of fog may also potentially increase due to the presence of a large waterbody during

Accident / disaster risk category and event type	Location risk*	Land use risk**	Is a major accident or disaster likely?	Relevant to construction phase	Relevant to operational phase	Further consideration required?	Rationale
							operation (see severe weather events above). Given the above, this risk has been scoped into the EIA and will be assessed under the Traffic and Movement aspect (see Chapter 11)
Accidents involving pedestrians	No	Yes	Yes	Yes	Yes	Yes	Due to the need for traffic to access the SESRO Project during both construction and operation, there is a potential for accidents involving pedestrians, therefore, this risk has been scoped into the EIA and will be assessed under the Traffic and Movement aspect (see Chapter 11)
Rail accidents	No	Yes	Yes	Yes	No	Yes	The SESRO Project includes the introduction of temporary sidings on the Great Western Rail line to the south resulting in a need for construction activity to take place on an operational rail line and an increase in train movements. Therefore, there is potential for rail accidents to occur. Given the above, this risk has been scoped into the EIA and will be assessed under the Traffic and Movement aspect (see Chapter 11)
Water sports accidents/drowning	No	Yes	Yes	No	Yes	No	The risk of drowning is possible given that the SESRO Project comprises the creation of a large expanse of water in a remote location, combined with the proposed recreational activities (such as sailing) that might take place within the reservoir. Rescue boats and lifeguards will be required and all relevant safety measures (such as provision of life belts at regular intervals along the embankments) will be included within the Safety Management Plan. The operators will also be required to have procedures in place to manage the safety of workers and visitors for all activities within the EIA Scoping Boundary, therefore, the potential for this risk occurring is limited. Given standard controls this risk has been scoped out of the EIA
Terrorism/civil unrest/public disorders							
Terrorist attack on people or the reservoir and WTW (bomb, chemical, vehicle, malicious drone incident)	No	Yes	Yes	No	Yes	No	The likelihood of this risk occurring is low, but could involve a large scale attack on the reservoir or a small scale attack on WTW workers or visitors. The Operators will be required to have security procedures in place to reduce the risk of such an event occurring, such as a manned gatehouse, security fencing in accordance with Thames Water Security Standards, CCTV and infra-red security lighting, to prevent unauthorised access. This may include controlled access to the top of the reservoir and other infrastructure/buildings. Given the above controls, meaning that such an attack would be no more likely to occur at the SESRO Project than anywhere else this risk has been scoped out of the EIA

Proposed major accidents and disasters assessment methodology

19.7.11 During the preparation of the PEI Report and the ES the following short list will be assessed:

- the Major Accident and Disasters aspect
- Animal strike (including bird strike)
- Water supply (various factors)
- Emergency drawdown on the River Thames

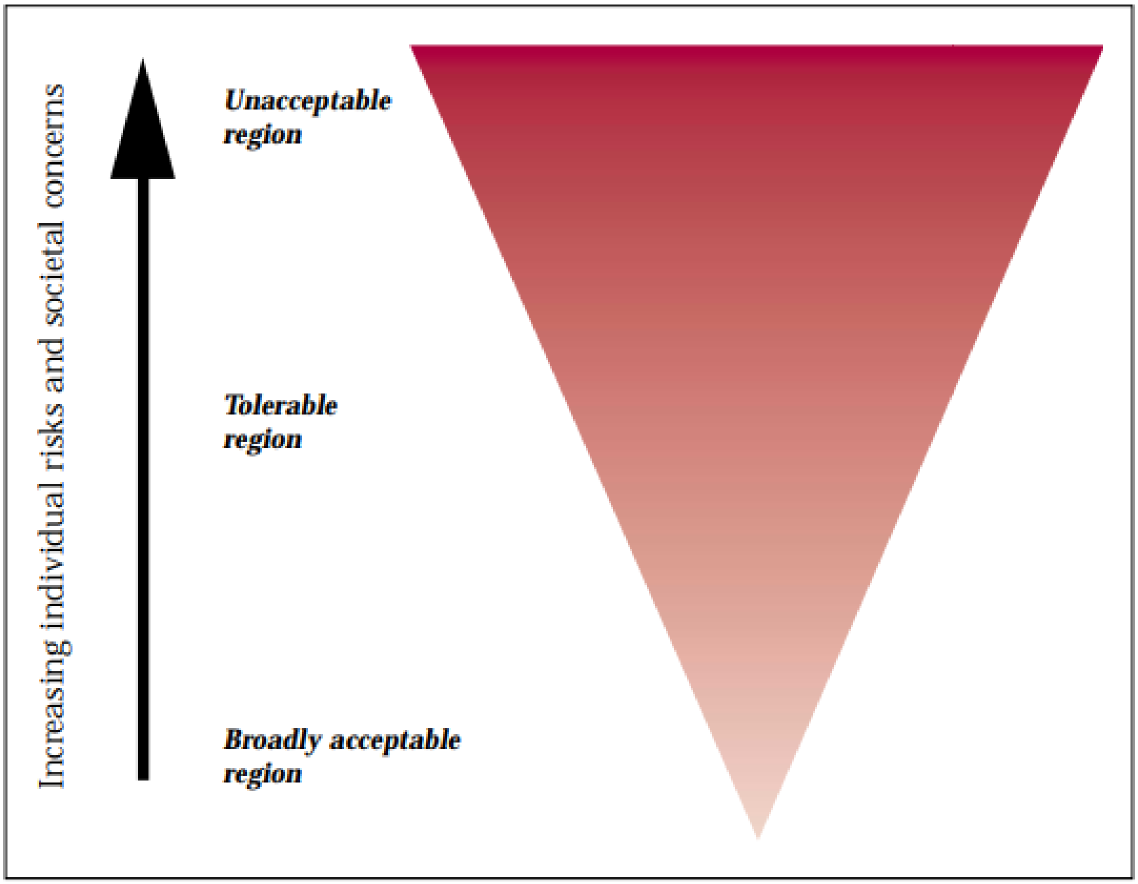
19.7.12 The short list of events / risks will be reviewed using professional judgement to determine, firstly, whether the events / risks are credible scenarios that could occur.

19.7.13 Each credible scenario would then be assessed to see whether they were 'unacceptable' or 'broadly tolerable' in accordance with the HSE's framework for the tolerability of risk, see Figure 19.2.

19.7.14 From Figure 19.2 the 'dark zone at the top represents an unacceptable region' and any event / risk '*falling into that region is regarded as unacceptable whatever the level of benefits associated with the activity*'. Whereas the *'light zone at the bottom, on the other hand, represents a broadly acceptable region. Risks falling into this region are generally regarded as insignificant and adequately controlled'.*

19.7.15 The *'zone between the unacceptable and broadly acceptable regions is the tolerable region. Risks in that region are typical of the risks from activities that people are prepared to tolerate in order to secure benefits'* such as employment, personal convenience or maintenance of food and water supplies.

Figure 19.2 HSE framework for assessing the tolerability of risks / events



Source: Figure 1 from the HSE Reducing risks, protecting people HSE's decision-making process (HSE, 2001).

19.7.16 The magnitude of potential impacts of the credible events / risks would then be assessed to determine what impacts they may have on the environment and associated receptors by identifying the source, pathways and receptors for each risk.

19.7.17 The assessments will be undertaken using the following terminology as set out in Table 19-3.

Table 19-3 Terminology to be used for significance of effect for Major Accidents and Disasters

Level of effect	EIA standard terminology	Terminology for Major Accidents and Disasters
Significant beneficial	Major beneficial	-
	Moderate beneficial	
Not significant	Minor beneficial	-
	Negligible	Broadly acceptable
	Minor adverse	Tolerable (As Low As Reasonably Practicable*)
Significant adverse	Moderate adverse	Unacceptable
	Major adverse	

Note:
* the ALARP principle in line with the Health and Safety at Work Act 1974.

19.7.18 The assessment of Major Accidents and Disasters will be undertaken with consideration of, but not limited to, the following:

- Any relevant studies such as System Safety Hazard Records
- The UK's NRR and associated local community risk registers
- Google aerial and street maps
- Health and Safety at Work Act 1974
- Consultation with the Health and Safety Executive (HSE), the EA and Oxfordshire County Council (OCC)

19.7.19 Workshops with key statutory consultees, will be held, as required, to discuss the assessment and mitigation measures for the short list as the SESRO Project design evolves, such that risks can be removed or reduced through mitigation, as far as practicable.

Assessment of cumulative effects

19.7.20 In relation to inter-development effects please refer to Chapter 20 – Cumulative Effects within this EIA Scoping Report.

19.7.21 Cumulative risks combined with other development projects have the potential to escalate the likelihood of major accidents or disasters from, or to, the SESRO Project. For example, other projects may cumulatively contribute to increased volumes of traffic on roads and highways. However, the management and control of the risk of accidents in this context is controlled by the highway authorities.

19.7.22 The ongoing process of risk assessment for the SESRO Project will include reviews to identify other developments brought forward that may cumulatively contribute to a change in hazard source and or the level of risk presented by existing hazard sources.

19.7.23 Due to their inherent severity, effects from major accidents and disasters are likely to be so significant that cumulative effects with other intra-development environmental effects are unlikely to be relevant.

19.8 Mitigation

19.8.1 Potential mitigation for the shortlisted risks is set out below, but this is not exclusive and will be developed further as the SESRO Project progresses. For mitigation associated with issues to be assessed under other environmental aspects (such as water environment, soils and geology and traffic and movement), please refer to mitigation set out in their respective chapters.

Construction phase mitigation

Primary

- Best practice measures will be put in place to avoid animal strike or vehicle accidents, such as speed limits on internal roads

Tertiary

- All relevant health and safety legislation will be adhered to during construction
- A Construction Phase Plan (as required under the Construction Design Management Regulations 2015) will set out measures to control all construction safety issues

Operation phase mitigation

Primary

- Best practice measures will be put in place to avoid animal strike or vehicle accidents such as speed limits on internal roads, and junctions with the public highway will be appropriately designed to the relevant safety standards. These measures will be specified in the Safety Management Plan

- Mixing systems will be employed, as required, to manage the occurrence of algal blooms and other water quality issues
- Cyber and physical security measures will be applied to minimise risks of sabotage
- Emergency drawdown facilities to meet the requirements of the Reservoirs Act 1975
- Use of emergency evacuation plans, if required, depending on the results of flood risk assessment associated with emergency drawdown

Secondary

- Use of emergency evacuation plans, if required, depending on the results of flood risk assessment associated with emergency drawdown

Tertiary

- All relevant health and safety legislation, including fire safety requirements, will be adhered to

19.9 Summary of Scope for the EIA

EIA scope for the preferred option

19.9.1 Table 19-4 provides a summary of the risks which have been scoped in and out of the EIA.

Table 19-4 Summary of the risks been scoped in and out of further assessment

Environmental matter	Relevant to construction phase	Relevant to operational phase	Scoped in / out	Rationale and where the risk will be assessed within the ES
Human, animal and plant health				
Animal strike (including bird strike)	Yes	Yes	IN	Animal strike is possible during construction and operation whilst bird strike is possible during operation which could result in a major accident or disaster. This matter has been scoped in for construction and operation within the Major Accidents and Disasters aspect
Insect infestation / disease	Yes	Yes	Out	Not considered to be a major accident or disaster specifically related to the SESRO Project
Healthcare	No	Yes	IN	Potential for algal blooms to develop within the reservoir during operation which could result in health risks to workers and users of the reservoir coming into contact with contaminated water, resulting in a major accident or disaster. This matter has been scoped in for the operation phase in the Water Resources, Carbon and Climate and Human Health aspects
Water supply affected (various factors)	No	Yes	IN	During operation, the water supply could be affected due to the presence of algal blooms, the failure of the critical infrastructure, a cyber attack or poisoning/contamination of the WTW which, if for a long period of time would result in a major accident or disaster. This matter has been scoped in within the Major Accidents and Disasters aspect

