



South East Strategic Reservoir Option
Preliminary Environmental Information Report

Chapter 2 - Project description

Date: October 2025

Contents

2	Project description	1
2.1	Introduction	1
2.2	Description of the Project	1
2.3	Design parameters and assumptions	6
2.4	Project description overview	7
2.5	The Project	10
2.6	Construction	31
2.7	Operation and maintenance	46
2.8	Decommissioning	52
	References	53

List of tables

Table 2.1	Maximum dimensions of diverted watercourses	17
Table 2.2	Key parameters for the recreational lakes	20
Table 2.3	Key parameters for PEI Report assessment – Recreational Lakes Centre	20
Table 2.4	Key parameters for PEI Report assessment – Water Sports Centre	21
Table 2.5	Key parameters for PEI Report assessment – Nature Education Centre	21
Table 2.6	Key parameters for PEI Report assessment – Site wide buildings	22
Table 2.7	Key parameters for pathways	23
Table 2.8	Dimensions for active travel alongside highways	25
Table 2.9	Locations of car parks and the number of spaces assigned	25
Table 2.10	Estimated materials import requirements	43
Table 2.11	Routes between A34 and construction access points (see Figure 2.2)	44
Table 2.12	Summary of estimated annual electrical demand	49
Table 2.13	Design life of key components	50

List of plates

Plate 2-1	Overview of SESRO with linked projects and key features (not to scale)	2
Plate 2-2	Typical Reservoir embankment cross-section at Water Sports Centre	11
Plate 2-3	Typical Reservoir embankment cross-section	11
Plate 2-4	Schematic showing design components of the reservoir and associated infrastructure	13
Plate 2-5	Cross-section of tower designs with dimensions (relative to top water level and max embankment height) (not to scale)	13
Plate 2-6	Example imagery of a two stage channel	17
Plate 2-7	Indicative hub and spoke model showing emerging pathway strategy (not to scale)	22
Plate 2-8	Project timeline	32
Plate 2-9	Example layout of the main construction compound	34
Plate 2-10	Image of a typical excavator	38

Plate 2-11 Image of a typical construction vehicle for the movement of bulk materials 39

Plate 2-12 Schematic for filling of the reservoir – Overview 47

Plate 2-13 Schematic for release of water from the reservoir – Overview 47

2 Project description

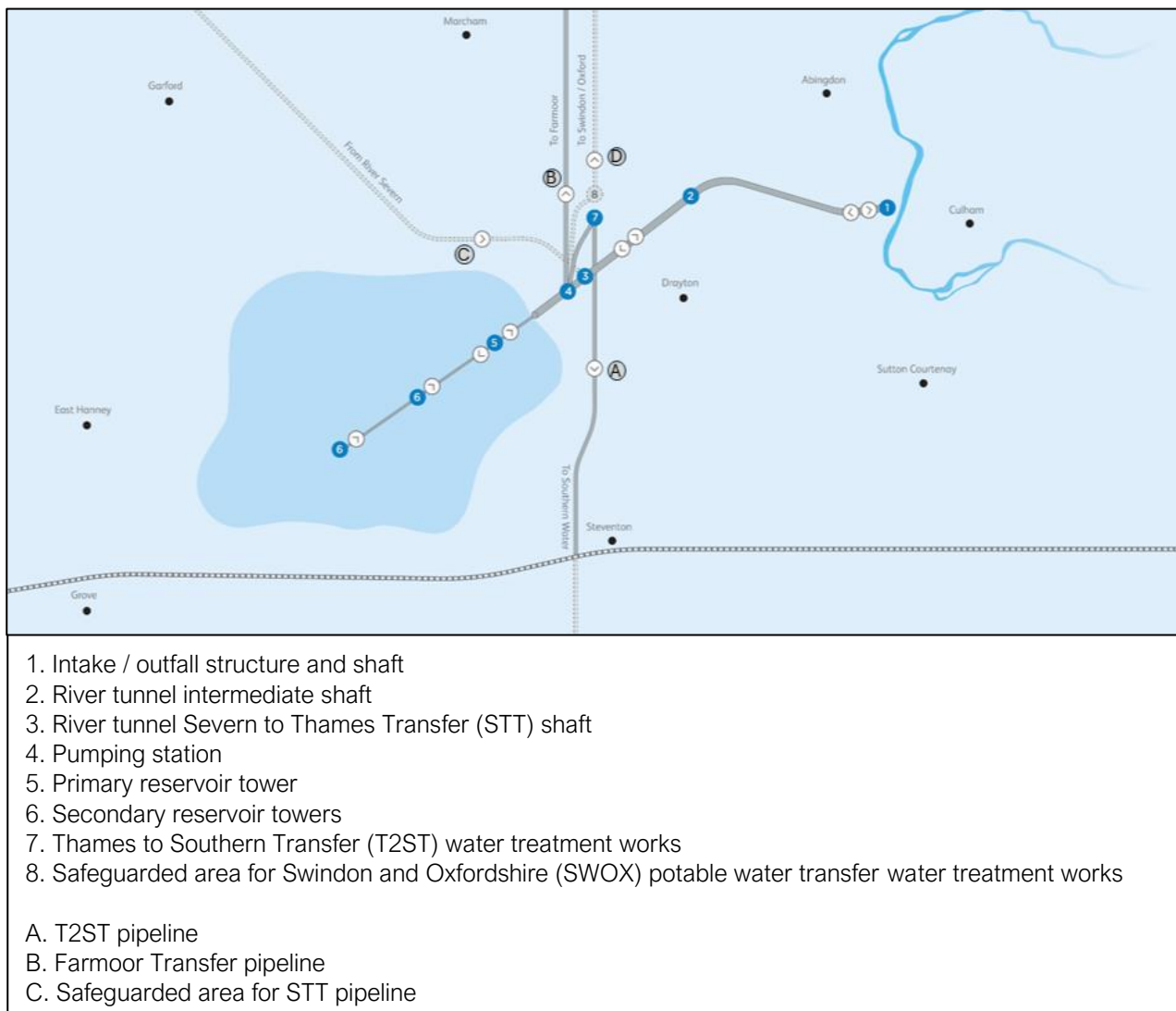
2.1 Introduction

- 2.1.1 This chapter provides a description of the Project and forms the basis for the preliminary environmental assessment provided in this Preliminary Environmental Information (PEI) Report. It describes key components of the Project, including embedded design mitigation (identified in the below text as [embedded design mitigation]), and how Thames Water anticipates it would be constructed, operated and maintained. Where Thames Water has applied parameters for the purpose of the assessment, these are also described in this chapter.
- 2.1.2 The design will continue to evolve based on the feedback received during the statutory consultation and further ongoing environmental and design work. The final assessed design will be presented in the application for development consent.
- 2.1.3 This chapter should be read alongside the following figures and appendices:
- Figure 2.1: Project overview
 - Figure 2.2: Construction elements
 - Appendix 2.1: Draft Code of Construction Practice
 - Appendix 2.2: Draft commitments register

2.2 Description of the Project

- 2.2.1 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 region of England currently 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 officially designated by the Environment Agency as ‘seriously water stressed’ (Environment Agency, 2021a).
- 2.2.2 The Project is vital infrastructure designed to provide a reliable and sustainable source of water for millions of customers served by Thames Water, Affinity Water, and Southern Water in Oxfordshire and the wider South East region. Located approximately 5km south-west of Abingdon in Oxfordshire, the reservoir and strategic inter-company water transfers will play a pivotal role in strengthening the region’s resilience to climate change, population growth, and drought risk. The Project would link to other strategic inter-company water supply projects, both directly and indirectly as noted in Plate 2-1.

Plate 2-1 Overview of SESRO with linked projects and key features (not to scale)



- 2.2.3 The Project is more than a reservoir; it will provide a place for people and nature.
- 2.2.4 As a place for people, it will include multi-functional spaces to enable new opportunities for walking, cycling, birdwatching, and education through enhanced public access and connectivity with local communities, integrated with recreational facilities and visitor parking.
- 2.2.5 As a space for nature it will include creation of new aquatic and terrestrial habitats, which will connect to natural systems across and beyond the reservoir site to support nature recovery and natural flood management.
- 2.2.6 Key Project features are shown on Figure 2.1: Project overview. The area within which the Project would be located is referred to as the draft Order limits. Within this Project description, this area is referred to as the Site. The reservoir and associated infrastructure would mostly be situated within an area bounded by the River Ock to the north, the A34 and the village of Steventon to the east, the Great Western Main Line railway to the south and, the A338 and village of East Hanney to the west (hereafter referred to as the Core Project Area, as shown on Figure 2.1: Project overview).

2.2.7 The Project comprises the following water resources infrastructure:

- Provision of a fully bunded raw (untreated) water storage reservoir with an operational capacity of 150 million cubic metres (Mm³).
- A pumping station at the base of the proposed reservoir embankment on the north-east side of the reservoir.
- The river tunnel to transfer flows between the pumping station and the River Thames via intake / outfall structures near Culham.
- The reservoir tunnels to transfer flows between the reservoir and the pumping station.
- Thames to Southern Transfer (T2ST) water treatment works (WTW).
- Sections of pipeline to facilitate transfers from the reservoir to Southern Water via T2ST and Farmoor, and infrastructure to allow connection to future transfer projects.