Environmental matter	Relevant to construction phase	Relevant to operational phase	Scoped in / out	Rationale and where the risk will be assessed within the ES
Natural and environmental				
Severe weather events (fog and ice)	No	Yes	IN	During operation, the introduction of the SESRO Project could alter the incidence of fog and freezing conditions in the area which could cause traffic accidents potentially resulting in a major accident or disaster. Fog and ice have been scoped in for the operation phase under road user and pedestrian safety within the Traffic and Movement aspect
Severe weather events (heatwaves, drought, rain, low temperatures, heavy snow, hail, lightning, high winds and tornado)	Yes	Yes	Out	Tornados are not common within the UK and are, therefore, are not anticipated to occur, plus the SESRO Project is not at any greater risk to rain, low temperatures, heavy snow, hail than anywhere else in the UK These severe weather events would not compromise the integrity of the reservoir embankments. Note that risks to workers and visitors from heat are dealt with under the Carbon and Climate Change and Human Health aspects
Geological				
Landslides/mass movements	Yes	No	Out	Construction methods will be specified to ensure landslips and mass movement do not occur and measures will be set out in the Safety Management Plan
Sinkholes	No	No	Out	This is not considered possible given the underlying geology across the EIA Scoping Boundary

Environmental matter	Relevant to construction phase	Relevant to operational phase	Scoped in / out	Rationale and where the risk will be assessed within the ES
Ground hazards/mobilisation of contamination	Yes	No	IN	Sources of contamination are likely to be found within the EIA Scoping Boundary during construction due to previous land uses the disturbance of which could lead to a major accident or disaster. This matter has been scoped in for the construction phase within the Geology and Soils aspect
Hydrological				
Inland flooding	Yes	Yes	IN	The design of the SESRO Project will ensure the probability of changes to flood risk for surrounding areas, occurring as a result of changes to existing catchments or watercourses through the construction or operation of the SESRO Project is unlikely. However, inland flooding could result in a major accident or disaster. This matter has been scoped in for both the construction and operation phase within Water Resources aspect
Emergency drawdown to the River Thames	No	Yes	IN	An emergency drawdown event may be required during the operation of the SESRO Project that could have an impact on the River Thames, potentially resulting in inland flooding which is considered to be a major accident or disaster. This has been scoped in during the operation phase in the Major Accidents and Disasters aspect
Engineering				
Reservoir/dam breach/collapse	No	Yes	Out	The SESRO Project is being developed to design out all credible and significant embankment failure modes and this type of embankment design is well understood. Dam failure is very rare, particularly in the UK, which has had specific legislation for

Environmental matter	Relevant to construction phase	Relevant to operational phase	Scoped in / out	Rationale and where the risk will be assessed within the ES
				reservoir safety since 1930 (reservoir safety in England and Wales is now managed in accordance with the Reservoirs Act 1975. Given the above regulatory regime the risk of embankment breach is highly unlikely and therefore scoped out of the EIA.
Building fire/failure	No	Yes	Out	Mitigation such as the preparation of Design Fire Strategies or equivalent including relevant fire and safety measures will remove this risk
Critical infrastructure failure/utilities failure not associated with the SESRO Project	Yes	No	Out	The diversion of services across the SESRO Project will be undertaken according to best practice, controls, good design and construction methods. Once the diversion work has been completed the SESRO Project would not have an impact on such infrastructure or utilities
Critical failure of the existing electrical substation (Steventon)	Yes	Yes	Out	Some works will be required to the existing Steventon sub-station but will be undertaken by an appropriately qualified company in accordance with standard best practice and would unlikely result in a major accident or disaster
Ground instability	Yes	Yes	Out	There is little risk of ground instability given the design of the SESRO Project and specialist engineers will follow international best practice and the works will be undertaken according to the Reservoirs Act 1975
Groundwater levels (flooding)	Yes	Yes	IN	The SESRO Project could have an impact on existing groundwater levels and flows and result in a flood risk which is considered to be a major accident or disaster. This matter has been scoped in for the

Environmental matter	Relevant to construction phase	Relevant to operational phase	Scoped in / out	Rationale and where the risk will be assessed within the ES
				both the construction and operational phases within the Water Resources aspect
Industrial accidents				
Defence / military accidents (UXO)	Yes	No	Out	UXO surveys will be undertaken prior to works commencing to clear working areas and survey teams and construction workers will be given toolbox talks on what to do should UXO be found, this risk has, therefore, been scoped out of the EIA
Industrial sites (Control of Major Accident and Hazards (COMAH) / Major Accident Control Regulations (MACR))	No	Yes	Out	Given the distance between the SESRO Project and the nearest COMAH facilities(and the stringent processes/measures in place at those sites a major accident or disaster is unlikely
Accidents				
Traffic accidents	Yes	Yes	IN	There is potential for an increase in traffic accidents as the SESRO Project is expected to lead to an increase in vehicle flows during both construction and operation and could potentially increase the incidence of fog which would affect visibility. This matter has been scoped in for the construction and operation phases within the Traffic and Movement aspect
Accidents involving pedestrians	Yes	Yes	IN	Due to the need for traffic to access the SESRO Project during both construction and operation, there is a potential for accidents involving pedestrians during the operation period, thus this matter

Environmental matter	Relevant to construction phase	Relevant to operational phase	Scoped in / out	Rationale and where the risk will be assessed within the ES
				has been scoped in for the construction and operation phases within the Traffic and Movement aspect
Rail accidents	Yes	No	IN	There is potential for rail accidents to occur as a result of the SESRO Project as it requires construction activity on an operational rail line and the introduction of temporary sidings on the Great Western Rail line which would result in an increase in train movements. This matter has been scoped in for the construction phase within the Traffic and Movement aspect
Water sports accidents/drowning	No	Yes	Out	Measures will be put in place to reduce the risk of drowning and water sports accidents occurring such as rescue boats, lifeguards, life belts at regular intervals along the embankments and a Safety Management Plan will be prepared
Terrorism / civil unrest / public disorders				
Terrorist attack on people (bomb, chemical, vehicle, malicious drone incident)	No	Yes	Out	The likelihood of a terrorist attack occurring is low as security measures will be put in place to prevent such an event from occurring such as a manned gatehouse, controlled access, security fencing, CCTV, infra-red security lighting and security procedures

Potential changes to scope and methods associated with other options

19.9.2 Other options will not alter the scope or geographic area of the Major Accidents and Disasters assessment. Assessment methods will also not be affected.

19.10 Next Steps

19.10.1 Going forward further detailed assessment will be undertaken on the risks that have been scoped into the EIA. Workshops will be held, where required, as set out in paragraph 21.7.19 and engagement will take place with relevant authorities and interested parties regarding the risks that have been identified in this chapter.

19.11 References

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20 Cumulative Effects

20.1 Introduction

20.1.1 Cumulative effects arise from impacts when past, present or future activities or developments combine to increase an environmental effect. This chapter outlines potential likely significant cumulative effects associated with the SESRO Project and how they will be assessed. There are two types of cumulative assessment as set out below:

- Intra-development effects – this describes the relationships between different aspects of the environmental impacts associated with a proposed development affecting the same receptor. For example noise, dust and visual impacts may be experienced at one particular residential dwelling or area. These impacts can interact together in an additive/synergistic way
- Inter-development effects – this describes the relationships of the project with 'other existing development and/or approved development'. For example, if two building sites are active concurrently in close proximity, receptors may experience construction noise effects from both

20.1.2 Due to construction and operational phases of the SESRO Project occurring at differing times, they do not act cumulatively.

20.2 Legislation, Policy, Standards and Guidance Context

20.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) set out in paragraph 5(e) of Schedule 4 that an Environmental Statement (ES) should include:

'the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'.

20.2.2 The requirement to consider cumulative effects is also outlined in planning policy. The National Policy Statement for Water Resources Infrastructure (Department for Environment, Food & Rural Affairs (Defra, 2023)) includes:

- Paragraph 3.1.3 states that '*In considering any proposed development, and in particular, when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State should take into account its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts*'
- Paragraph 3.2.6 states that '*When considering significant cumulative effects, any Environmental Statement should provide information on how*

the effects of an applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted)'

- Paragraph 3.2.7 states that '*The Examining Authority should consider how significant cumulative effects, and the interrelationship between effects, might as a whole affect the environment, even though they may be acceptable when considered on an individual basis or with mitigation measures in place*'

- Paragraph 3.2.6 also notes that the applicant should refer to the Planning Inspectorate's advice on assessing cumulative effects (Advice note 17 - Cumulative Effects Assessment)

20.2.3 In addition to the policy set out in the National Policy Statement for Water Resources Infrastructure, the SESRO Project will also have regard to other relevant legislation, policy, standards and guidance for cumulative effects assessment as listed in Table 20-1.

20.2.4 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the SESRO Project, will be provided in the ES.

Table 20-1 Relevant legislation, policy, standards and guidance

Relevant legislation, policy, standards and guidance
Legislation
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations')
National policy
National Policy Statement for Water Resources Infrastructure (Defra, 2023)
National Planning Policy Framework (Ministry of Housing Communities & Local Government, 2023)
Regional policy
Oxfordshire Minerals and Waste Local Plan – Part 1 Core Strategy (Oxfordshire County Council, 2017)
Local policy
Local Plan 2031 Part 1: Strategic Sites and Policies (Vale of White Horse District Council, 2016)
Local Plan 2031 Part 2: Detailed Policies and Additional Sites (Vale of White Horse District Council, 2019)

Relevant legislation, policy, standards and guidance
South Oxfordshire Local Plan 2011-2035 (South Oxfordshire District Council, 2020)
West Oxfordshire Local Plan 2031 (West Oxfordshire District Council, 2018)
Oxford Local Plan 2036 (Oxford City Council, 2020)
Standards and guidance
Planning Inspectorate (PINS) Advice Note 17 – Cumulative Effects (Planning Inspectorate, 2019)

20.3 Engagement

20.3.1 A meeting was held with planning officers from the following Local Planning Authorities (LPAs) on 15 March 2024 to discuss the scope of the cumulative effects assessment. Local Authorities represented included Oxfordshire County Council (OCC) and Vale of White Horse District Council (VoWHDC). A summary of their comments in relation to the scope of the cumulative effects assessment for SESRO is set out in Table 20-2, along with responses and actions taken.

Table 20-2 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
OCC	Any applications with the County Council, safeguarded locations, local level and not just district level will need to be considered	All applications of relevant scale, proximity and time period are to be considered whether at Local, County or Nationally Significant Infrastructure Project (NSIP) level
VoWHDC	Dalton Barracks will probably be a Tier 1 project as will look to make an application later this year to run alongside Regulation 19 of the Joint Local Plan, which will probably be between autumn and Christmas. Will likely be a garden village designation. 2,750 homes are currently allocated in the proposed Joint Local Plan, the Garden Village designation is up to 4,500. So, the cumulative impacts of this may need to be considered. If this goes beyond the plan period of the Joint Local Plan 2041, there is all likelihood that further housing allocations will come forward on the garden village designation	Dalton Barracks and associated garden village to be included in the cumulative effects assessment
VoWHDC	Requested sight of the Long List of potential cumulative developments as soon as possible	The preliminary long list is included in this Environmental Impact Assessment (EIA) Scoping Report. However, it should be noted that this list will be subject to change as the SESRO Project develops up to ES submission to PINS (expected 2026) given the long lead in times associated with SESRO (construction expected to commence 2030 and become operational by 2040). The majority of any developments going through the planning process now will likely be built before construction on SESRO commences, such that they would become part of the baseline. Nevertheless, the applicant will develop the long and short lists in consultation with PINS and the LPAs during the Preliminary Environmental Information (PEI) Reporting process continuing up to ES submission

20.4 Existing Environment and Baseline Conditions

Study area

20.4.1 PINS Advice Note 17 states that *'The scale and nature of NSIPs will typically dictate a broad spatial and temporal zone of influence (ZOI)'.* As such, there is not normally a fixed study area within which to assess inter-development cumulative effects as it depends on the geographic extent of the effects of the development and where they intersect with effects from another development.

20.4.2 To define the study area, the individual aspect assessments will need to be advanced to determine the ZOI of the SESRO Project and estimate where they may intersect with other proposed developments.

20.4.3 The study area for intra-development cumulative effects is the area where the ZOI of one or more assessment aspects interact.

20.5 Desk-Based Assessment

Current known potential developments for potential consideration regarding inter-development cumulative effects

20.5.1 The baseline conditions presented in this EIA Scoping Report reflect the situation at the time of writing.

20.5.2 An initial review of major proposed developments (as defined by The Town and Country Planning (Development Management Procedure) (England) Order 2015) in proximity to the SESRO Project (7km commensurate with the furthest currently known impact associated with landscape and visual effects – see paragraph 20.5.4) has been undertaken, using professional judgement to identify developments that could potentially result in cumulative effects with SESRO. Relevant planning applications submitted to the LPAs within this nominal study area have been reviewed along with infrastructure projects within Oxfordshire (which covers the extent of the ZOI) on the PINS website and known development within the water industry in the Thames catchment which are most likely to affect the River Thames downstream of SESRO. This initial Long List (provided in Appendix O) will be continually revisited during the EIA process as the relevant ZOIs are identified (see paragraphs 20.5.3 – 20.5.5) and as further developments are proposed in consultation with PINS and the LPAs.