2.2.8 The proposed non-water resources infrastructure includes:

- Main access road into the Site from A415 Marcham Road.
- Diversion of the existing Steventon to East Hanney Road.
- Public access and parking.
- Improvements to highways outside of the Core Project Area, including the A34 Marcham Interchange.
- Two recreational lakes.
- Recreational facilities, including a Recreational Lakes Centre, Water Sports Centre on the reservoir embankment, Nature Education Centre and active travel provision.
- A network of Project Priority Areas for Biodiversity (PAB) to provide habitat creation, enhancement or species relocation.
- Watercourse diversions to both the east and the west of the reservoir.
- Provision for the Wilts and Berks Canal, this would be provided as a water channel to allow for future provision of operational features such as locks.
- Additional floodplain conveyance on the east bank of the River Thames and adjacent to the diverted watercourses in the Ock catchment.
- A groundwater drain encircling the reservoir.
- Provision of renewable energy infrastructure including floating solar, solar on structures and hydro-electric turbines. In addition, potential for ground mounted solar is being considered (but for the purposes of the PEI Report is assumed to be included) to replace three existing solar farms that would be lost as a result of the Project.
- Utility diversions, including the diversion of an existing 132kV overhead electricity cable, diversion of an existing gas main near Drayton Road and diversion of an existing gas main to the south of the reservoir embankment which would conflict with the proposed alignment of the Steventon to East Hanney Road diversion.
- Temporary rail sidings will also be required during construction, which will be removed upon completion. Some assets associated with the rail sidings may be adopted by Network Rail for ongoing use and maintenance during operation. An embanked area will be retained to provide landscape and habitat creation.

2.2.9 The Project would abstract and store water taken from the River Thames via intake / outfall structures near Culham, and potentially from a future Severn to Thames Transfer (STT) project (see Section 2.4, Links to other water infrastructure projects). Water would be

abstracted from the River Thames during high flow periods via tunnels and a pumping station and be stored in the reservoir.

- 2.2.10 Water from the reservoir would be released into the River Thames under gravity via the new tunnels and intake / outfall structure 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. The reservoir would also facilitate the transfer of water to Farmoor (via the Farmoor Transfer) and Southern Water (via the T2ST WTW) and provide the opportunity for a potential future transfer of potable water to the Swindon and Oxfordshire (SWOX) Water Resource Zone.
- 2.2.11 Construction of the Project is expected to take place over three phases (early works, enabling works and main works) see paragraphs 2.6.1 to 2.6.5 in Section 2.6 for details. An early works phase would commence in 2027 subject to separate consents as required, with enabling works taking place after the Development Consent Order (DCO) is granted (expected to be in 2028). The main works would commence from 2032 and are expected to be complete by 2043, taking approximately 12 years. The reservoir commissioning and filling would take place during the main works phase from 2039 to 2041. Water would be available for use from 2040.

Design Approach

- 2.2.12 Chapter 1: Introduction, Section 1.2, outlines the Project vision, which together with the design principles have continued to be developed and refined since Environmental Impact Assessment (EIA) Scoping stage. Alongside the Project's functional requirements, these set out a broader vision and strategic design framework that serve to deliver a holistic, coherent design approach, aiming to deliver **more than a reservoir**; embracing the reservoir's potential as **a space for nature** and **a place for people**. The intent behind the latter two aims is summarised below.
- 2.2.13 As **a space for nature** the Project aims to be integrated and sympathetic to local landscape character, connecting buildings with a common architectural style and incorporating planting to create a cohesive, functional, and visually appealing environment. This will include a network of Project PABs that will provide a blend of habitats in alignment with the Local Nature Recovery Strategy (Defra, 2023). The Project PABs will support the movement and survival of protected and priority species, fostering biodiversity and ecological resilience [embedded design mitigation].
- 2.2.14 As **a place for people**, the Project aims to support diverse activities that include sailing, water sports, bird watching and active travel. A placemaking and architectural strategy will help to ensure the Project offers inclusive, accessible, and multifunctional recreational spaces for both local residents and visitors, offering opportunities for nature and recreation, contributing to an improved quality of life: a destination with a lasting legacy [embedded design mitigation].
- 2.2.15 Since the EIA Scoping stage, the masterplan design has continued to evolve (an updated illustrative masterplan of the overall design concept is provided in Chapter 1: Introduction), with a clear emphasis on the overarching vision, whilst also responding to feedback from a range of **engagement and consultation** with the local community, stakeholders and consultees. The non-statutory public consultation period (June - August 2024) coincided with publication of the EIA Scoping report and encouraged feedback from a wide range of consultees. In addition, ongoing engagement with specialist technical stakeholders has

continued through collaborative meetings and workshops with several Technical Liaison Groups (TLGs). Another influence on the design approach during this period has come from engagement with the UK Design Council, in accordance with its voluntary design review role for Nationally Significant Infrastructure Projects.

2.2.16 Of particular relevance to EIA are the landscape and environmental design, which play a key part in shaping the masterplan. An understanding of landscape context and character has been embedded into the design process, with the wider landscape recognised as the integrating framework. Within that framework there have been some notable environmental design developments since the EIA Scoping stage, including:

- Design of Project PABs, in alignment with the draft Local Nature Recovery Strategy (LNRS), targeting priority locations for new and improved habitats of particular importance to local biodiversity. These areas aim to connect natural systems across and beyond the reservoir site, extending ecological value, helping to deliver Biodiversity Net Gain (BNG) requirements¹ and seeking to provide Environmental Net Gain, whilst also helping to integrate the new infrastructure into the wider landscape and provide multiple benefits for both people and nature.
- Refinement of the reservoir embankment design, drawing on landscape context and character studies. Crest profiles and the gradient of the outer face of the embankment have been sculpted with varying radii and undulations to echo other local landforms and reduce linearity and create a more natural visual profile.
- Increased woodland and scrub provision, strategically placed and designed to further the integration of the reservoir and associated infrastructure into the wider landscape, whilst softening and controlling specific views of the Project from key visual receptors.
- Enhancement of the visitors' experience of the new landscape, particularly the experience from the embankment crest, providing a series of spatial experiences, nodes and designed views from the crest path and connecting pathways.
- Further development of a recreation and amenity strategy, aimed at balancing more active areas with educational opportunities, quiet contemplative experiences and areas focused on nature conservation. Guided by community consultation outcomes, site-wide recreational opportunities have been enhanced, providing opportunities both for the local community and for visitors with a clustering of activities around the site (including Recreation Lakes Centre, Water Sports Centre, Nature Education Centre, and the crest experience), providing clear separation of uses to promote safety, comfort, and accessibility for all visitors. The strategy includes new routes for non-motorised 'active travel', along with long-term planning for potential future development, with safeguarded areas to accommodate possible future growth.
- Enhanced agricultural landscape – enhancement of areas of agricultural landscape, through betterment of retained woodlands, hedgerows and grassland.
- Avoidance of sensitive environmental receptors – sensitive environmental receptors have been avoided where possible. These include, for example, the Sutton Wick Settlement Scheduled Monument, the site south-east of Noah's Ark Inn Frilford Scheduled Monument, listed buildings / structures and rugby pitches north of Abingdon Sewage Treatment Works (STW).
- Designated ecological site protection from direct disturbance – Designated sites will be protected during construction from direct adverse effects where practicable. This will

¹ The UK Government propose introducing mandatory BNG for Nationally Significant Infrastructure Projects from May 2026.

include appropriate planning of drainage systems from hydrologically connected infrastructure to ensure that water quality and quantity does not deteriorate.

2.3 Design parameters and assumptions

- 2.3.1 Thames Water is still refining the design, with the refinement being informed by stakeholder engagement, consultation, and ongoing surveys and assessments. As such, an understanding of the likely significant environmental effects of the Project is continuing to develop, and the information provided within the PEI Report is therefore preliminary at this stage. The design may be subject to change before the production of the Environmental Statement (ES), as the design and assessment work develops, and feedback from consultation is taken into account.
- 2.3.2 To ensure a robust assessment of the current Project design, Thames Water is following the EIA guidance contained in Planning Inspectorate (PINS) Advice Note Nine: 'Rochdale Envelope' (PINS, 2018 (version 3, updated March 2025)). The advice note discusses the degree of flexibility that will be considered appropriate to address uncertainties within an application for development consent under the Planning Act 2008 process. The advice note states that the assessment of likely significant effects should establish relevant and reasonable parameters (i.e. assumptions) for the purposes of the assessment '*likely to result in the maximum adverse effect (the worst-case scenario) and be undertaken accordingly to determine significance*'.
- 2.3.3 This PEI Report is based on parameters for the design, construction and operation of the Project, particularly in terms of the maximum or minimum dimensions of Project components, i.e. their limits of deviation (LOD) and the range of potential uses and locations. The measurements referenced in the PEI Report in some cases are quoted to one decimal point which could be taken to imply a detailed level of design accuracy, however this is due to the application of a percentage uplift to the emerging design parameters to allow for design refinement. The use of design parameters is required at this stage of the Project to enable environmental assessments, consultation responses and technical considerations of the emerging design to further inform the proposals. Thames Water will continue to refine the design parameters as the design, EIA and associated assessments are progressed to inform the parameters that are secured through the DCO.
- 2.3.4 Where the Project description provides a range of parameters for particular Project components, or does not report on parameters for particular components because the design is not sufficiently progressed, the environmental aspects (e.g. Water environment, Aquatic ecology etc.) have developed parameters and assumptions specific to their assessments that represent the reasonable worst case scenario. These aspect-specific parameters and assumptions are documented in Chapter 5: Water environment to Chapter 20: Cumulative effects.

Embedding mitigation in design

- 2.3.5 Thames Water has included certain embedded design (also known as 'primary') mitigation in the Project to date, and this is identified in the below text as [embedded design mitigation]. This will be refined as part of the EIA process. Further information on the approach to mitigation is described in Section 4.6 in Chapter 4: Approach to the environmental assessment. This includes an explanation of the different categories of

mitigation as classified by the Institute of Sustainability and Environmental Professionals (formerly the Institute of Environmental Management and Assessment) (IEMA, 2024), and how these have been factored into the preliminary assessment of effects reported in this PEI Report. The full suite of proposed embedded design mitigation and standard good practice considered in the preliminary assessment is included in Appendix 2.2: Draft commitments register. Standard good practice mitigation to be applied during construction of the Project is also documented in Appendix 2.1: Draft Code of Construction Practice (CoCP). The Draft CoCP outlines how control measures and standards will be implemented throughout the construction works to mitigate effects on the local community and the environment.

- 2.3.6 The individual aspect Chapter 5: Water environment to Chapter 20: Cumulative effects set out aspect relevant embedded design and standard good practice mitigation that are assumed to be applied to the preliminary assessment, and these are also included in Appendix 2.2: draft Commitments Register. The aspect chapters also identify additional mitigation that is currently under consideration to reduce adverse effects that are initially anticipated to be significant in the preliminary assessment of effects.

2.4 Project description overview

Location and site context

- 2.4.1 The Project would link to other strategic inter-company water supply projects, both directly and indirectly as noted in Plate 2-1 and detailed in paragraphs 2.4.5 to 2.4.21 below. The draft Order limits of the Project are mainly within the Vale of White Horse District, with the exception of the far eastern extent on the eastern bank of the River Thames, which falls within the South Oxfordshire District. The Project is situated wholly within the County of Oxfordshire, and the draft Order limits encompass an area of approximately 3,719ha (37km²) (see Figure 1.2: Draft Order limits).
- 2.4.2 The reservoir and associated infrastructure would mostly be situated within an area bounded by the River Ock to the north, the A34 and the village of Steventon to the east, the Great Western Main Line railway to the south and, the A338 and village of East Hanney to the west (the Core Project Area). The draft Order limits extend east of the A34 for the intake / outfall structure on the River Thames and to the north, south and west for habitat provision (See Figure 2.1: Project overview).
- 2.4.3 There are also a number of isolated locations within the draft Order limits where supporting works are proposed to support the Project. These include the A34 to the east of Harwell at Rowstock and extending approximately 5.5km west from the southern part of the draft Order limits along a corridor following the Great Western Main Line railway.
- 2.4.4 The area within the draft Order limits is generally flat agricultural land, sloping gently from approximately 65m Above Ordnance Datum (AOD, a term used to describe height above mean sea level), along the Great Western Main Line railway in the south, down to 54mAOD along the River Ock in the north, and back up to 57mAOD north of the A415 Marcham Road. The agricultural fields are interspersed with 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, and three existing operational solar farms, two located to the north of Hanney Road in the centre of the draft Order limits and one to the east of the A338 in the west of the draft Order limits. 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, and these are outside of the draft Order limits.

[Links to other water infrastructure projects](#)

- 2.4.5 The direct interfaces with these other projects have been accounted for within the draft Order limits to enable future utilisation of the Project to reflect the requirements of the respective water company Water Resources Management Plans (WRMPs) and regional water resources planning. See Chapter 3: Consideration of alternatives for further detail.
- 2.4.6 The following two projects are planned to come forward by 2040:

[Thames to Southern Transfer \(T2ST\)](#)

- 2.4.7 One of the direct supplies from the Project would be to Southern Water, South East Water and Thames Water customers via the proposed T2ST WTW and a potable water transfer pipeline to Berkshire and Hampshire. The T2ST WTW is included within the Project parameters and draft Order limits as discussed in Section 2.4. The Project would install a section of the potable water transfer pipeline between the T2ST WTW and an area close to the railway.
- 2.4.8 The remaining components of the T2ST pipeline, under and beyond the railway, do not form part of the Project, and would be consented separately by Southern Water. The T2ST WTW and pipeline would be operated by Southern Water. Therefore, the potential for both projects to result in significant cumulative effects on common receptors during the construction of the remaining components and operation of the transfer has been considered as part of the cumulative effects assessment. The downstream environmental effects of T2ST, beyond the cumulative zone of influence outlined in Chapter 20: Cumulative effects is not considered in this PEI Report.

[Farmoor Transfer \(previously referred to as the Swindon and Oxfordshire \(SWOX\) raw water transfer\)](#)

- 2.4.9 The Water Resources Management Plan 2024 (WRMP24) published by Thames Water (Thames Water, 2024) indicates the need for a raw water transfer pipeline to support Farmoor Reservoir and supply Thames Water's SWOX Water Resource Zone. The Farmoor Transfer would allow water to be transferred by a pipeline from the Project to Farmoor Reservoir via a pump set in the pumping station. This would enable reduced abstraction from the River Thames at Farmoor (upstream of the Project) in certain flow scenarios and facilitate a 1 in 500-year level of resilience.
- 2.4.10 The Project would include a pump set within the pumping station allowing up to 150ML/d to be transferred, and a section of pipeline up to the south side of Marcham Road. The remainder of the pipeline would be delivered as a separate project, under a separate planning application, with water planned to be available for use by 2040. There are constructability and environmental benefits of providing the infrastructure for the Farmoor Transfer that falls within the draft Order limits as part of the Project construction rather than at a later date.
- 2.4.11 The remaining components of the Farmoor Transfer beyond the draft Order limits do not form part of the Project. Therefore, the potential for both projects to result in significant cumulative effects on common receptors during the construction of the remaining

components and operation of the transfer has been considered as part of the cumulative effects assessment. The downstream environmental effects of Farmoor Transfer, beyond the cumulative zone of influence outlined in Chapter 20: Cumulative effects is not considered in this PEI Report.

Potential future projects

- 2.4.12 In addition, the WRMP24 identifies the following projects as potentially required in the future if the demand reduction target is not achieved, these are on the 'adaptive pathway'. The adaptive pathway considers different future water resources scenarios to ensure the WRMP is adaptable to all of them. The following projects linked to the Project are on the adaptive pathway:

Severn to Thames Transfer (STT)

- 2.4.13 The STT project would comprise the transfer of water from the North West and the Midlands regions via the River Severn and a pipeline from the River Severn to the River Thames. Water would be discharged into the River Thames or the reservoir via the Project infrastructure.
- 2.4.14 The Project provides a shaft for a future pipeline connection from STT, to facilitate a future pipe connection without taking the Project out of operation. The Project provides a safeguarded corridor for a future STT pipeline within the draft Order limits, a below ground crossing at the Wilts and Berks canal to prevent future disruption to the ongoing operation of the Project, and space for a future turbine building in the Project pumping station. Including these components as part of the Project would enable future connectivity and reduce future development impacts to the operation of the reservoir.
- 2.4.15 The future need for STT is not confirmed, although the WRMP24 notes that there are a lot of uncertainties in planning ahead for the next 50 years. Thames Water is continuing to develop the transfer project as a reserve option to allow quick action if additional water is needed in the future. STT is not part of the Project and therefore the potential for both projects to result in significant cumulative effects on common receptors during the construction and operation of the transfer has been considered as part of the cumulative effects assessment. The upstream environmental effects of the STT, beyond the cumulative zone of influence outlined in Chapter 20: Cumulative effects is not considered in this PEI Report.

Swindon and Oxfordshire (SWOX) potable water transfer

- 2.4.16 If the water demand reduction target set out in the WRMP24 looks as though it would not be achieved, additional treatment assets may be required to treat water from the Project for transfer to the Swindon and Oxfordshire (SWOX) Water Resource Zone.
- 2.4.17 Space would be safeguarded within the draft Order limits for a future WTW and for future pumps within the pumping station and electrical equipment. Corridors for future feed and return pipelines to / from a SWOX WTW and for a potable water pipeline from a SWOX WTW are safeguarded within the draft Order limits. The Project would provide valves on pipework to enable future connection efficiencies should the SWOX potable water transfer project come forward and below ground crossings at watercourses and the water channel for the Wilts and Berks Canal to prevent future disruption to the ongoing operation of the Project.

- 2.4.18 The SWOX potable water transfer does not form part of the Project. Due to the uncertainty on need for this transfer, the timescale for delivery and limited design or other information being available, it has not been considered as part of the cumulative effects assessment in this PEI Report.

Downstream abstractions

- 2.4.19 The Project 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

- 2.4.20 Discharge of water from the Project into the River Thames would allow abstraction of water further downstream from the River Thames. Thames Water would abstract water using its Lower Thames Intakes. In addition, under some future scenarios, new water sources would be required for the Slough, Wycombe and Aylesbury (SWA) Water Resource Zone from 2050. The WRMP24 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 projects is required, and if so, which project. These downstream abstractions require no additional ancillary infrastructure as part of the Project and are therefore not assessed in this PEI Report.

Thames to Affinity Transfer (T2AT)

- 2.4.21 The discharge of water from the Project into the River Thames would also allow abstraction by Affinity Water. This is being progressed by their Thames to Affinity Transfer (T2AT) Strategic Resource Option (SRO). This requires no additional ancillary infrastructure as part of the Project and is therefore not assessed in this PEI Report.

2.5 The Project

Reservoir and associated infrastructure

Reservoir

- 2.5.1 The Project would provide an 'off-line' (i.e. separate from its water source, it would not dam the River Thames or Ock) and fully bunded (i.e. the reservoir will be fully contained by embankments) raw water storage reservoir that would support the delivery of improvements to drought resilience once it is available for use in 2040. The reservoir and associated infrastructure would be designed to the appropriate national and international standards to ensure safe operation [embedded design mitigation].
- 2.5.2 Inflows to the reservoir would be pumped from the River Thames and potentially from the STT if that project is progressed. Pumped inflows would be limited to 1,000 Million litres each day (Ml/d). The pumped inflows would cease at Top Water Level (the maximum water level that the reservoir would be filled to) and there would be fail-safes in place to ensure this happens.