Further desk study

20.5.3 To define the study area, the individual aspect assessments will need to be advanced to determine each aspect's ZOI for the SESRO Project The ZOI will be mapped using GIS. This will provide a justifiable area of search for other developments and will support desk study to identify and update the Long List in the form of planning applications, relevant development plans and any other relevant sources within the SESRO ZOI. The expected scale of ZOIs for each EIA aspect are set out below and will be refined as the EIA progresses.

20.5.4 Aspects with large ZOIs include:

- Landscape and Visual – Tall, large scale or extensive highly visible developments, dependent on context, topography and screening. For example, there may be cumulative effects with any development highly visible from the ridge of the North Wessex Downs National Landscape (NL) and The Ridgeway National Trail over 6km to the south. This is where the furthest currently known impact is expected to occur (as the site is visible from the Ridgeway) so the current estimated ZOI associated with landscape and visual effects is estimated at approximately 7km
- Heritage – Effects on buried archaeology only occur within a development site boundary but setting effects on designated sites and buildings may occur with the Zone of Visual Influence (ZVI) (see landscape and visual above). Nevertheless, effects on setting are generally only undertaken within <1km, which is considered appropriate to consider any potential harm on heritage assets that would be indirectly affected by the works, as it is likely that there would potentially only be limited visual intrusion arising from SESRO at this distance
- Traffic / Air Quality / Biodiversity - Developments generating large volumes of traffic using similar routes which may affect air, noise and associated effects on ecology. An example for SESRO might be any development adding significant traffic through Marcham Air Quality Management Area (AQMA). Note that this should be accounted for in baseline traffic prediction models so may not need to be specifically quantified
- Water - Developments up or downstream that could affect flows / water quality, water availability, designated sites or rare, sensitive species/habitats. Effects could be catchment wide, even upstream if, for example, affecting migratory species or Invasive Non-Native Species (INNS)
- Materials and Waste - Developments using high volumes of materials and producing high volumes of waste. materials and waste are generally managed on a regional (or, where justified, national) basis. As such, effects are too dispersed to be assessed for cumulative effects with other specific developments. Nevertheless, the consideration of materials and waste effects is inherently cumulative as it takes account of the capacity and use of all materials and waste facilities in a region

- **Socio-economics and Health** - Large employment or tourist/recreation schemes could potentially result in cumulative effects with SESRO at the local, district, county or even regional level depending on their scale and nature
- **Carbon** – Effects are inherently cumulative and assessed at the national level against national targets. However, the County and District Councils also have targets to be met

20.5.5 Aspects with smaller ZOIs include:

- **Geology and Soils** – Effects associated with contaminated land are generally assessed within 250m (based on Guidance for the Safe Development of Housing on Land Affected by Contamination (National House Building Council, Environment Agency and Chartered Institute of Environmental Health, 2008) which is used as a standard approach for all development types). However, large scale schemes removing large areas of best and most versatile land may potentially be relevant on a district/county basis as their own ZOI in this regard may be large
- **Noise and Vibration** – The general assessment ZOI for noise is in the order of 500m dependent on source (construction, traffic, industrial). The ZOI for vibration is much smaller (<100m). This is in accordance with various guidance including BS 5288-1 (BSI, 2014), LA 111 (Highways England, 2020), CRN (Department of Transport, 1995) and Transport and Roads Research Laboratory (British Steel & General Steels, 1986)
- **Major Accidents and Disasters** – ZOI varies on type of accident or disaster

20.6 Sensitive Receptors and Potential Environmental Effects

Intra-development cumulative effects

20.6.1 The types of environmental effect and associated sensitive receptors are the same as those set out in the technical aspect chapters.

Inter-development cumulative effects

20.6.2 The types of environmental effect and associated sensitive receptors are the same as those set out in the technical aspect chapters.

20.7 Assessment Methodology

Introduction

20.7.1 There are different methods associated with assessing intra and inter-development effects as set out below.

20.7.2 Assessment will be iterative, proportionate, commensurate with the level of available information and precautionary, assuming a realistic worst case.

20.7.3 Significance criteria will account for:

- duration, i.e. will the effect be temporary or permanent
- extent, e.g. the geographical area of an effect
- type, e.g. whether additive or synergistic
- frequency
- 'value' and resilience of the receptor
- the likely success of mitigation

20.7.4 The generic EIA matrix approach to combining receptor sensitivity/value and impact magnitude to derive effect significance will be used (see Chapter 5 – EIA Methodology).

Intra-development cumulative effects

20.7.5 There is no standard approach to intra-development cumulative assessment, Professional judgment will be used to identify whether potential cumulative effects could occur across the aspects. Likely significant effects are outlined within the aspect Chapters 6 to 19 within this EIA Scoping Report.

20.7.6 Cumulative effects would be reported in the chapter that deals with the receptor affected, for example, where noise and air quality may cumulatively affect a designated ecological site, the cumulative effect would be reported in the Terrestrial or Aquatic Ecology chapter. Where a receptor is shared by an aspect (e.g. a residential receptor affected by noise, air quality and landscape) cumulative effects will be reported where considered most appropriate, for example, within the Amenity section of the Communities assessment. While intra-development cumulative effects will be identified and reported in the aspect chapters, a summary will be presented in the cumulative effects chapter of the ES.

Inter-development cumulative effects

20.7.7 PINS Advice Note 17 sets out a staged approach to the assessment process as follows:

- Stage 1: Establishing the long list
- Stage 2: Establishing the short list
- Stage 3: Information gathering
- Stage 4: Assessment

20.7.8 It is not considered practicable to undertake a meaningful assessment of the likely significance of potential cumulative effects at this early stage. However, PINS Advice Note 17 states that '*Stages 1 – 2 should ideally be undertaken early in the pre-application phase and ideally before requesting a Scoping*

Opinion. Applicants should make use of the EIA scoping process to provide information on the CEA [cumulative effects assessments] and ensure that it is appropriately focussed and proportionate'. Therefore, an initial Stage 1 - 2 assessment has been undertaken which will be refined later during the EIA process as the relevant ZOIs are determined.

Stage 1: long list

20.7.9 In accordance with PINS Advice Note 17, the first task in establishing the long list of relevant 'other existing development and/or approved development(s)' is to determine the 'search area'. The 'search area' is determined by consideration of the ZOI for each environmental aspect assessed.

20.7.10 Also, in accordance with PINS Advice Note 17, the developments identified within the 'search area' are divided into the Tiers set out in Table 20-3.

Table 20-3 PINS Advice Note 17 – Table 2 – Assigning certainty to 'other existing development and / or approved development

Tier	Description
Tier 1	• Under construction (see Note) • Permitted application(s), whether under the Planning Act 2008 or other regimes, but not yet implemented • Submitted application(s) whether under the Planning Act 2008 or other regimes but not yet determined
Tier 2	• Projects on the Planning Inspectorate's Programme of Projects where a scoping report has been submitted
Tier 3	• Projects on the Planning Inspectorate's Programme of Projects where a scoping report has not been submitted • Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals • Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward
Note Where other projects are expected to be completed before construction of the proposed NSIP and the effects of those projects are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of both the construction and operational assessment.	

Source: PINS Advice Note 17

20.7.11 Tier 1 projects are the most likely to have associated environmental information available for use in an assessment of cumulative effects. Tier 3 projects are the least likely to have this information.

20.7.12 For the purposes of this EIA Scoping Report an initial planning application search has been undertaken to identify other development in proximity to the SESRO Project (7km – based upon the l the furthest currently known impact for landscape and visual effects) to create an initial Long List (Appendix O). This search has been undertaken using the planning portals of Vale of White Horse District Council, South Oxfordshire District Council, West Oxfordshire District Council, Oxford City Council, Oxfordshire County Council and PINS (Vale of White Horse District Council, 2024; South Oxfordshire District Council, 2024; West Oxfordshire District Council, 2024; Oxford City Council, 2024; Oxfordshire County Council, 2024; PINS, 2024).

20.7.13 The following types of existing and / or approved developments (approved on or after 1 January 2022) have been considered for inclusion in the Long List:

- NSIPs within Oxfordshire
- Hybrid Bills and Transport and Works Act Orders within and bordering LPA areas to SESRO
- Major development (as defined in The Town and Country Planning (Development Management Procedure) (England) Order 2015)
- Major minerals, waste and road developments
- Known development within the water industry in the Thames River Basin District
- Adopted allocations
- Emerging allocations
- Developments likely to come forward in relation to SESRO e.g. The Thames Water to Southern Water Transfer (T2ST) and Swindon and Oxfordshire (SWOX) raw water transfer pipelines (see Chapter 2 – Project Description)

20.7.14 Planning applications which have been withdrawn or rejected are scoped out. Allocated sites in Local Plans or other Development Plans which are not yet subject to planning applications, are included despite the development or operational timeframe of these proposals sites not yet being known. This is due to the long lead in times associated with SESRO construction, expected to take 10 years (2030 – 2040). During the EIA process, it is likely that new developments subject to major planning applications will come forward, these would then be further considered, as appropriate, in consultation the LPAs.

20.7.15 The initial Long List provided in Appendix O will be continually revisited throughout the EIA process as the relevant ZOIs are identified (see paragraphs 20.5.3 – 20.5.5.) and further developments are proposed.

Stage 2: short list

20.7.16 Following the completion of the Long List, the eligible other developments identified require further assessment (Stage 2) to establish a Short List which, in combination with the SESRO Project, have the potential to result in significant cumulative effects.

20.7.17 Shortlisted developments are likely to include:

- NSIPs located within the SESRO ZOI – including other Thames Water and Southern Water projects as well as non-water related NSIPs
- Major developments located within the SESRO ZOI
- Developments likely to come forward in relation to SESRO e.g. T2ST and SWOX raw water transfer pipelines

20.7.18 Other developments are prioritised by Tier. Most Tier 1 (under construction, permitted, submitted), or even Tier 2 (EIA Scoping) developments may not apply given the long period before construction starts (2030) and the long construction period (10 years) of the SESRO Project. In addition, Tier 3 (scoping not submitted, in Local Development and other plans) development timescales are uncertain. Other developments to be constructed earlier than the SESRO Project will be included within the baseline as potential receptors and as contributors to baseline environmental conditions, where feasible.

20.7.19 An initial Short List (Appendix P) has been developed from the initial Long List using project professional judgement based on temporal alignment, relative scale and proximity, type of development, nature of potential impact, capacity of the receiving environment, source-pathway-receptor relationships and the SESRO ZOI.

20.7.20 Professional judgement has been used to provide justifications for scoping other developments in or out, which has been based on a judgement of balance between the scale, type and proximity of the other development to the SESRO Project. Typically, other developments which have been scoped into the initial Short List comprise large housing and employment allocations or planning applications within close proximity to the SESRO Project (for example, generally 500 dwellings / over 10 hectares of employment land within 2.5km). However, flexibility to this approach has been applied on a case-by-case basis, for example, where a particularly large housing development is a little further away than 2.5km, or a smaller development is especially close to SESRO, it may be scoped in.

20.7.21 In addition, rather than scoping in smaller scale individual allocations or developments, the cumulative effects assessment will consider total housing and employment growth as a whole within the ZOI. From the Long List this growth is estimated at approximately 20,000 dwellings and over 170 hectares of employment land within the associated LPA Local Plan periods.

20.7.22 Minor developments have not been assessed at this stage of the EIA process as it is assumed, due to their scale and nature, that they will be complete by the time that SESRO construction will begin (expected to commence 2030) and, therefore, such minor developments will become part of the baseline environment and become potential environmental receptors.

20.7.23 When creating the Long List during Stage 1, multiple planning applications can be identified that relate to individual projects. To try to avoid duplication in the assessment, reserved matters applications have been excluded from the Short List, as it is assumed that such projects would be already identified and captured within any outline applications. Furthermore, applications that have been refused planning permission have been excluded from the Short List as these projects do not have permission to be constructed and, therefore, to have potential for cumulative effects.

20.7.24 Other projects have been provisionally screened against indicative thresholds identified under Schedule 3 of the EIA Regulations 2017. Projects which exceed those thresholds have the potential to cause significant environmental effects, and such projects have, therefore, been included in the initial Short List. Although the thresholds are indicative only, and the sensitivity of the receiving environment would also be taken into account in any formal EIA screening determination, the use of the thresholds for shortlisting is considered proportionate at this stage of the assessment.