- 2.5.3 The reservoir would have a capacity of 150Mm³ of water which would be available for use when the reservoir is full (referred to as the 'operational capacity'). A volume of approximately 9Mm³ would be retained below operational volumes.
- 2.5.4 There are two faces to the reservoir embankment. These are referred to as the inner face, which is in contact with the reservoir water, and the outer face on the dry side.
- 2.5.5 The reservoir embankments would be constructed of layers of clays excavated from the base of the reservoir and placed in horizontal layers and compacted to create the reservoir embankment, plus stone, gravel and sand used to protect the embankment from wave erosion and create drainage routes within the embankment. Additional clay and superficial deposits excavated from the Site would be used for landscaping above the structural core of the embankment on the outer face (and other landscaping around the Site).
- 2.5.6 The majority of the inner face of the reservoir embankments would be protected by rip rap (rock armour) at higher levels. There is the potential for use of open stone asphalt at lower levels.
- 2.5.7 In small areas, the inner face of the reservoir embankments may be made from concrete slabs, such as around the Water Sports Centre to allow for boat launching.
- 2.5.8 Typical cross sections of the embankments are shown in Plate 2-2 and Plate 2-3. The general arrangement of the reservoir embankments with towers within the reservoir and associated reservoir infrastructure is shown in Plate 2-4 below.

Plate 2-2 Typical Reservoir embankment cross-section at Water Sports Centre

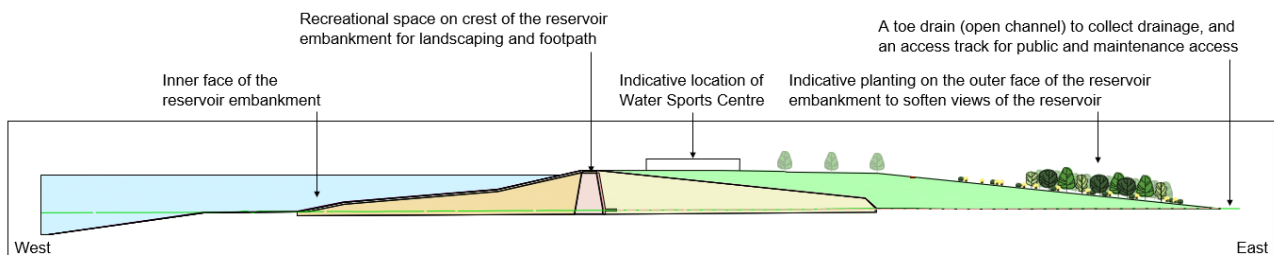
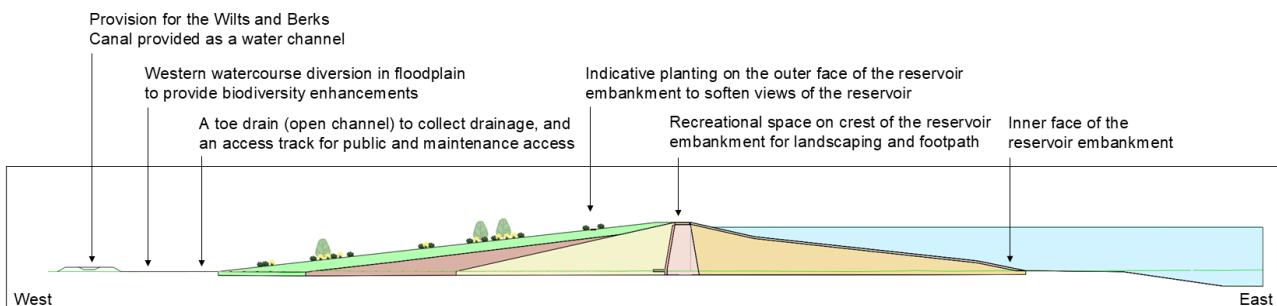


Plate 2-3 Typical Reservoir embankment cross-section

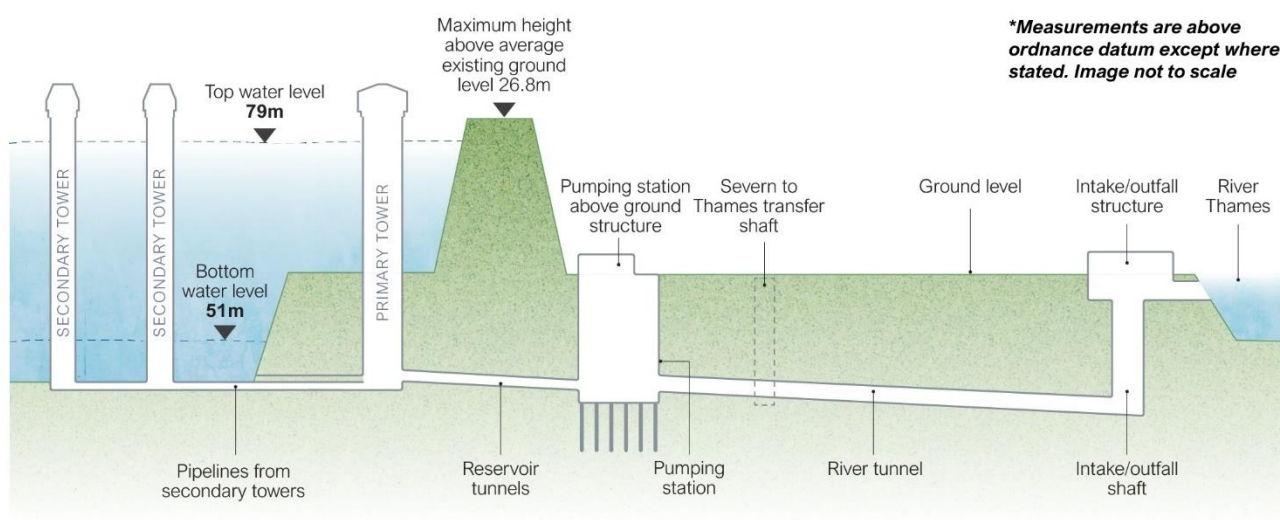


- 2.5.9 The recreational space on the crest of the reservoir embankment would typically be 17m wide, including space for landscaping. An access track would be in place around the crest of the embankment for public recreational use (for pedestrians and cyclists only),

maintenance, inspection and emergency access, with multiple access points to this around the reservoir.

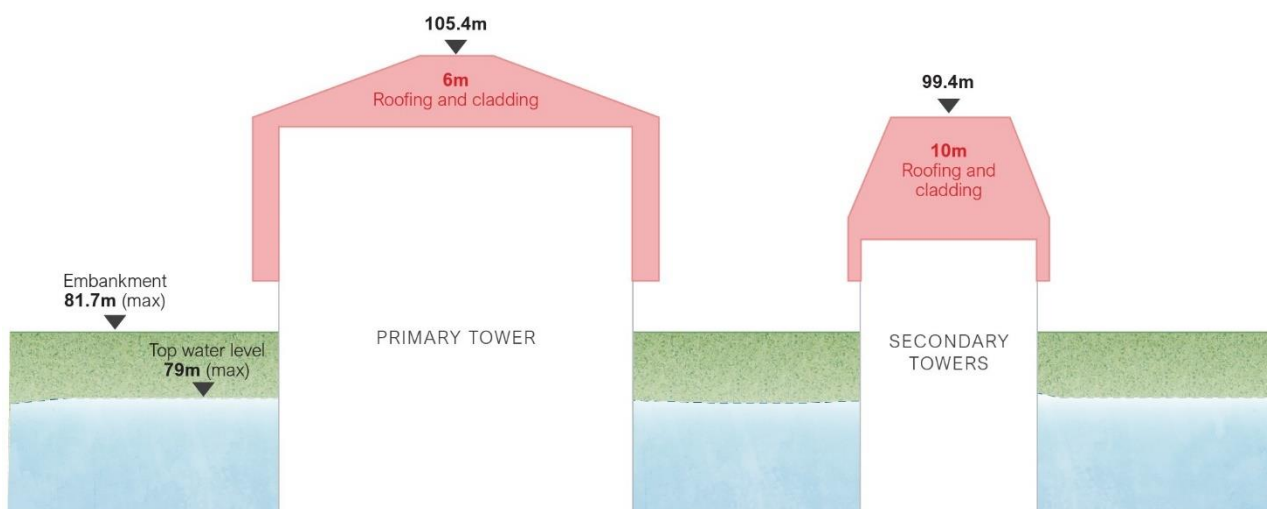
- 2.5.10 At various points this would further widen to accommodate features such as recreational facilities (e.g. Water Sports Centre area and café to be located on the crest) and environmental or landscaping enhancements (such as tree planting or lagoons on the inner edge of the reservoir) [embedded design mitigation]. If viewed from above, the embankment crest position would have a LOD of +20m / -60m (a move towards the centre of the reservoir if viewed from above is negative). The base of the reservoir embankment would be approximately 400m wide on average, varying to account for existing ground levels and topography.
- 2.5.11 The slopes of the outer face of the reservoir embankment would vary both spatially around the perimeter of the reservoir embankment and vertically up the height of the reservoir embankment faces, due to engineering requirements, landscaping, access roads, and recreational facilities. The gradient of the outer face of the reservoir embankment will typically be 1:9 but would vary between 1:3 and 1:10 as the slope undulates from the crest to the toe to provide a more natural appearance to the slope.
- 2.5.12 The toe position of the outer face of the reservoir embankment would have a LOD of +20m / -160m (a move towards the centre of the reservoir is negative). A toe drain would be located at the outer toe of the reservoir embankment. This would be an open channel to collect and monitor drainage. An access track would be in place around the toe of the reservoir embankment for the same purposes with access ramps connecting the two tracks. Access tracks may be surfaced with asphalt or unbound gravel.
- 2.5.13 The reservoir embankment would have a crest height of approximately 81.5mAOD, with a potential LOD of an additional 200mm, creating a maximum crest height of 81.7mAOD.
- 2.5.14 The existing ground level around the perimeter of the reservoir embankment varies (see paragraph 2.4.4) such that the height of the reservoir embankment above existing ground level ranges from a minimum of 14.9m to a maximum of 26.8m. The average height above existing ground level would be between 20.5m and 21.9m. This has increased since the preparation of the EIA Scoping Report, as explained in Chapter 3: Consideration of alternatives.
- 2.5.15 The reservoir would hold water at a 'top water level' of 79mAOD down to a bottom water level of 51mAOD. The base of the reservoir would be at approximately 46mAOD. The top approximately 1.4m of the reservoir embankment may take the form of a wave protection feature on the outer face. This would typically be a concrete structure, although it could take the form of a grass covered bund in places. The reservoir would have an adequate freeboard in the height of the embankment crest to allow for wind and wave effects and precipitation [embedded design mitigation].