20.7.25 Known developments which could potentially be scoped into the cumulative effects chapter of the ES are shown in the provisional Short List in Appendix P. Other developments currently within the Short List generally comprise large housing and employment developments within 2.5km (such as Dalton Barracks to the north-east of SESRO), solar farm developments and large scale highway developments (such as the proposed Milton Interchange on the A34). However, note that at this early stage this does not represent a final 'Short List' of developments. Both the Long and Short Lists will continue to be developed during the EIA process as the relevant ZOIs are identified, and in consultation with the LPAs.

Stage 3: information gathering

20.7.26 The other existing development and/or approved developments that form part of the Short List will be subject to a review of environmental information, where available, including details of:

- Proposed design and location information
- Proposed programme of construction, operation and decommissioning
- Environmental assessments that set out baseline data and effects arising from the 'other existing development and/or approved development'

20.7.27 This information will be gathered from LPA websites, the PINS website and through direct liaison with the LPAs and other stakeholders including statutory bodies and relevant applicants/developers.

Stage 4: assessment

20.7.28 In the ES, each environmental aspect will consider the cumulative effects of the SESRO Project with each other development identified. Professional judgment will be used to determine the potential for cumulative effects, which will be identified as direct, indirect, short-term or long-term, permanent or temporary. The likely magnitude of effect will be determined, any proposed mitigation measures would be taken into account, and the residual significance of the effects will be assessed.

20.7.29 Detailed information about each development will be collected, wherever available, for a robust assessment of cumulative effects. In particular, the temporal information of other developments (i.e. does the construction phase overlap with the SESRO Project) as well as the nature of their likely effects.

20.7.30 Other developments where there is insufficient information available on which to conduct an evidence-based assessment will either be excluded or only a high level qualitative assessment will be undertaken, dependent on the level of up-to-date information available. In practice this is likely to include schemes which may be in a Local Plan but for which no definitive information, such as at least pre-application engagement or EIA scoping, is available.

Assumptions, limitations, and uncertainties

20.7.31 As set out above, for some of the identified other existing development and/or approved developments, relevant information for assessment may not be available or will not be sufficiently detailed to undertake a robust assessment. Where this is the case, the assessment will be based upon clearly reported assumptions and professional judgement.

20.8 Summary of Scope for the EIA

EIA scope for the preferred option

20.8.1 Both intra and inter-development cumulative effects are scoped into the assessment. Inter-development effects associated with the ‘Short-List’ identified in Appendix P are currently scoped in but this is likely to change as more information becomes available and other applications are made within the relevant ZOIs of SESRO.

Potential changes to scope and methods associated with other options

20.8.2 Consideration of other options for SESRO associated with alternative road, intake/outfall and rail sidings options will not change the scope of the cumulative effects assessment. However, changes to the site boundary associated with option choice may potentially slightly alter the ZOIs.

20.9 Next Steps

20.9.1 The Long and Short List of other existing development and/or approved developments will be revised throughout the EIA process, in consultation with the LPAs.

20.10 References

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21 Summary and Conclusions

21.1 Introduction

21.1.1 This chapter summarises:

- The aspects and matters that are proposed to be scoped into and out of the Environmental Impact Assessment (EIA)
- The proposed content of the Environmental Statement (ES)
- The next steps as the Project moves forward

21.2 Aspects Proposed to be Scoped in and Out of the EIA

21.2.1 Table 21-1 summarises the aspects and matters that are proposed to be scoped in and out of the EIA and the guidance to be followed for their assessment. This is based on the baseline and current Project proposals and whether the Project has the potential to result in significant effects on relevant receptors. The rationale for these scoping conclusions are set out within the individual aspect chapters (Chapters 6 to 20).

21.2.1 This Scoping Report is submitted to the Planning Inspectorate (PINS) under the EIA Regulations 2017. PINS will scrutinise this report, take account of comments provided by consultees, and provide a Scoping Opinion. The Scoping Opinion will confirm which aspects are to be scoped into or out of the EIA process, and the final ES will be based on the Scoping Opinion adopted by the Secretary of State.

Table 21-1 Scoping Summary

Environmental Aspect	Environmental Matter	Scoped In/Out		Assessment Guidance / Standards to be followed
		Construction	Operation	
Water Environment (see Chapter 6)	Flood Risk	IN	IN	Design Manual for Roads and Bridges (DMRB) LA 113 Road drainage and the water environment (National Highways, 2020) DMRB LA104 Environmental assessment and monitoring (National Highways, 2020) Transport Assessment Guidance (TAG) Unit A3 environmental impact appraisal (Department for Transport, 2023) 'Guidebook of applied geomorphology' (Sear, Newson and Thorne, 2009)
	Hydrology	IN	IN	
	Fluvial Geomorphology	IN	IN	
	Surface Water Quality	IN	IN	
	Hydrogeology	IN	IN	
Aquatic Ecology (see Chapter 7)	Statutory and non-statutory designated sites and notable (e.g. priority) habitats	IN	IN	Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (CIEEM, 2018)
	Watercourse and pond habitats	IN	IN	
	Fish (including protected and notable species)	IN	IN	
	Macroinvertebrates (including protected and notable species)	IN	IN	
	Macrophytes (including protected and notable species)	IN	IN	
	Phytobenthos (Diatoms)	IN	IN	
	Phytoplankton	Out	IN	
	Zooplankton	Out	IN	
Terrestrial Ecology (see Chapter 8)	European designated sites	IN	IN	Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (CIEEM, 2018)
	Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR)	IN	IN	
	Local Nature Reserves (LNR)	Out	Out	
	Local Wildlife Sites (LWS)	IN	Out	
	Badger	IN	IN	
	Bats	IN	IN	
	Birds – breeding, wintering and Schedule 1 species (including barn owl, Cetti's warbler and kingfisher)	IN	IN	

Environmental Aspect	Environmental Matter	Scoped In/Out		Assessment Guidance / Standards to be followed
		Construction	Operation	
	Hazel dormouse	Out	Out	
	Great crested newt	IN	Out	
	Otter	IN	IN	
	Water vole	IN	IN	
	Natterjack toad	IN	Out	
	Other amphibians	IN	Out	
	Priority species	IN	IN	
	Reptiles	IN	Out	
	Terrestrial invertebrates	IN	IN	
	Ancient woodland	Out	Out	
	Ancient/veteran trees	IN	Out	
	Priority habitats	IN	Out	
	Notable vascular plants	IN	Out	
Landscape and Visual Effects (see Chapter 9)	Landscape	IN	IN	Guidelines for Landscape and Visual Impact Assessment (3rd edition) (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
	Visual	IN	IN	
Historic Environment (see Chapter 10)	Non-designated archaeology	IN	Out	DMRB LA104 Environmental assessment and monitoring (National Highways, 2020) Institute of Environmental Management and Assessment (IEMA) 'Principles of Cultural Heritage Impact Assessment in the UK' (IEMA, 2021)
	Non-designated paleoenvironmental resources	IN	IN	
	Non-designated historic structures	IN	IN	
	Listed Buildings	IN	IN	
	Non-designated historic landscapes	IN	IN	
	Scheduled monuments	IN	Out	
	Registered Parks and Gardens	IN	IN	
	Historically important hedgerows	IN	Out	
Traffic and Movement (see Chapter 11)	Severance	IN	IN	IEMA Guidance: Environmental Assessment of Traffic and Movement (IEMA, 2023)
	Driver delay	IN	IN	

Environmental Aspect	Environmental Matter	Scoped In/Out		Assessment Guidance / Standards to be followed
		Construction	Operation	
	Pedestrian delay	IN	IN	DMRB LA101 Introduction to environmental assessment (Highways England, 2019a) DMRB LA103 Scoping projects for environmental assessment (Highways England, 2020) DMRB LA104 Environmental assessment and monitoring (Highways England, 2020) DMRB LA 112 Population and human health (Highways England, 2020)
	Non-motorised user amenity	IN	IN	
	Fear and intimidation	IN	IN	
	Road user and pedestrian safety	IN	IN	
	Hazardous/large loads	IN	Out	
Noise and Vibration (see Chapter 12)	Construction airborne noise	IN	N/A	British Standards Institution (BSI) British Standard (BS) 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BSI, 2014a) BSI BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BSI, 2014b) BSI BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BSI, 2019) DMRB LA111 Noise (Highways England, 2020)
	Construction vibration	IN	N/A	
	Groundborne noise and vibration from tunnelling	IN	N/A	
	Construction road traffic noise and vibration	IN	N/A	
	Rail noise and vibration	IN	N/A	
	Potential use of on-site temporary worker accommodation	IN	N/A	
	Noise from the pumping station and intake/outfall structures	N/A	IN	
	Operational vibration from pumping station and intake/outfall structures	N/A	Out	
	Noise from the operation of valves	N/A	Out	
	Noise and vibration from the flow of water within the underground pipeline	N/A	Out	
	Noise during emergency conditions	N/A	Out	
	Noise from transformer substations	N/A	Out	
	Operational road traffic noise	N/A	IN	
	Operation of diverted 132kV (and lower) overhead powerlines	N/A	Out	
Air Quality (see Chapter 13)	Dust and particulate matter	IN	Out	Institute of Air Quality Management (IAQM) Construction dust guidance (IAQM, 2024)
	Emissions from site plant and machinery	Out	N/A	
	Emissions from proposed freight trains transporting bulk material	Out	N/A	
	Emissions from off-site traffic	Out	Out	

Environmental Aspect	Environmental Matter	Scoped In/Out		Assessment Guidance / Standards to be followed
		Construction	Operation	
	Odour from construction / operational activities	Out	Out	
	Operational pollutant emissions	N/A	Out	
Geology and Soils (see Chapter 14)	Geological designations	IN	Out	DMRB LA109 Geology and soils (National Highways, 2019a) IEMA 'A New Perspective on Land and Soil in Environmental Impact Assessment' guidance (IEMA, 2022)
	Soils supporting biomass production	IN	Out	
	Soils supporting sites of ecological importance	IN	Out	
	Soil carbon	IN	Out	
	Land contamination	IN	IN	
Materials and Waste (see Chapter 15)	Materials availability	IN	Out	IEMA Guide to Materials and Waste in EIA (IEMA, 2020)
	Mineral safeguarding sites	Out	Out	
	Landfill void capacity	IN	Out	
Carbon and Climate Change (see Chapter 16) Note: Micro-climate - potential changes to frost and fog will be explored in relation to traffic accidents in the Traffic and Movement assessment at the request of highways consultees	Impact on climate (greenhouse gas emissions) - Construction phase greenhouse gas emissions (lifecycle modules A1 – A5): Raw material extraction and manufacturing of building materials, Transportation of building materials and Construction processes)	IN	N/A	BSI PAS 2080:2023 Carbon management in infrastructure and built environment (BSI, 2023) IEMA's 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' guidance (IEMA, 2022) IEMA 'Climate Change Resilience and Adaptation' guidance (IEMA, 2020)
	Impact on climate (greenhouse gas emissions) - Operation phase greenhouse gas emissions (lifecycle modules B1 – B8, D2: Use, Maintenance, Repair, Replacement, Refurbishment, Operational energy, Operational water, User's utilisation and Exported utilities)	N/A	IN	
	Vulnerability to climate change - projected changes in temperature, dry periods, precipitation, extreme events and flooding	Out	IN	
	Vulnerability to climate change - projected changes in wind speed	Out	Out	
	Vulnerability to climate change - in combination climate assessment	Out	IN	
	Micro-climate - potential changes to local temperatures, and winds	Out	Out	
	Micro-climate - potential changes to frost and fog	Out	IN	
Communities (see Chapter 17)	Accessibility	IN	IN	IEMA 'Socio-Economic Assessment and Improving EIA' (IEMA, 2014) IEMA 'Socio-Economic Impact Assessment' (IEMA, 2021) DMRB LA112 Population and Human Health (Standards for Highways, 2020)
	Land take	IN	IN	
	Amenity	IN	IN	
	Employment	IN	IN	
	Economic activity	IN	IN	
	Skills	IN	IN	