Plate 2-4 Schematic showing design components of the reservoir and associated infrastructure



- 2.5.16 External protection against burrowing mammals may be required in any affected locations on the outer face of the reservoir embankment (e.g. a mesh would be laid, which would be buried beneath topsoil and grassed over) [embedded design mitigation].
- 2.5.17 Up to four reservoir towers would be required to control water entering and leaving the reservoir. The primary tower, which is closest to the pumping station, would be used for transferring water into the reservoir. The (up to) three other towers would be 'secondary' towers and would be used to draw-off (abstract) water from the reservoir at different locations and at varying depths. These would include screens to prevent fish in the reservoir entering the draw-off towers.
- 2.5.18 The primary tower would have a 32m diameter and a height up to 105.4mAOD. Secondary towers would have diameters up to 15m and a height up to 99.4mAOD. Plate 2-5 below shows these levels in context with the reservoir top water level.

Plate 2-5 Cross-section of tower designs with dimensions (relative to top water level and max embankment height) (not to scale)



- 2.5.19 Six to twelve electricity substations (up to 15m long, 6m wide and 4m high) would be sited around the toe of the reservoir embankment, to power recreational facilities and

instrumentation, and to collect power from floating solar panels and other renewable energy on site.

- 2.5.20 There would be an air mixing system within the reservoir, through which air is pumped from the pumping station and / or from compressor buildings (kiosks) and released from the reservoir bed. Kiosks would be equally spaced around the outer face toe of the embankment.

Reservoir design integrity

- 2.5.21 The reservoir would be designed in compliance with the Reservoirs Act 1975 (the Reservoirs Act). In accordance with the Reservoirs Act, construction would be overseen and certified by an appointed Construction Engineer. The Construction Engineer appointment would continue through the entire construction phase, through first filling and the initial years of operation. A Reservoir Advisory Panel made up of industry experts provide regular review of the design and construction activities and draw upon best practice from around the world.
- 2.5.22 The reservoir embankment and associated structures would be designed to national and international guidance documents, standards and best practice. These would include relevant UK guidance documents (Construction Industry and Information Association (CIRIA) documents, Institute of Civil Engineers (ICE) guides), Eurocodes and international standards, including International Commission on Large Dams (ICOLD) Bulletins, United States Bureau of Reclamation (USBR) and US Army Corp of Engineers (USACE) standards, amongst others. Critical structures will be subject to rigorous design reviews, including independent third party checks, and extensive monitoring and instrumentation systems will be deployed to monitor the performance of the embankment during construction, first filling and operation phases.

Reservoir security

- 2.5.23 A reservoir security strategy would be implemented into the design [embedded design mitigation], this would restrict vehicular access to the reservoir and include:
- Landscape design to restrict vehicular access to the reservoir
 - Controlled vehicular access to maintenance access roads to key assets and the crest of the embankment
 - Controlled access to water and egress slipways
 - Controlled vehicular access to the Water Sports Centre and recreational facilities.

Reservoir tunnels

- 2.5.24 The reservoir tunnels are currently assumed to comprise two underground tunnels containing pipework for transferring water in to the reservoir from the River Thames (or a future STT connection) and out of the reservoir to the pumping station for distribution to the River Thames, T2ST WTW or future connections to SWOX and / or Farmoor Reservoir.
- 2.5.25 In the unlikely event of an emergency, both tunnels would facilitate emergency discharge from the reservoir and discharge via the river tunnel into the River Thames, in order to release water from the reservoir quickly. To accommodate additional loading from the reservoir embankment, the reservoir tunnels would be reinforced with a secondary lining.

- 2.5.26 The tunnels from the Primary Tower (within the reservoir) to the pumping station would be approximately 625m long and approximately 7.7m in diameter externally.

Pumping station

- 2.5.27 The pumping station would connect to the reservoir via the reservoir tunnels, and to the River Thames via the river tunnel.
- 2.5.28 The pumping station substructure would house the mechanical infrastructure needed to lift water into the reservoir via the reservoir tunnels and the primary reservoir tower, and to deliver water to / from the T2ST WTW, Farmoor Transfer and potential future connections to a SWOX WTW. This structure is expected to be up to 153m long, 73m wide and extend to 20m below ground level. Piled foundations would be required below this structure
- 2.5.29 Above ground, buildings and a compound would be required. The building would be up to 120m long, 75m wide and up to 23m above ground level.
- 2.5.30 The building would be positioned above the pumping station structure and would potentially house a compressed air system for the reservoir air mixing system, as well as, welfare and maintenance facilities, and control equipment. Design measures would be implemented to ensure noise emissions are mitigated from the infrastructure [embedded design mitigation].
- 2.5.31 The pumping station compound would cover an area approximately 52,000m² (5.2ha) and provide up to 10 parking spaces for the workforce.
- 2.5.32 A foul pumping station within the pumping station compound would control foul water flows from the T2ST WTW (see paragraph 2.5.42) and the Project via a foul water pipeline that would connect to either Abingdon STW or Drayton STW through a further pipeline, where waste water would be treated. This is assumed to be a 200mm diameter pipe of up to 4.25km in length (to Abingdon STW) or up to 3.3km (to Drayton STW). Upgrade works may need to be carried out at either Abingdon STW or Drayton STW within the existing STW boundary. These upgrades are still being defined.

River tunnel

- 2.5.33 The river tunnel would transfer flows from the pumping station to and from the intake / outfall structures on the River Thames near Culham and would also facilitate drawdown of the reservoir in an emergency.
- 2.5.34 The river tunnel would have an external diameter of 7m generally. The tunnel length would be approximately 3.5km and be up to 23.5m deep (as measured at the centre point of the tunnel).
- 2.5.35 There would be three shafts on the river tunnel, one at the intake / outfall structure, one intermediate shaft for operational access adjacent to Drayton Road, and a third provided by the Project for connection to a future STT project (see paragraph 2.4.13).

River Thames intake / outfall structures

- 2.5.36 The intake and outfall structures would be situated on the west bank of the River Thames near Culham, alongside an associated compound, shaft and buildings for control and housing equipment. The intake system would include screening and pipework to transmit

flow from the River Thames through a shaft into the river tunnel and then subsequently into the reservoir via the pumping station and reservoir tunnels as shown on Figure 2.1: Project overview. A section of the west bank of the River Thames would need to be lowered to install these structures.

- 2.5.37 A debris boom would be installed in the River Thames to prevent floating debris from entering the intake area. Additional deterrents, including guard piles that would protrude higher than river flood levels, buoys and signage, would be installed to prevent unauthorised access to the intake area. It is envisaged that the permanent guard piles would extend approximately 10m into the River Thames. The structure would have a 2mm mesh screen to prevent eels and fish being drawn into the reservoir [embedded design mitigation].
- 2.5.38 The outfall structure would consist of a weir and spillway of approximately 40m width and 65m in length.
- 2.5.39 Scour and erosion protection in the form of granular fill to replace sections of the existing riverbed would be installed along a length of approximately 160m (10m width) on both the eastern and western sides of the River Thames. This would be required to protect the bed and the banks of the River Thames in close proximity to the intake and outfall structures [embedded design mitigation]. A localised area (10-15m stretch) of the eastern bank may require reinforcing with 300mm of rock block protection.
- 2.5.40 In order to mitigate effects of the works on upstream flood levels, a berm (lowered area of bank) would be formed on the eastern bank of the River Thames to provide additional flood compensation [embedded design mitigation]. This is assumed to be approximately 500m long and 90m wide and would be finished with landscaping / seeding to match the existing floodplain. Ground levels would be reduced by up to 2m. The River Thames path would be reinstated in its current form (rough grass track) on its present route at the reduced level of the berm with an additional path provided around the periphery of the berm to maintain access in times of high river flow when the berm is activated as flood conveyance.
- 2.5.41 The existing Abingdon STW outfall would be relocated to be downstream of the intake structure on the River Thames.

Thames to Southern Transfer (T2ST) water treatment works

- 2.5.42 The T2ST WTW design would consist of a series of buildings up to 16m above ground level, a water control tower building up to 26m above ground level, external tanks, smaller structures / kiosks, above and below ground pipework, car parking and security fencing. There would be a new access road from the main reservoir access road. The proposed layout would be designed to blend with the existing landform which has a gentle slope with a fall of around 8-10m across the site of the WTW. T2ST WTW provide up to 120MI/d of drinking water with an average utilisation of between 60MI/d and 80MI/d.
- 2.5.43 Water would be transferred from the reservoir to the T2ST WTW via a pump set and raw water pipeline from the pumping station. This is assumed to be around 1m diameter steel pipe of up to 1.44km in length.
- 2.5.44 The treated water from the T2ST WTW would be transferred to Southern Water's supply zone in Hampshire via a pump set and potable water pipeline from the T2ST WTW. Connections from the T2ST pipeline would also supply Thames Water customers in the Newbury area and South East Water customers in the Basingstoke supply area. The

Project would install the pipeline from the WTW to an area close to the railway only. This pipeline would be a 1.1m diameter steel pipe of up to 4.54km in length.

- 2.5.45 Southern Water (under a separate project) would install the remainder of the T2ST pipeline, which would be approximately 80-85km, ending in Hampshire. The remainder of the T2ST project is expected to be constructed and operational by 2040, but consent is being sought under a separate DCO application.
- 2.5.46 A waste water pipeline connection would take foul drainage from the T2ST WTW site to a foul pumping station within the pumping station compound (see paragraph 2.5.32).

Waterbodies

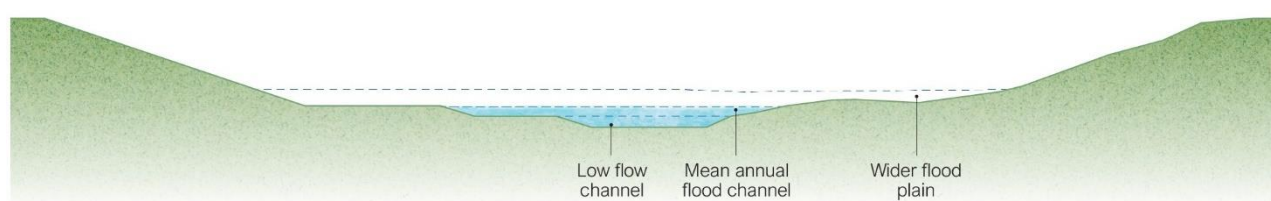
Watercourse diversions

- 2.5.47 Construction of the Project would require the diversion of existing watercourses which would intersect the footprint of the reservoir and associated infrastructure. These would be diverted around both the eastern and western sides of the reservoir before building the reservoir to provide replacement floodplain [embedded design mitigation]. These diverted watercourses would be formed of two-stage channels, consisting of a low flow channel and a mean annual flood channel, together with a wider floodplain to provide flood conveyance and compensation to ensure zero detriment to flood risk receptors, as illustrated in Plate 2-6. The maximum dimensions of diverted watercourses are shown in Table 2.1.

Table 2.1 Maximum dimensions of diverted watercourses

Watercourse Diversion	Maximum channel length (linear metres, Lm)	Maximum corridor width (metres, m)	Maximum channel width (m)	Maximum channel depth (m)
Mere Dyke Diversion (eastern)	6,570	65	9	2
Drayton North Ditch Diversion (eastern)	72	40	3	1.8
Cow Common Brook Diversion (eastern)	7,700	85	9	2
Landmead Ditch Realignment (western)	396	65	20	3.9
River Ock Realignment	790	55	30	3.7

Plate 2-6 Example imagery of a two stage channel



- 2.5.48 The eastern watercourse diversion would begin south of the reservoir and divert flows from the existing Steventon Ditch West, Orchard Farm Ditch, Mere Dyke East and Mere Dyke West and tributaries south of the reservoir. The existing Steventon Ditch East and roadside ditches near the village of Drayton would largely be retained and would flow into the eastern watercourse diversion.
- 2.5.49 The western watercourse diversion would involve the rerouting of Cow Common Brook, East Hanney Ditch and Portobello Ditch. This would begin at the south of the reservoir, just north of the existing railway, and runs along the western side of the reservoir before flowing into the existing Landmead Ditch. The western watercourse diversion would pass under the proposed route of the water channel for the Wilts and Berks Canal.
- 2.5.50 The design of the watercourse diversions would prioritise the preservation of natural flow regimes to accommodate water flows (including during times of flood), minimisation of erosion, provide enhancement of aquatic habitats [embedded design mitigation], to meet Water Framework Directive (WFD) Regulations requirements, and to contribute to BNG.

The Wilts and Berks Canal

- 2.5.51 A section of the historic Wilts and Berks Canal lies within the area or land that would be needed for the new reservoir and would be lost during construction. To compensate, the Project would create a new channel, which would hold water within it, to allow for the future provision of a canal [embedded design mitigation]. The new channel would be constructed on a realigned route through the Site.
- 2.5.52 The design of the new channel would respect the canal's heritage but also allow for future navigation if locks were added later [embedded design mitigation]. The channel would be wide enough for two narrowboats to pass in the future, with a clay or membrane lining to hold water. A towpath would run alongside the channel, with crossing points where the route meets roads, paths and cycleways. The channel would widen to provide space for turning points (winding holes). A side weir would be built at the downstream end, ensuring that during high flows, water would safely discharge into the River Ock rather than overtopping the canal.

Recreational spaces, facilities and access

- 2.5.53 An overarching design principle for the Project is to develop an inclusive, accessible and multi-functional recreational facility for both local residents and visitors. Based on current information, it is estimated that 1.058 million visitors could visit the Site per year. Daily visitor numbers are expected to peak at approximately 8,000, for example on a typical August weekend day.
- 2.5.54 The Project would provide extensive new areas of publicly accessible green and blue spaces for recreation with a wide range of facilities with leisure opportunities, plus new routes for non-motorised 'active travel'.
- 2.5.55 Key recreational facilities are arranged in three locations around the reservoir:
- Recreational Lakes Centre
 - Water Sports Centre
 - Nature Education Centre.

Main site access road

- 2.5.56 The main access road to the reservoir for public and workforce vehicles would be via a new road that would tie into the A415 to the west of the A34 Marcham Interchange via a new proposed 3-arm roundabout. The roundabout would be constructed largely without disrupting traffic flows. Traffic control would be used to direct traffic when completing the roundabout and road integration. The roundabout has been designed to accommodate a future fourth arm (which would be consented separately) if required to accommodate the potential future Dalton Barracks development. The alignment of the access road would actively support the delivery of the Abingdon Flood Alleviation Scheme proposals as developed by the EA in 2018.
- 2.5.57 This 3km road would provide the main access road to the main visitors' car park, Water Sports Centre, Recreational Lakes Centre, pumping station and water treatment works.

Recreational buildings (general)

- 2.5.58 The recreational buildings will be located in various positions around the reservoir embankment. Where these are located on the reservoir embankment outer slopes, terraces would be formed to avoid additional structural load on key internal components of the embankments and to reduce visual impact, including on National Landscapes (formally Areas of Outstanding Natural Beauty (AONB)) [embedded design mitigation].
- 2.5.59 Buildings would vary in height according to function, it is assumed at this stage that the tallest buildings would be the Reception building and Visitors Centre at a maximum height of 14m. These larger buildings would not be located on the crest of the reservoir embankment. Buildings and structures proposed on the crest of the reservoir embankment are limited to one café, and the series of buildings associated with the Water Sports Centre. All structures and associated foundations proposed to be sited on the crest or slopes of the reservoir would be designed to maintain the integrity and safety of the reservoir embankment as a whole.
- 2.5.60 The extent and position of glazing will be designed to minimise reflectivity of buildings when seen from local receptors and the National Landscape [embedded design mitigation].

Recreational Lakes Centre

- 2.5.61 Two recreational lakes (east and west) are proposed to the north-east of the Site. One recreational lake is to be provided for nature and fishing and the other one for activities such as swimming, paddleboarding and sailing. These recreational lakes would be lined and fed by a sweetening flow (from a source on Site to be confirmed) to retain water levels throughout the year [embedded design mitigation]. These lakes would be approximately 3ha and 5.5ha in surface area, the smaller of the two lakes would be for nature and fishing. The requirement for lining of the lakes would be confirmed by local ground investigation, however for the purposes of the PEI Report it is assumed that a lining would be included, comprising a layer of clay around 300mm thick that would be excavated from within the draft Order limits. An accessible entry to the water would also be provided. Key parameters for the recreational lakes and Recreational Lakes Centre are noted in Table 2.2 and Table 2.3.

Table 2.2 Key parameters for the recreational lakes

Design Element	Parameter and units	Limit of deviation (positive and negative)	Maximum value (for PEI Report assessment)
Area	8.5 ha	+1 -2 ha	9.5 ha
Depth	2.5 m	+1 -1m	3.5 m

Table 2.3 Key parameters for PEI Report assessment – Recreational Lakes Centre

Building List	Approximate Footprint (sqm)	Height (m) above final ground level	Potential Height Deviation (m)	Total Height (m)
Cafe	400	8	+4	12
Reception / Information	150	12	+2	14
Changing facilities	400	8	+2	10
Outfitters	400	8	+4	12
Education centre	550	8	+4	12
Utilities compound	100	4	+4	8
Visitor Centre, Mobility and Active Travel Hub	150	8	+2	12
Visitor Centre	900	12	+2	14
Café on the embankment	400	8	+4	12
Public toilet blocks	150	8	+2	10

Water Sports Centre

2.5.62 The Water Sports Centre would be located adjacent to the reservoir on the crest of the embankment and would facilitate use of the reservoir waterbody by non-motorised watercraft. No motorised craft would be authorised except for those required for emergency or operational requirements [embedded design mitigation]. The centre would have the following provision in alignment with Royal Yachting Association (RYA) and Sport England best practice:

- Seven slipways, a provision that aligns with both user needs and industry standards. One of the seven slipways would be a minimum 15m wide to accommodate heavy equipment accessing the reservoir for emergency and maintenance purposes. Slipways would follow the slope gradient of the embankment with the exception of at least one, which would be accessible at 1:12.
- A dedicated laydown area would be provided at the top of the embankment crest adjacent to the maintenance slipway to facilitate the storage and manoeuvring of various equipment, including trucks, cranes, maintenance boats, tugboats, pontoons, barges to access and remove valves and other equipment from the reservoir towers.