Environmental Aspect	Environmental Matter	Scoped In/Out		Assessment Guidance / Standards to be followed
		Construction	Operation	
	Accommodation	IN	IN	DMRB LA104 Environmental assessment and monitoring (Standards for Highways, 2020)
	Public services	IN	Out	
Human Health (see Chapter 18)	Healthy Lifestyles	IN	IN	The IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper, 2022b) Human Health: Ensuring a high level of protection. A reference paper on addressing Human Health in Environmental Impact Assessment as per EU Directive 2011/92/EU amended by 2014/52/EU (Cave, 2020) Institute of Public Health's HIA Manual (Pyper, Cave, Purdy, & McAvoy, 2021) Health Impact Assessment in spatial planning (Chang, Sharpe, Stimpson, Petrokofsky, & Netherton, 2020)
	Safe and cohesive communities: Housing	IN	IN	
	Safe and cohesive communities: Built environment	IN	IN	
	Safe and cohesive communities: Transport	IN	IN	
	Safe and cohesive communities: Community safety	IN	IN	
	Safe and cohesive communities: Community identity	IN	IN	
	Socio-economic conditions: Education	IN	IN	
	Socio-economic conditions: Socio-economic status	IN	IN	
	Environmental conditions: Climate change	Out	IN	
	Environmental conditions: Air quality	IN	Out	
	Environmental conditions: Water	IN	IN	
	Environmental conditions: Soil	IN	IN	
	Environmental conditions: Noise	IN	IN	
	Environmental conditions: Radiation	IN	IN	
	Health and social care services	IN	IN	
	Wider societal benefits	IN	IN	
Major Accidents and Disasters (see Chapter 19) Note: Some matters to be dealt with in other assessment chapters (e.g. Water, Geology and Soils and Traffic and Movement)	Animal strike (including bird strike)	IN	IN	IEMA Major Accidents and Disasters in EIA: A Primer (IEMA, 2020) International Federation of Red Cross website (IFoRC, 2024) National Risk Register (NRR) (United Kingdom Government, 2023)
	Insect infestation/disease	Out	Out	
	Healthcare	N/A	IN	
	Water supply affected (various factors)	N/A	IN	
	Severe weather events (fog and ice)	N/A	IN	
	Severe weather events (heatwaves, drought, rain, low temperatures, heavy snow, hail, lightning, high winds and tornado)	Out	Out	
	Landslides/mass movements	Out	N/A	
	Sinkholes	N/A	N/A	
	Ground hazards/mobilisation of contamination	IN	N/A	

Environmental Aspect	Environmental Matter	Scoped In/Out		Assessment Guidance / Standards to be followed
		Construction	Operation	
	Inland flooding	IN	IN	
	Emergency drawdown to the River Thames	N/A	IN	
	Reservoir/dam collapse	N/A	Out	
	Building fire/failure	N/A	Out	
	Critical infrastructure failure/utilities failure not associated with the project	Out	N/A	
	Critical failure of the existing electrical substation (Steventon)	Out	Out	
	Ground instability	Out	Out	
	Groundwater levels (flooding)	IN	IN	
	Defence / military accidents (UXO)	Out	N/A	
	Industrial sites (Control of Major Accident and Hazards (COMAH) / Major Accident Control Regulations (MACR))	N/A	Out	
	Traffic accidents	IN	IN	
	Accidents involving pedestrians	IN	IN	
	Rail accidents associated with temporary sidings	IN	N/A	
	Water sports accidents/drowning	N/A	Out	
	Terrorist attack on people (bomb, chemical, vehicle, malicious drone incident)	N/A	Out	
Cumulative Effects (see Chapter 20) Note: Intra-development effects assessed within each aspect chapter	Intra-development effects	IN	IN	Planning Inspectorate (PINS) Nationally Significant Infrastructure Projects - Advice Note 17 (PINS, 2015)
	Inter-development effects associated with the Short List	IN	IN	

21.3 Proposed Contents of the Environmental Statement

21.3.1 The final ES will be produced in a number of volumes which is likely to be as follows:

- Volume 1 Non-Technical Summary: This will summarise the main elements of the Project and the significant environmental effects identified through the EIA process. It will be written in plain English for a non-technical audience
- Volume 2 Main Text: This will detail the findings of the EIA. It would include the chapters listed in Table 21-2, to be confirmed following receipt of the Scoping Opinion
- Volume 3 Figures: This will contain accompanying figures referred to within Volume 2
- Volume 4 Appendices: This will contain accompanying reports or documents to support Volume 2

21.3.2 The structure of the ES will reflect the aspects and matters confirmed through the Scoping Opinion provided by the Planning Inspectorate. Based on the conclusions set out in this Scoping Report, the proposed ES contents would be as set out in Table 21-2. Each of the technical topic chapters will be undertaken by a competent expert and the details of those competent experts will be included in the ES.

Table 21-2 Proposed Contents of the Environmental Statement

Chapter	Title
Non-Technical Summary	Non-Technical Summary
1	Introduction
2	Scheme Description
3	Alternatives and Design Evolution
4	Consultation and Engagement
5	Environmental Assessment Methodology
6	Water Resources
7	Aquatic Ecology
8	Terrestrial Ecology
9	Landscape and Visual Effects
10	Historic Environment

Chapter	Title
11	Traffic and Movement
12	Noise and Vibration
13	Air Quality
14	Geology and Soils
15	Materials and Waste
16	Carbon and Climate Change
17	Communities
18	Human Health
19	Major Accidents and Disasters
20	Assessment of Cumulative Effects
21	Summary

21.4 Next Steps and Environmental Documents to Support the DCO

21.4.1 Following submission of this Scoping Report, the Project design, planning and EIA will be progressed, as follows:

- Obtain the Scoping Opinion and review scoping consultation feedback to refine the scope of the assessments and surveys and inform the ES
- Continue desk studies, data collation and field surveys to obtain further baseline information to support the assessment
- Continue stakeholder engagement with both statutory/prescribed consultees and with landowners and tenants
- Ongoing design evolution and identification of potential additional mitigation measures, as well as identification of potential environmental enhancements, such as biodiversity net gain (BNG)
- Preparation of a Code of Construction Practice (CoCP) to include outline Environmental management plans
- Submission of the Draft Habitats Regulations Assessment (HRA) Screening Report to Natural England for comment before finalising into a No Significant Effects Report for submission with the application for development consent

- Preparation of the Preliminary Environmental Information (PEI) Report, which will be submitted as part of the engagement material presented at the Statutory Consultation, and
- Preparation of the ES, which will be submitted as part of the application for development consent

21.4.2 Alongside the EIA process, a number of other assessments will be undertaken and included as part of the application for development consent. Some of these assessments will form separate reports, either corresponding to separate legislative or good practice requirements, whilst others will be integrated in the ES.

21.4.3 Where the assessments form separate reports, the authors will work alongside each other to ensure consistency of data use and allow the findings of assessment to inform the others as appropriate.

21.4.4 These other assessments and their proposed location as part of the documentation submitted with the application for development consent include:

- HRA No Significant Effects Report, will be provided as a separate appendix to the ES
- Water Framework Directive assessment report, will be provided as a separate appendix to the ES
- Flood Risk Assessment (FRA), will be provided as a separate appendix to the ES
- Protected species survey reports and draft licence applications will be provided as required to support Letters of no Impediment from Natural England
- CoCP
- Consents and Agreements Position Statement
- Equality Impact Assessment (EqIA), which will provide information in terms of groups with protected characteristics under the Equality Act 2010 and social inequalities, will be relevant for consideration of vulnerable groups and health inequalities. Equality effects will be considered in a separate EqIA which will be submitted as part of the DCO application if significant impacts are identified at the screening stage

Glossary

Term	Definition
Abnormal Loads	Large, heavy, or wide cargo that cannot be transported by a standard vehicle
Accessibility	Ability of users to access facilities and resources
Amenity	Public benefits or contribution that can enhance the quality of life for a community
Ancient Woodland	Designated land that has been continually wooded since at least 1600 AD in England
Aggregates	Minerals which are used primarily to support the construction industry including soft sand, sand and gravel and crushed rock
Agricultural Land Classification	A framework for classifying land according to the extent to which its physical and chemical characteristics impose limitations on agricultural use in England and Wales
Air Quality Management Area	An area within a local authority's boundary that is identified as an area where Air Quality Objectives are not likely to be achieved
Air Quality Objectives	Defined levels of air quality and maximum pollution limits as specified in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007
Allocated mineral sites	Allocated mineral sites include mineral deposits specifically identified in a Local Plan as those that would be mined or extracted
Ammonia (NH3)	Ammonia, primarily generated from agricultural activities, is a gas that when mixed with other gases in the atmosphere, such as nitrogen oxides and sulphur dioxide, can form particulate matter
Annual average daily traffic	Total volume of vehicle traffic on a road flowing past a certain point over a year divided by 365 days
Archaeology	The physical remains of human activity
Archaeological Trial Trenching	Intrusive archaeological investigation, typically taking the form of a series of machine-excavated straight trenches, targeted or otherwise at archaeological anomalies
Arterial Routes	Arterial routes also known as arterial streets or highways, are major roadways within a city or region also known as arterial streets or highways, are major roadways within a city or region
At-Grade Junctions	A junction or crossing being at the same level

Term	Definition
Automatic Traffic Count	Traffic count that involves using sensors or cameras to collect data on vehicle flow, speed, and other traffic-related information
Average Annual Daily Traffic	The total volume of vehicle traffic for a year divided by 365 days
Average Annual Weekday Traffic	The average number of vehicles (such as cars, trucks, or buses) that travel on a road or highway during a typical weekday
Backfilling	A recovery operation where suitable waste is used for reclamation purposes in excavated areas or for engineering purposes in landscaping and where the waste is a substitute for non-waste materials
Biodiversity Action Plan	An internationally recognised program addressing threatened species and habitats and is designed to protect and restore biological systems. The original impetus for these plans derives from the 1992 Convention on Biological Diversity
Baseline	Describes the existing nature of the environment within the study area at a fixed point in time, as well as any changes likely to occur independently of the Project, including the legislative and planning context and any relevant published guidance
Baseline data	Data used to describe the current conditions of the environment, against which future predictions can be made
Basic oxygen steelmaking	A steelmaking route where oxygen is blasted through liquid iron to make steel
Bat roost	Any place that a wild bat uses for shelter or protection
Best and Most Versatile	The most flexible, productive and efficient agricultural land in the ALC system (Grades 1, 2 and 3a)
Biodiversity Net Gain	An approach to development and land management which aims to leave the natural environment, in terms of biodiversity, in a measurably better state than beforehand
Bill of quantities	A document containing details on the volumes of excavated arisings from, and materials required for, a development. Also ‘Schedule of Rates’
Borrow pit	A pit resulting from the excavation of material for use in embankments and bunds

Term	Definition
Biodiversity net gain	An approach used to improve a sites biodiversity value. Once applied, on completion, a site will have a positive ecological impact, delivering improvements through habitat creation or enhancement after avoiding or mitigating harm
Bridleway	A path or track that allows horse riding, cycling and walking
British Geological Survey	A partly publicly-funded body that provides technical advice to public and private sectors and aims to advance geological knowledge of the United Kingdom
Built Heritage	Historic buildings and structures, be they designated (Listed) or non-designated
Carbon dioxide equivalent (CO2e)	Unit for comparing the radiative forcing (i.e. global warming potential) of a greenhouse gas relative to carbon dioxide
Chlorophyll-a	Is a measure of the amount of algae growing in a waterbody and is used to describe the trophic condition of a waterbody. It is usually measured using a spectrophotometer with a narrow band width. Phosphorus is usually considered the ‘limiting nutrient’ in aquatic ecosystems, controlling the pace at which algae and aquatic plants grow
Carbon emissions	Inclusive of all greenhouse gas emissions (group of gases that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect) and refers to tonnes of carbon dioxide equivalent (tCO2e) unless otherwise stated
Carbon management plan	A plan which sets out how greenhouse gas emissions will be assessed, reduced and removed during the planning, optioneering, design, delivery, operation, use, end of life (and beyond) of an asset, network and/or system
Carbon offsetting	The process of using discrete reductions or removals of greenhouse gas emissions not arising from the defined subject, made available in the form of a carbon credit meeting a defined set of requirements (as per PAS 2060:2014), to counteract emissions from the defined subject. Offsets can be generated via a variety of activities, including those that avoid or reduce emissions and those that remove carbon from the atmosphere
Carbon sink	Natural environment viewed in terms of its ability to absorb carbon from the atmosphere (e.g. a forest)