- 25sqm space will be allocated for a future winch house in the laydown area centred on the maintenance slipway.
- A boat store to house two maintenance boats for Thames Water would be adjacent to the larger maintenance slipway.

2.5.63 Key parameters for the Water Sports Centre are noted in Table 2.4.

Table 2.4 Key parameters for PEI Report assessment – Water Sports Centre

Building List	Footprint (sqm)	Height (m)	Potential Height Deviation (m)	Total Height (m)
Water Sports Centre (with accessible access)	900	12	+2	14
Water Sports Centre Changing facilities	400	8	+2	10
Boat store and maintenance	400	8	+4	12
Safety boat store and lookout	150	12	+4	16
Thames Water maintenance boat store	200	8	+4	12
Public toilet blocks	150	8	+2	10
Winch House	50	4	+4	8
Utilities compound	100	4	+4	8

Nature Education Centre

2.5.64 The Nature Education Centre would be located to the south-west of the reservoir.

2.5.65 A possible integrated constructed wetland is currently being considered near the Nature Education Centre, as part of a nature-based solution to treating foul discharge from the proposed buildings in this area. An alternative harder-engineered approach may be adopted as the final design solution at this location.

2.5.66 Table 2.5 provides the key parameters of the Nature Education Centre.

Table 2.5 Key parameters for PEI Report assessment – Nature Education Centre

Building List	Approximate Footprint (sqm)	Height (m)	Potential Height Deviation (m)	Total Height (m)
Cafe	150	8	+4	12
Education Centre	250	8	+4	12
Public toilet blocks	100	8	+2	10
Observation tower	150	16	+4	20
Utilities compound	200	4	+4	8

Other recreational buildings

2.5.67 The Project includes other recreational buildings including toilet blocks and bird hides. The parameters for these buildings are shown in Table 2.6.

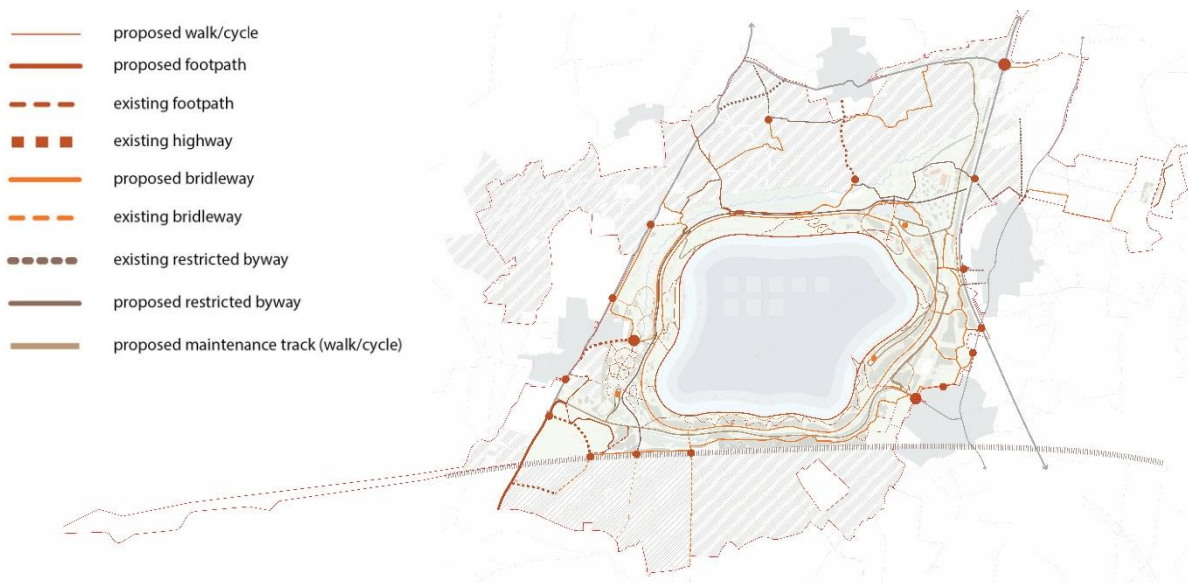
Table 2.6 Key parameters for PEI Report assessment – Site wide buildings

Building List	Footprint (sqm)	Height (m)	Potential Height Deviation (m)	Total Height (m)
Public toilet blocks	100	8	+2	10
Bird hides	100	8	+4	12

Active Travel / Public Rights of Way

2.5.68 The active travel proposals would connect the proposed recreational amenities and reservoir to local villages and the existing Public Right of Way (PRoW) network. Plate 2-7 shows an indicative hub and spoke model that places the Project at the centre of a new network of routes. A safe, effective and attractive network would link together the local areas of population.

Plate 2-7 Indicative hub and spoke model showing emerging pathway strategy (not to scale)



2.5.69 Several PRoW currently run through the area within the draft Order limits and cater for a wide range of users. Existing routes, in particular existing points of access, would be retained where possible [embedded design mitigation].

2.5.70 The majority of active travel routes would be accessible to all users regardless of mobility needs; alternative paths would be available where topographical constraints could render a route unsuitable for inclusive access.

2.5.71 Active travel provision could include:

- Provision for walkers, wheelers and cyclists alongside the Steventon to East Hanney road diversion. Horse riders would be able to use the main carriageway or bridleways within the wider active travel network proposed to be provided.

- Provision on the canal towpath for walkers and cyclists, and horses associated with pulling narrow boats.
- Footway improvements connecting to the Site along Hanney Road, Steventon
- Improvements to active travel facilities at the A34 Marcham Interchange and alongside the A415.
- A range of paths for walking, wheeling, cycling and horse riding would connect into the existing PRow network surrounding the Project.
- An access track around the crest for public recreational use (walking and cycling only) and maintenance and inspection, with multiple accesses to this from approximately each 'corner' of the reservoir.
- Walking and cycling provision as part of junction designs to ensure safe movement along key routes between nearby settlements and the Project.

New pathways

- 2.5.72 There would be new pathways to enable access for pedestrians, cyclists and horse riders. Some paths would be for pedestrians only. The Project would also include upgrades and extensions to bridleways, which would accommodate pedestrian, cyclist and equestrian users.
- 2.5.73 Table 2.7 lists the current proposals for new pathways. The classification of each pathway e.g. public footpath, bridleway, is not confirmed at this stage. For the purposes of assessment, a 5m maximum width is assumed for pathways subject to confirmation of the pathways' classifications. The 5m maximum width allows for overgrowth of planting adjacent to paths as it matures, boat access / mooring alongside the canal, or for additional width adjacent to a vertical feature.

Table 2.7 Key parameters for pathways

ID	Component of the Project	Approximate length
1	Embankment crest track (shared with maintenance vehicles)	10,380m
2-1	Embankment toe track (shared with maintenance vehicles)	11,800m
2-2	Embankment toe pathway	11,860m
3	South connection (Abingdon Lane)	1,900m
4	South-west connection (East Old Man's Lane)	3,980m
5	South connection (railway and road)	5,230m
6	South connection (reservoir embankment)	3,400m (as a network of bike trails)
7	West connection (reservoir embankment)	1,040m
8	North connection (reservoir embankment)	750m
9	East connection (reservoir embankment)	1,300m
10	East connection (Eastern Rivers)	9,500m
11	West connection (Western Rivers)	6,260m

ID	Component of the Project	Approximate length
12	North-west connection (Field Barn Farm access)	580m
13	East connection (reservoir to A34)	1,810m
14	North connection (Mill Road)	1,450m
15	North connection (crematorium to WTWs)	3,810m
16	North-east connection (Garford to Marcham)	5,850m
17	North connection (Frilford)	2,150m
18	Nature Education Centre north connection	560m
19	Nature Education Centre north-west access	760m
20	North-east connection (reservoir embankment)	2,090m
21	Recreational ponds track	2,570m
22	Canal towpath	8,670m
23	East connection from A34 (intake / outfall site)	4,370m
24	A415 Marcham Road	1,110m

Canal and watercourse crossings

- 2.5.74 New crossings of watercourses will be avoided where practicable, with a preference to use existing crossing points and structures wherever practicable [embedded design mitigation].
- 2.5.75 The access network does however include several crossings of watercourses and the water channel for the Wilts and Berks Canal (these are shown on Figure 2.1: Project overview). Bridges or culverts would be provided where pathways cross watercourse diversions, canals and ditches. Bridges would be provided on main rivers and watercourses covered by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the WFD Regulations), whereas culverts would be provided across ditches.
- 2.5.76 Boardwalks would create a network of paths though the wetlands area on the western side of the Site. Most of these would be for pedestrians but further design development may lead to some catering for cyclists and for horse riders as well due to demand from equestrians in East Hanney.
- 2.5.77 Design of the approach ramps to crossings would take account of inclusive access for wheelchair users and other mobility impairments, access for cyclists and, in some locations, access for horse-drawn carriages where demand is identified. The working assumption is a gradient of 4.5% (1:22) with landings at appropriate intervals to provide users with an opportunity to rest.

Active Travel in highways

- 2.5.78 The Project includes the Steventon to East Hanney road diversion, with a shared cycle track on one side. The new cycle track would have a 30kph design speed aimed at road

cyclists rather than the slower cycling that would be seen from recreational users on routes around the reservoir area.

- 2.5.79 A two-way cycle track would also be provided alongside the main access road, tying into the shared footway / cycleway that runs along the A415. Table 2.8 below summarises the dimensions for active travel alongside highways, including the distance and separation from the carriageway.