Term	Definition
Circular economy	A circular economy is an alternative to a traditional linear economy (of make, use, dispose) in which we keep resources in use for as long as possible; extract the maximum value from them while in use; recover and regenerate products and materials at the end of life; and keep products, components and materials at their highest utility and value at all times
Chartered Institute of Ecology and Environmental Management	A professional membership body representing and supporting ecologists and environmental managers in the UK, Ireland and abroad
Critical raw materials	Materials that are considered to have high importance within the UK economy, but where security of supply is at great risk
Climate change	Change in global, national, or regional climate patterns (such as temperature, precipitation and wind)
Code of Construction Practice	A set of guidelines or principles that will be adhered to during the construction of the SESRO Project
Commercial waste	Waste from premises used wholly or mainly for the purposes of a trade or business or the purposes of sport, recreation or entertainment. N.B. this excludes industrial waste defined below
Conceptual Site Model	A conceptual site model is a representation of the characteristics of the site. It shows the possible relationships between contaminants, pathways and receptors
Conservation Area	‘An area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance’, designated under what is now s69 of the Planning (Listed Buildings and Conservation Areas) Act 1990
Construction	Any activity involved with the provision of a new structure (or structures), its modification or refurbishment
Construction phase	The period during which construction activities are undertaken and prior to the asset or system becoming operational
Construction Traffic Management Plan	A plan developed by construction project managers to manage traffic flow around construction sites
Contaminated Land: Applications in Real Environments	A not-for-profit organisation aimed at stimulating further land regeneration in the UK. This includes providing guidance documents, information and advice

Term	Definition
Contractor	An entity that undertakes a contract to provide materials and/or labour to construct, build, maintain, repair, replace, disassemble or demolish an asset
Cumulative effects	Incremental effects that result from the accumulation of a number of individual effects, either caused by different types of effect from the same project (intra-project effects), or by the interactions between the likely effects of other reasonably foreseeable developments with the likely effects of the proposed project (interproject effects)
Demolition	Any activity involved with the removal of an existing structure (or structures). This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time
Department for Environment, Food and Rural Affairs	The UK government department responsible for policy and regulations on the environment, food and rural affairs
Deposition (dust)	The vertical passage of a substance (e.g., dust) to a surface or the ground
Design phase	The period during which an asset or system is designed and prior to construction activities commencing
Designation	The recognition of particular heritage value(s) of a significant place by giving it formal status under law or policy intended to sustain those values
Direct effect	An effect that is directly attributable to the Project
Disaster	A disaster is a sudden, catastrophic event that can result in serious damage to human welfare or the environment or result in major disruption to society or communities, or economic and environmental loss. Disasters can be caused by both natural processes and by human actions
Disposal	Any operation which is not recovery, even where the operation has, as a secondary consequence, the reclamation of substances or energy (e.g. landfilling, incineration)
Donor site	A development or defined area of land that offers up (donates) wastes or materials to be treated and/or reused

Term	Definition
Dust	Solid particles that are suspended in air or have settled out onto a surface after having been suspended in air. The terms dust and particulate matter (PM) are often used interchangeably, although in some contexts one term tends to be used in preference to the other. In this assessment the term 'dust' has been used to include the particles that give rise to soiling, and to human health (i.e. PM10 or PM2.5) and ecological effects. Note: this is different from the definition given in BS 6069-2:1994, where dust refers to particles up to 75 µm in diameter
Earthworks	Covers the processes of soil-stripping, ground-levelling and excavation
Effects	The consequences of the changes in airborne concentrations and/or dust deposition for a receptor. These might manifest themselves as annoyance due to an increase in the dust deposition rate, increased health effects due to exposure to PM10 or PM2.5 or plant dieback due to reduced photosynthesis. The term 'significant effect' has a specific meaning in The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('EIA Regulations'). The opposite is a 'not significant effect'
Electric arc furnace steel making	A steel making route where an electric arc furnace is used to melt steel scrap using electricity
Embodied carbon	The carbon dioxide equivalent (CO_2e) emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure. It includes any CO_2e created during the manufacturing of building materials (material extraction, transport to manufacturer, manufacturing), the transport of those materials to the job site, and the construction practices used
Enhancement	A beneficial measure that is over and above what is required to mitigate the adverse effects of a project
Event category	Is an event which could result in a major accident or disaster such as human, animal and plant health, natural and environmental, geological, hydrological, engineering, industrial, terrorism
Environment Agency	Regulatory Agency in England responsible for licences and consents relevant to flooding, discharge consents, waste licences and the protection of the environment
Environmental Impact Assessment	A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making

Term	Definition
Environmental Product Declarations	Certification that independently quantifies and verifies the lifecycle impacts of products and goods, as cited in the International Standards Organisation (ISO) ISO14025 Environmental Labels and Declarations
European Protected Species	Animals and plants protected under the Conservation of Habitats and Species Regulations 2017 (as amended)
Excavated arisings	For the purposes of this assessment, this term is restricted to those materials that fall within the scope of, and meet the reuse / exemption criteria set out in: relevant waste exemptions, the Waste Framework Directive or the CL:AIRE Definition of Waste: Development Industry Code of Practice. Any material which it is not considered to fall within the above definition would be defined as waste
Geoarchaeology	Geoarchaeology is the use of earth sciences to understand the archaeological record. It is a branch of archaeological science involving the study of stratigraphy, sites and landscapes with techniques from soil science, sedimentology and geology
Geological Conservation Review	A major initiative to identify and describe the most important geological sites in Britain, coming to a conclusion in 1990. Updates to the GCR are undertaken by the appropriate Statutory Nature Conservation Body – Natural England, Natural Resources Wales, or Scottish Natural Heritage
Geomorphology	The scientific study of the origin and evolution of topographic and bathymetric features created by physical, chemical or biological processes operating at or near the earth's surface. For example fluvial geomorphology is the study of the interactions between the physical shapes of rivers, their water and sediment transport processes, and the landforms they create
Geophysical Survey	Non-intrusive survey of buried remains using hand-held, cart-based or machine towed instrumentation
Good Ecological Status / Potential	Good Ecological Status/Good Ecological Potential – Artificial and Heavily Modified Water Bodies (A/HMWBs) are considered unable to attain GES due to the physical modifications that are necessary to maintain their function for society or their 'human use' as they provide important socio-economic benefits. They are, however, required to achieve Good Ecological Potential, through the implementation of a series of Mitigation Measures, which essentially aim to enhance the ecology in the water body without compromising its human use
Grade Separated Junctions	A junction that involves vertical separation of two or more different routes, placing them at different heights

Term	Definition
Greenhouse gases (GHGs)	Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds
Greenhouse gas (GHG) emissions	The total mass of GHGs released to the atmosphere over a specific period of time
Ground Investigation	An investigation into the below-ground characteristics of a site
Habitats Regulations Assessment	The process by which plans and projects are assessment for whether they are likely to have a significant effect on a European Site either alone or in combination with other plans or projects
Habitat Suitability Index	A technique used for evaluating the suitability of habitats for specific species of wildlife in order to assess the likelihood of their presence or absence
Haul road	A term for roads designed for heavy or bulk transfer of materials by construction vehicles
Hazardous waste	Defined in line with Article 3(2) of the Waste Framework Directive (Council Directive 2008/98/EC) as: 'waste which displays one or more of the hazardous properties listed in Annex III' of the Directive
Heavy duty vehicle	Vehicle with a gross weight of more than 3.5 tonnes and buses
Heritage	Historic resources, visible and non-visible, which are inherited and are valued beyond their utility
Historic Environment	All aspects of the environment resulting from human activity over time, often broken down into three main areas: archaeological remains, historic buildings and structures and historic landscapes, designed or otherwise
Historic Landscapes	These include designed landscapes, for example those within historic manorial estates and the broader rural landscape which has evolved in various forms from human activity
Holt	A hole in the ground which is used by an otter for sleeping and resting
Hydrogeology	A branch of geology that involves the study of water occurring underground including how water gets into the ground, how it flows in the subsurface and interactions with the surrounding soil and rock
Hydrotreated Vegetable Oil	A diesel-like fuel that can be produced without fossil resources by processing renewable waste lipids

Term	Definition
Impacts	The changes in airborne concentrations and/or dust deposition. A scheme can have an ‘impact’ on airborne dust without having any ‘effects’, for instance if there are no receptors to experience the impact
Impact Risk Zone	A Geographical Information System (GIS) tool developed by Natural England to make a rapid initial assessment of the potential risks posed by development proposals to Sites of Special Scientific Interest (SSSIs)
In Combination Climate Impacts (ICCIs)	The combined impacts of climate change on environmental receptors assessed for other environmental aspects
Indicative Location for SESRO	The area that is directly occupied by SESRO infrastructure
Indirect effect	An effect that results from the project as a consequence of a direct effect(s), often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway
Industrial waste	Waste from any of the following premises — (a) any factory; (b) any premises used for the purposes of, or in connection with, the provision to the public of transport services by land, water or air; (c) any premises used for the purposes of, or in connection with, the supply to the public of gas, water or electricity or the provision of sewerage services; or (d) any premises used for the purposes of, or in connection with, the provision to the public of postal or telecommunications services
Inert waste	A sub-category of non-hazardous waste, that that does not undergo any significant physical, chemical, or biological transformations when deposited in a landfill
Invasive Non-Native Species	Non-native UK species of fauna and flora that are invasive e.g. Japanese Knotweed
Inter-development effects	The combined action of a number of different developments, in combination with the development being assessed, on a resource/ receptor
Intra-development effects	The combined action of a number of different environmental topic specific effects upon on a resource/ receptor
Key material	Construction or operational materials which, by weight, constitute the majority of material required to deliver a project
Landform	The shape and form of the land surface resulting from combinations of geology, geomorphology, slope, elevation and physical processes

Term	Definition
Landscape and Visual Impact Assessment	*'A tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.'* (Guidelines for Landscape and Visual Impact Assessment (3rd edition) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
Landscape Character Areas	*'These are single unique areas which are the discrete geographical areas of a particular landscape type.'* (Guidelines for Landscape and Visual Impact Assessment (3rd edition) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
Landscape Character Types	*'These are distinct types of landscape that are relatively homogenous in character.'* (Guidelines for Landscape and Visual Impact Assessment (3rd edition) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
LiDAR	Light Detection and Ranging. A method for determining ranges (variable distance) by targeting an object or a surface with a laser and measuring the time for the reflected light to return to the receiver. It is commonly used to make digital 3D representations of areas on the Earth's surface and therefore determine the variability of a surface feature such as a landform
Life Cycle Assessment (LCA)	The systematic analysis of the potential environmental impacts of products or services during their entire life cycle
Light duty vehicle	Vehicle with a gross weight of not more than 3.5 tonnes
Listed Buildings	Historic buildings or structures that are designated under the Planning (Listed Buildings and Conservation Areas) Act 1990
Local Air Quality Management	A process that requires local authorities across the UK to review, assess and manage the air quality within their geographical areas
Local Biodiversity Action Plan	A plan aimed at conserving the fauna, flora and habitats – collectively referred to as biodiversity – of a defined area, usually along local authority boundary lines
Local Development Plan	Sets out local planning policies and identifies how land is used, determining what will be built where. Adopted Local Plans provide the framework for local development across England. Emerging Local Plans are those that are undergoing an update and are not yet adopted

Term	Definition
Local Nature Reserve	A site that is designated by the local authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation which has wildlife or geological features that are of special interest locally
Local Wildlife Site	Local Wildlife Sites are sites with 'substantive nature conservation value'. They are defined areas, identified and selected for their nature conservation value, based on important, distinctive and threatened habitats and species within a local context
Magnitude	Refers to the size, amount, intensity and volume of an impact, in quantitative terms where feasible
Major accident	A major accident s an event or situation that threatens serious damage (loss of life or permanent injury or long-lasting damage to an environmental receptor) and for which a response would require the use of resources beyond those available to the Project (e.g., the emergency services, the Environment Agency etc.)
Multi-Agency Geographic Information for the Countryside	A web-based interactive map that brings together information on key environmental schemes and designations in one place. Multi Agency Geographic Information for the Countryside (MAGIC) is a partnership project involving six government organisations who have responsibilities for rural policy making and management
Major / minor developments	A major development is defined by the Development Management Procedure (England) Order 2015 and is any application that involves: Mineral extraction Waste development Residential development of between 10 or more dwellings Residential development on a site area of 0.5 ha or more and the number of dwellings is unknown Development of floorspace of 1,000m^2 or more Development on sites over 1 ha or more A minor application is anything that is not considered to be major
Major events	A combination of major accident or disasters
Manual Classified Counts	Traffic counts conducted by enumerators or video camera and are normally used to gather 12-hour link counts as well as pedestrian and cycle data

Term	Definition
Manual Classified Turning Counts	Similar to Manual Classified Counts, these focus specifically on recording turning movement at junctions
Materials Management Plan	A Materials Management Plan (MMP) is a document used in construction and environmental projects to manage the reuse of materials, such as soil and Made Ground, without needing an environmental permit. The MMP ensures that materials are reused in a way that protects human health and the environment and is suitable for the intended use. It is prepared in accordance with the CL:AIRE voluntary Definition of Waste: Development Industry Code of Practice
Material resources	Material resources includes solid materials and products from primary, secondary, recycled, sustainable and renewable sources, and the use of site-won / imported excavated materials
Minerals and Waste Planning Authority	The Minerals and Waste Planning Authority is the county council (in two-tier parts of the country), the unitary authority, or the national park authority responsible for planning control of minerals and waste development
Mineral resource	Natural concentrations of minerals or, in the case of aggregates, bodies of rock that are, or may become, of potential economic interest
Mineral Safeguarding Area	An area designated by a minerals and waste planning authority which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined would be worked)
Mineral safeguarding sites	A general term that has been used to capture any impacts to Mineral Safeguarding Areas, Mineral Strategic Resource Areas, allocated mineral sites and mineral ownership rights
Mineral Strategic Resource Areas	An area that is used by Oxfordshire County Council to demarcate the principal locations for aggregate minerals extraction within the county. These areas are exclusively located within Mineral Safeguarding Areas
Ministry of Agriculture, Fisheries and Food	A former department of the government responsible for agriculture, fisheries and food. In 2002, its responsibilities were merged with that of Defra
Mitigation measures	Actions that are taken to reduce, prevent or compensate for adverse effects of a development

Term	Definition
Municipal solid waste	Waste from households and waste which, because of its nature or composition, is similar to waste from households. As well as waste collected by local authorities, municipal waste includes commercial and industrial waste that is similar in nature to household waste and is collected by the private sector
National Policy Statement	National Policy Statements (NPS) are produced by Government. They give reasons for the policy set out in the statement and must include an explanation of how the policy takes account of Government policy
Nationally Significant Infrastructure Project	Major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc. that require a development consent under the Planning Act 2008
National Trip End Model	A transportation model used to forecast the growth in trip origins-destinations within a region
Natural England	A public body responsible for ensuring that England's natural environment is protected and improved
Net zero carbon emissions	Reduction of anthropogenic greenhouse gas emissions to zero or to a residual level that is consistent with reaching net zero emissions in eligible 1.5 °C pathways (hence time-bound) and neutralizing the impact of residual emissions (if any) by removing an equivalent volume of carbon. A net zero target is normally set at the system level reflecting regional, national and/or international decarbonisation trajectories to align to an eligible 1.5 °C pathway
Nitric oxide (NO)	Primarily formed during the combustion of fossil fuels, NO can react with other gases in the atmosphere to form NO_2
Nitrogen dioxide (NO_2)	An air pollutant measured in respect of Defra's AQO for the protection of human health. Nitrogen dioxide is a gas that is mainly produced during the combustion of fossil fuels
Nitrogen oxides (NOx)	Refers to nitric oxide (NO) and nitrogen dioxide (NO_2), both of which are mainly formed during the combustion of fossil fuels
Non-hazardous waste	Non-hazardous waste can have the following two meanings: all waste which does not meet the above definition of 'hazardous' and, for the purpose of landfill regulation, waste which is neither hazardous nor inert
Non-Road Mobile Machinery	Any mobile machine, item of transportable industrial equipment, or vehicle – with or without bodywork – that is not intended for carrying passengers or goods on the road and is powered by an internal combustion engine

Term	Definition
Nuisance	The term nuisance dust is often used in a general sense when describing amenity dust. However, this term also has specific meanings in environmental law: (a) statutory nuisance, as defined in S79(1) of the Environmental Protection Act 1990 (as amended); (b) private nuisance, arising from substantial interference with a person's enjoyment and use of their land; and (c) public nuisance, arising from an act or omission that obstructs, damages or inconveniences the rights of the community. Each of these applies as far as the nuisance relates to the unacceptable effects of emissions. It is recognised that a significant loss of amenity may occur at lower levels of emission than would constitute a statutory nuisance
Operational carbon	GHG emissions associated with the operation of infrastructure required to enable it to operate and deliver its service
Operation phase	The period over which the asset or system is assumed to operate (in this instance, a 60 appraisal period)
Palaeoenvironmental	Pertains to the environment at particular periods of the past. In historic environment studies these are often represented by the preservation of relict water courses and organic remains associated with fluvial activity
Particulate matter	Airborne particulate matter is made up of a collection of solid and/or liquid materials of various sizes that range from a few nanometres in diameter (about the size of a virus) to around 100 micrometres (about the thickness of a human hair)
Particulate matter (PM_{10})	Particles with an aerodynamic diameter of 10 microns or less
Particulate matter ($PM_{2.5}$)	Particles with an aerodynamic diameter of 2.5 microns or less
PAS 2080	The Publicly Available Specification (PAS) to address the management of carbon in buildings and infrastructure
Planar slope	A terrain feature that does not curve and is shaped like a tilted book. Planar slopes have the same slope angle throughout
Planning Inspectorate	An executive agency of the Department for Levelling Up, Housing and Communities. The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales
Potential Contaminant Linkage	It refers to the possible connection between a contaminant source, a pathway, and a receptor

Term	Definition
Preliminary Risk Assessment	First tier of risk assessment that develops the initial conceptual site model to establish whether there are any potentially unacceptable risks
Preparing for reuse	Checking, cleaning or repairing products or components of products that have become waste so that they can be re-used without any other pre-processing
Primary materials	Physical substances from non-renewables sources, i.e. those that cannot or would not be replaced in short (non-geological) periods of time. Also referred to as ‘virgin’ materials
Primary mitigation	Is an intrinsic part of the Project design – it should be described in the design evolution narrative and included within the Project description
Protected Species Mitigation Licence	The licence issued to permit an activity affecting protected species that would otherwise be an offence
Proximity principle	The principles of self-sufficiency and proximity which require that waste should generally be managed as near as possible to its place of production, mainly because transporting waste has a significant environmental impact
Public Byway	A highway over which the public is entitled to travel on foot, horseback, or pedal cycle and by wheeled vehicles of all kinds, including mechanically propelled vehicles, but which is used by the public mainly for walking or for riding
Public Right of Way	A widely known right to cross private land is known as a ‘right of way’. If this is a right granted to everyone it is a ‘public right of way’
Ramsar site	Wetlands of international importance designated under the Ramsar Convention 1971
Raw water	Non-potable water
Reasonably Foreseeable Future Projects	These are projects that are likely to occur within the life of a specific project or within the next 30 years
Receptor	A defined individual environmental feature usually associated with population, fauna and flora that have potential to be impacted by a development
Recovery	Any operation, the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the development or in the wider economy

Term	Definition
Recycled aggregates	Aggregates that are typically derived from reprocessing materials previously used in construction, such as road planings, railway ballast, crushed concrete or masonry from construction and demolition activities
Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. Recycling does not include energy recovery nor the reprocessing into materials for fuel or for backfilling operations
Region	The defined geographical areas or physical extents of the second study area. For the purposes of this aspect, the recommended physical extent is the former south-east planning region
Regionally Important Geodiversity Sites	Locally designated sites of local, national and regional importance for geodiversity (geology and geomorphology) in the United Kingdom
Residual effect	The predicted consequential change on the environment from the impacts of development after mitigation
Registered Parks and Gardens	The designated register of formal historic parks and gardens maintained by Historic England. Although they are not protected by legislation they are material considerations in decision-making by local authorities
Resource productivity	A measure of the total amount of materials directly used by an economy (measured as material consumption in relation to Gross Domestic Product (GDP)). It provides insights into whether decoupling between the use of natural resources and economic growth is taking place
Restricted Byway	A highway over which the public is entitled to travel on foot, horseback and with non-mechanically propelled vehicles
Re-use	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived
Risk	The likelihood of an adverse event occurring
Runoff	The movement of water above and below the surface
Secondary materials / aggregates	Useful by-products from manufacturing or industrial processes. Secondary aggregates are typically by-products of industrial and other processes
Sensitivity (of a receptor)	A judgement regarding the susceptibility of a receptor to the change arising because of the proposed development and the value attached to the receptor

Term	Definition
Scheduled Monuments	Designated archaeological remains protected by the Ancient Monuments and Archaeological Areas Act 1979 (as amended)
Setting	Setting is defined by Historic England as the surroundings in which any heritage asset, including those such as a Listed Buildings or Scheduled Monuments are experienced. Setting may contribute to, detract from or be neutral with respect to a heritage asset's value (significance)
Severance	A reduction in the ability of user to move around their community to access facilities and resources
Significant effect	An effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'
Site of Special Scientific Interest	A site designated as being of special interest for its flora, fauna or geological or physiographical features and protected under the Wildlife and Countryside Act 1981
Soil Resource Plan	A document used primarily in construction and land development projects to manage soil resources effectively. It provides clear guidance on how to recover, store, and reuse soils while minimising loss in quality and function
Special Area of Conservation	An area within the UK which has been identified as being important for a range of vulnerable habitats, plant and animal species within the European Union and are designated under the Conservation of Habitats and Species Regulations 2017
Special Protection Area	Sites within the UK designated under the Conservation of Habitats and Species Regulations 2017 due to their international importance for the breeding, feeding, wintering, or the migration of rare and vulnerable species of birds
Stable non-reactive hazardous waste	Hazardous waste, the leaching behaviour of which would not change adversely in the long-term
Standard Operating Procedures	A set of written instructions that can describe how to perform a task or activity
Sterilise	Substantially constrain / prevent existing and potential future use and extraction of mineral resources, typically by constructing infrastructure over or adjacent to a deposit
Sub-region	The defined geographical areas or physical extents of Oxfordshire County

Term	Definition
Tertiary mitigation	Is required regardless of any Environmental Impact Assessment, as it is imposed, for example, as a result of legislative requirements and/or standard sectoral practices
Trackout	The transport of dust and dirt from the site onto the public road network, where it may be deposited and re-suspended by other vehicles using the road network
Tranquillity	‘A state of calm and quietude associated with peace, considered to be a significant asset of landscape.’ (Guidelines for Landscape and Visual Impact Assessment (3rd edition) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
Trip End Model Presentation Program	A software used to view the National Trip End Model (NTEM) dataset
United Nations Educational, Scientific and Cultural Organisation	A United Nations body that strives to build networks among nations through education and intellectual development. One of their remits is the conservation of internationally significant areas of heritage
Waste	Defined in line with Article 3(1) of the Waste Framework Directive (Council Directive 2008/98/EC) as: ‘any substance or object which the holder discards or intends or is required to discard’. Waste is commonly split into the following classifications: Inert, Hazardous and Non-hazardous waste
Waste hierarchy	The rank of waste management options according to what is best for the environment, as set out in Regulation 12 of The Waste (England and Wales) Regulations 2011. It gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery (including energy recovery), and last of all disposal (e.g. landfill)
Waste prevention	Measures taken before a substance, material or product has become waste, that reduce: 1) the quantity of waste, including through the re-use of products or the extension of the life span of products; 2) the adverse impacts of the generated waste on the environment and human health; or 3) the content of harmful substances in materials and products

Term	Definition
Water Framework Directive	The Water Framework Directive (2000/60/EC) is an EU directive which was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 ('the WFD Regulation'). It aims to achieve good status of all water bodies (surface waters, groundwaters and the sites that depend on them, estuaries and near-shore coastal waters) and prevent any deterioration to these water bodies. It has introduced a comprehensive River Basin Management Plan system to protect and improve the ecological quality of the water environment. It is underpinned by published environmental standards
Water Framework Directive Classification	The WFD classification for a defined water body is produced by the assessment of a wide variety of different 'elements' which includes: 'biological elements' such as phytoplankton, macrophytes, phytobenthos, benthic invertebrates and fish; 'supporting elements' that include chemical measurements such as ammonia, dissolved oxygen, pH, phosphate, copper, zinc and temperature; and 'supporting conditions' (sometimes referred to as hydromorphology) that assess the physical attributes of the water body such as 'river continuity', 'quantity and dynamics of flow' and 'morphology'. The assessment given for each element is also accompanied by a measure of certainty in the result. The status classification is published in the RBMP and provides a baseline condition against which compliance and future improvements can be measured
Water Framework Directive Status	The Water Framework Directive (2000/60/EC) is an EU directive which was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 ('the WFD Regulations'). It aims to achieve good status of all water bodies (surface waters, groundwaters and the sites that depend on them, estuaries and near-shore coastal waters) and prevent any deterioration to these water bodies. It has introduced a comprehensive River Basin Management Plan system to protect and improve the ecological quality of the water environment. It is underpinned by published environmental standards
Water Industry National Environment Programme	The WINEP is the programme of actions water companies need to take to meet statutory environmental obligations, non-statutory environmental requirements or delivery against a water company's statutory functions

Term	Definition
Whole life carbon	Sum of greenhouse gas emissions and removals from all work stages of a project and/or programme of works within the specified boundaries. This includes GHG emissions and removals within the project/programme boundary, as well as emissions/removals between the project/programme and appraisal study area
Whole life cycle carbon emissions	The sum of GHG emissions from all stages of the life cycle of a product or asset and within the specified system boundaries of the product or asset
Zone of Influence	The area within which receptors could potentially be affected by the construction and / or operational phases
Zone of Theoretical Visibility	*'A map, usually digitally produced, showing areas of land within which a development is theoretically visible.'* (Guidelines for Landscape and Visual Impact Assessment (3rd edition) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
Zone of Visual Influence	Area within which a proposed development can have an influence or effect on visual amenity

Acronyms

Acronym	Term
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
ADC	Auxiliary drawdown channel
AGI	Above Ground Infrastructure
AIL	Abnormal Indivisible Load
AIM	Aerial Interpretation and Mapping
ALBST	Advanced Level Bat Survey Techniques
ALC	Agricultural Land Classification
AMP	Asset Management Plan
ANC	Association of Noise Consultants
AONB	Area of Outstanding Natural Beauty
AONB-LCA	North Wessex Downs AONB Integrated Landscape Character Assessment
AQO	Air Quality Objective
AQMA	Air Quality Management Area
AS	Age Standardised
ASDR	Age Standardised Death Rate
ATC	Automatic Traffic Count
AWE	Atomic weapons establishment
B&B	Bed and Breakfast
BAP	Biodiversity Action Plan
BBOWT	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust
BCC	Buckinghamshire County Council
BCT	Bat Conservation Trust
BGS	British Geological Society
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain

Acronym	Term
BNL	Basic Noise Level
BOD	Biological Oxygen Demand
BOS	Basic oxygen steelmaking
BritPits	British Pits (database)
BSI	British Standards Institution
BTO	British Trust for Ornithology
c	circa
CDM	Construction Design Management
CCTV	Closed-circuit television
CEA	Cumulative Effects Assessment
CEH	Centre for Ecology and Hydrology
CEN	European Committee for Standardisation
CFMP	Catchment Flood Management Plan
CH_4	Methane
CIEEM	Chartered institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry and Information Association's
CL:AIRE	Contaminated Land: Applications in Real Environments
CMD	Common mental health disorders
CO_2	Carbon dioxide
CoCP	Code of Construction Practice
CoP	Code of Practice
COPA	Control of Pollution Act
CPRE	The Campaign to Protect Rural England
CROW	Countryside and Rights of Way
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model

Acronym	Term
CTMP	Construction Traffic Management Plan
CWIS2	The second cycling and walking investment strategy
CWS	County Wildlife Site
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DDA	Disability Discrimination Act
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
DLL	District Level Licencing
DLUHC	Department for Levelling Up, Housing and Communities
DMRB	Design Manual for Roads and Bridges
DNO	Distribution Network Operator
DoT	Department of Transport
DoW	Definition of Waste
dRBMP	draft River Basin Management Plan
EAF	Electric arc furnace steelmaking
EC	European Commission
EcIA	Ecological Impact Assessment
eDNA	Environmental DNA
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
EPS	European Protected Species
EPSML	European Protected Species Mitigation Licence
EPUK	Environmental Protection UK
EQS	Environmental Quality Standard
ES	Environmental Statement
ESI	Environmental Simulations Incorporated

Acronym	Term
EU	European Union
EV	Electric vehicle
FCD	Field Capacity Days
FCS2	Fisheries Classification Scheme 2
FRA	Flood Risk Assessment
GBV	Groundborne Vibration
GCR	Geological Conservation Review
GCN	Great Crested Newt
GHG	Greenhouse Gases
GI	Ground Investigation
GIS	Geographical Information System
GPP	Guidance for Pollution Prevention
GWML	Great Western Main Line railway
GWB	Groundwater body
GWDTE	Groundwater Dependent Terrestrial Ecosystems
GWP	Global-warming potential
GVA	Gross Value Added
GLVIA	Guidelines for Landscape and Visual Impact Assessment
HDV	Heavy Duty Vehicle
HER	Historic Environment Record
HFC	Hydrofluorocarbons
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HiAP	Health in All Policies
HLC	Historic Landscape Characterisation
HMWB	Heavily Modified Water Body
HoF	Hands-off Flow

Acronym	Term
HRA	Habitats Regulations Assessment
HS2	High Speed 2
HSE	Health and Safety Executive
HSI	Habitat Suitability Index
HSM	Habitat Suitability Modelling
HVO	Hydrotreated Vegetable Oil
IAQM	Institute of Air Quality Management
ICCI	In combination Climate Impacts
ICM	Integrated Catchment Model
IEMA	Institute of Environmental Management and Assessment
IFoRC	International Federation of Red Cross
IMD	Index of Multiple Deprivation
INNS	Invasive non-native species
IRZ	Impact Risk Zone
ISO	International Organisation for Standardisation
JNCC	Joint Nature Conservation Committee
LAD	Local Authority Districts
LAQM	Local Air Quality Management
LCA	Landscape Character Area
LCRM	Land Contamination Risk Management
LCT	Landscape Character Type
LCWIP	Abingdon Local Cycling and Walking Infrastructure Plan
LDV	Light Duty Vehicle
LDP	Long Distance Path
LEMP	Landscape and Ecological Management Plan
LGS	Local Geological Site
LGV	Light Goods Vehicle

Acronym	Term
LiDAR	Light Detection and Ranging
LMDW	Lowland Mixed Deciduous Woodland
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LoD	Limits of Deviation
LPA	Local Planning Authority
LSOA	Lower layer Super Output Area
LTN	Local Transport Note
LVIA	Landscape and visual impact assessment
LWS	Local Wildlife Site
M&E	Mechanical and electrical
MACR	Major Accident Control Regulations
MAGIC	Multi-Agency Geographic Information for the Countryside
MCC	Manual Classified Counts
MCTC	Manual Classified Turning Counts
MEICA	Mechanical, electrical, instrumentation, control and automation
MHCLG	Ministry of Housing, Communities & Local Government
MI-ROG	Major Infrastructure – Resource Optimisation Group
MMP	Materials Management Plan
MoD	Ministry of Defence
MoRPh	Modular River Physical Survey
MSOA	Middle Layer Super Output Area
Mt	Megatonne (or million tonne)
Mtpa	Megatonne (or million tonne) per annum
N_2O	Nitrous oxide
NAU	National Appraisal Unit
NCA	National Character Area

Acronym	Term
NCN	National Cycling Network
NE	Natural England
NERC	Natural Environment Research Council
NFRA	National Flow River Archive
NF_3	Nitrogen trifluoride
NHS	National Health Service
NIT	National Infrastructure Team
NL	National Landscape
NNR	National Nature Reserve
NMU	Non-Motorised User
NO_2	Nitrogen dioxide
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NRMM	Non-Road Mobile Machinery
NRR	National Risk Register
NSIP	Nationally Significant Infrastructure Project
NT	National Trail
NTEM	National Trip End Model
OC	Oxfordshire County
OCC	Oxfordshire County Council
OHER	Oxfordshire Historic Environment Record
OHID	Office for Health Improvements and Disparities
ONS	Office for National Statistics
ORCS	Oxfordshire Rail Corridor Study

Acronym	Term
OS	Ordnance Survey
OWLS	The Oxfordshire Wildlife and Landscape Study
OxLEP	Oxfordshire Local Enterprise Partnership
PBDE	Polybrominated Diphenyl Ethers
PCL	Potential Contaminant Linkage
PDSA	Pre-Desk Study Assessment
PEA	Preliminary Ecological Appraisal
PEI	Preliminary Environmental Information
PEI Report	Preliminary Environmental Information Report
PFOS	Perfluoro Octane Sulfonic Acid
PFC	Perfluorocarbons
PINS	Planning Inspectorate
PM	Particulate Matter
PPE	Personal Protective Equipment
PR24	Price Review 2024
PRA	Preliminary Risk Assessment
PRoW	Public Rights of Way
PPV	Peak Particle Velocity
PSYM	Predictive SYstem for Multimetrics
Pywr	Python Water Resource (software)
RAF	Royal Air Force
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathways
rdWRMP	Revised draft Water Resource Management Plan
RFFP	Reasonably Foreseeable Future Projects
RFM	Reservoir Flood Mapping
RPG	Registered Parks and Gardens

Acronym	Term
RNAG	Reason for Not Achieving Good
RSMH	Rail siding and materials handling area
RTF	Regional Traffic Forecasts
SAC	Special Area of Conservation
SAGIS	Source Apportionment GIS
SESRO	South East Strategic Reservoir Option
SF_6	Sulphur hexafluoride
SIMCAT	Simulations of Catchment model (EA)
SNRHW	Stable Non-Reactive Hazardous Wastes
SO	South Oxfordshire
SOAEL	Significant Observed Adverse Effect Level
SODC	South Oxfordshire District Council
SO-LCA	South Oxfordshire Landscape Character Assessment
SPA	Special Protection Area
SPZ	Source Protection Zone
SRP	Soil Resource Plan
SRN	Strategic Road Network
SRO	Strategic Resource Option
SSE	Scottish and Southern Electricity
SSSI	Site of Special Scientific Interest
STT	Severn Thames Transfer
STW	Sewage Treatment Works
SWMP	Site Waste Management Plan
SWOX	Swindon and Oxfordshire
TAG	Transport Analysis Guidance
TBM	Tunnel Boring Machine
TEA	Terrestrial Environmental Appraisal

Acronym	Term
TEMPro	Trip End Model Presentation Program
TLG	Technical Liaison Group
TPO	Tree Preservation Orders
T2AT	Thames to Affinity Transfer
TRRL	Transport and Roads Research Laboratory
TS2T	Thames Water to Southern Water Transfer
TTAD	Talking Therapies for Anxiety and Depression
TVERC	Thames Valley Environmental Records Centre
UK-Air	UK Air Information resource
UKCP	UK Climate Projections
UKHab	UK Habitat Classification
UKHSA	UK Health Security Agency
UKTAG	UK Technical Advisory Group
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UXO	Unexploded Ordnance
VoWH	Vale of White Horse
VoWHDC	Vale of White Horse District Council
VoWH-LCA	Vale of White Horse District Landscape Character Assessment
VSD	Variable Speed Drives
WC	Wetness Class
WCH	Walkers, cyclists, and horse-riders
WFD	Water Framework Directive
WHO	World Health Organisation
WIMS	Water Information Management System (EA’s water quality data archive)
WINEP	Water Industry National Environment Programme
WRMP	Water Resource Management Plan
WRSE	Water Resources South East

Acronym	Term
WSI	Written Schemes of Investigation
WTW	Water treatment works
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

Units

Unit	Definition
μg/m^3	Micrograms per cubic metre (the principal unit of measurement for the concentration of an air pollutant in ambient air).
%	Percentage
°C	Degrees Celsius
% sat	Percentage saturation (dissolved oxygen)
AD	Anno Domini
AS	Age Standardised
ASDR	Age Standardised Death Rate
CO_2e	Carbon dioxide equivalent
dB	Decibel
dB(A)	A-weighted decibel
Decile	One of 10 subsections within a larger dataset
ha	Hectare
km	Kilometre (linear measure)
km^2	Square kilometre (area measure).
kph	Kilometres per hour
m	Metre (linear measure)
m^2	Square metre
m^3/s	cubic metres per second
Ml/d	Megalitre(s) per day
Mm^3	Million cubic metre (volume measure)
mm	Millimetres
mm/s	Millimetres per second
$(MtCO_2e)^2$	Million tonnes of carbon dioxide equivalent
PPV	Peak Particle Velocity
t	Tonne
tCO_2e	Tonnes of carbon dioxide equivalent

Thames Water

It's everyone's water