Table 2.8 Dimensions for active travel alongside highways

Facility	Width	Distance and separation from carriageway
Footway	2.0m	5.0m adjacent to swale 8.0m adjacent to cycle track
Two-way cycle track	3.0m	5.0m adjacent to swale
Bridleway	3.0m	5.0m adjacent to swale

Permanent car parking

- 2.5.80 The two main car parks are proposed to be located to the south-west and north-east of the reservoir, as part of the Nature Education Centre and Recreational Lakes Centre respectively. There is a further car park associated with the Water Sports Centre plus smaller areas for parking distributed around the recreational lakes area, which would be accessed from the main access road, and at two trailheads. Table 2.9 below identifies the locations of car parks and the number of spaces assigned to each.

Table 2.9 Locations of car parks and the number of spaces assigned

Location	Approximate number of spaces
Recreational Lakes Centre main car park	400 Permanent Spaces 400 Overflow
Recreational Lakes Centre lakeside area	50 permanent spaces (distributed around the rec. lakes)
Water Sports Centre	200 permanent spaces, overflow accommodated in the boat store area
Nature Education Centre	100 permanent spaces 100 Overflow
Trailhead at Steventon	25
Trailhead at East Hanney	25

Habitat design

- 2.5.81 A network of Project PABs is incorporated within the draft Order limits [embedded design mitigation] that would provide a blend of habitats in alignment with the Local Nature Recovery Strategy – these are shown on Figure 2.1: Project overview. The purpose of the Project PABs is to provide sufficient space to develop ecological mitigation for adverse effects associated with the direct disturbance to habitats and species and provide habitat

enhancement to contribute to BNG requirements. The design of the Project PABs will continue to evolve to reflect the outcome of environmental surveys and ongoing design development.

- 2.5.82 The Project PABs include the creation of habitats in and around the Core Project Area, plus additional habitats within the wider draft Order limits (see Figure 2.1: Project overview). It is assumed that all existing habitats in the Core Project Area would be lost during construction, except small areas of retained habitat to the north of the railway line. In areas where habitats would be lost, it is anticipated that proposed new habitats would be created towards the end of the construction programme.
- 2.5.83 Habitats in the wider draft Order limits would be established as early as practicable in the programme and would either be an enhancement of existing habitats or creation of new habitats (assumed to be 515ha woodland / grassland creation).
- 2.5.84 Where possible, planting including blocks of woodland and hedgerows, other habitats, and / or landforms are strategically located and designed to reduce visual impacts of new infrastructure [embedded design mitigation].
- 2.5.85 Note that more detailed habitat creation and enhancement proposals are subject to ongoing design development and the results of further surveys.
- 2.5.86 Widely spaced small trees and shrubs such as hawthorn would form woodland planting on the embankment outer face.
- 2.5.87 For proposed wetland areas, it is assumed that there would be sufficient water availability to create a range of aquatic habitats including floodplain grazing marsh habitat to the west of the reservoir.
- 2.5.88 All ditches would be used for the conveyance of water, some would be designed to be dry at certain times of the year to aid certain flora and insects, whilst others would be designed to remain wet (these would be clay lined) to provide habitat for water voles, otter, fish and invertebrates amongst other species. The main watercourse diversions would also be clay lined to keep them wet all year round [embedded design mitigation].
- 2.5.89 There would be public access to most of the areas close to the reservoir, with certain areas having restricted access to provide sanctuary for wildlife. Within the draft Order limits, but outside the Core Project Area, public access would largely be restricted to existing Public Rights of Way.
- 2.5.90 The reservoir design includes the provision of floating islands, which would be planted with a range of different native species which would also provide further habitat for birdlife.

Renewable energy provision

Floating solar energy generation

- 2.5.91 Floating solar panels [embedded design mitigation] are proposed on the reservoir waterbody. These are assumed to be located within the area shown in Figure 2.1: Project overview. Panels would cover approximately 6% of the reservoir surface area when full (not the entirety of the area shown in Figure 2.1: Project overview). It is anticipated that the floating solar panels would generate approximately 40 megawatts (MW) at peak.

Solar energy generation on structures

- 2.5.92 The integration of solar panels on buildings and carports within the car parks is proposed [embedded design mitigation] and the design will consider the effects on landscape. The provision of solar panels on the T2ST WTW is also being considered. A battery energy storage system is being considered and assessed as part of the Site wide energy strategy [embedded design mitigation] to confirm the appropriate size and locations. It is assumed to be a 6MWh storage system located within the main pumping station compound.

Ground-mounted solar energy generation (solar farm reprovision)

- 2.5.93 Consideration is being given to the provision of 69.5MW of ground based solar generation where existing facilities within the Core Project Area would be removed during construction of the Project [embedded design mitigation]. The solar arrays would be approximately 0.8m from the ground with dedicated transformer enclosure(s) up to 4m high. Panels would be up to 4.5m high, with space provided for landscape and ecological improvements around the edges of the solar farm reprovision area. Associated equipment would be provided, such as inverters, transformers, a substation and new buried cabling to an existing grid connection at Drayton. The proposed location for this reprovision is show in Figure 2.1: Project overview.

Hydropower

- 2.5.94 An energy recovery system (hydro-electric energy recovery turbines within the pumping station) would be provided to generate energy when water is released from the reservoir to the River Thames [embedded design mitigation]. This is anticipated to provide up to 442 MWh in a typical year.

Highways and roads

- 2.5.95 With the exception of the replacement Steventon Road to East Hanney, there would be no vehicular through-route through the draft Order limits between the A415 and the realigned East Hanney to Steventon Road for the public. Public access into the water sports and recreational lake centres would be via the main access road (see above section on Recreational spaces, facilities and access) which would tie into the A415 to the west of the A34 Marcham Interchange. Public access would also be available from the diverted Steventon to East Hanney Road into the Nature Education Centre.

Steventon to East Hanney Road diversion

- 2.5.96 The existing Steventon to East Hanney Road is made up of the Steventon Road (to the west) and Hanney Road (to the east). This would be realigned to the north of the Great Western Main Line to ensure connectivity between East Hanney, Steventon and beyond is maintained during construction and operation of the Project. This route alignment was chosen to reduce effects on surrounding sensitive environmental receptors including the North Wessex Downs National Landscape, agricultural land, the historic environment and aquatic receptors [embedded design mitigation].
- 2.5.97 The route would consist of approximately 5km of new highway with a proposed 3-arm roundabout connecting to the A338 at the western end and merging into the existing alignment on the approach to Steventon village at the eastern end. Noise bunds

[embedded design mitigation] approximately 4m in height would be provided where relevant on the southern side of the new road, as close to the road alignment as possible, in order to mitigate noise from the road to existing receptors including Bradfield Barn (near East Hanney) and residents in Steventon.

- 2.5.98 The newly diverted road would come into operation whilst the reservoir is under construction and remain in place following completion of the works [embedded design mitigation]. It is assumed that the proposed highway would be in full operation prior to any works within the draft Order limits impacting the existing road.

Steventon Road (West)

- 2.5.99 Parts of Steventon Road would be lost under the footprint of the Project. The remaining portion of the existing Steventon Road towards the western extent of the draft Order limits, near to the junction with the A338, would be retained to provide access to adjoining properties and residential streets. A turning head would be provided at the point of stopping-up.
- 2.5.100 The section of the road beyond residential properties would be reinstated on a revised alignment, providing onward walking, cycling and horse riding provision into the Site. A small car park of approximately 25 spaces is to be provided near the point of stopping-up. Two structures would be required to carry the alignment over the western watercourse diversion and water channel for the Wilts and Berks Canal.
- 2.5.101 To restrict antisocial parking a traffic regulation order for parking restrictions along the retained section of Steventon Road and potentially surrounding residential street entrances would be applied; they are not proposed to apply to local residents. Other measures could include CCTV, lighting and access control to the proposed car park, increasing security and avoid dark spaces which may provide space for anti-social behaviour.
- 2.5.102 The existing footway close to existing bus stop provision would be extended between the new entrance into the Site and the junction with the A338.

Other highways works

- 2.5.103 There is a potential need for other improvements to highways outside of the Core Project Area. These are labelled on Figure 2.1: Project overview and are expected to include improvement works at:
- **T&T1** – potential need to provide improvements at the junction of the A338 Oxford Road and Kingston Road in Frilford should third party improvements not progress. This is to be confirmed after further strategic transport assessment is undertaken.
 - **T&T2** – potential need to provide improvements at the junction of the A415 and Howard Cornish Road in Marcham, to be confirmed after further strategic transport assessment is undertaken.
 - **At A34 Marcham Interchange - T&T3, T&T5, T&T7 and T&T19** – to upgrade slip roads, provide a temporary construction compound, and a new temporary construction access via Tesco car park roundabout, possible signalisation upgrades of the junction and active travel upgrades, with some works being required outside the existing highway boundary.

- **T&T4** - at A415 to construct a new roundabout to provide access into the Site and some extended capacity and active travel improvements on the A415, outside the existing highway boundary.
- **T&T6** – works to convert an existing layby south of Milton Interchange as mitigation for the potential loss of a layby south of A34 Marcham Interchange should access be provided directly from the Site onto the A34 during construction. This may require localised earthworks and widening to the existing carriageway.
- **T&T8** – on Marcham Road / B4017 including temporary works associated with construction vehicle access and active travel infrastructure works on approach to the A34.
- **T&T9** – north of Drayton to provide an access to the river tunnel intermediate shaft compound from the B4017 Abingdon Road.
- **T&T10** – an upgrade to the existing Stonehill Lane to provide construction vehicle access to the River Thames intake / outfall structure location.
- **T&T11** – potential conversion of existing layby south of A34 Marcham Interchange on western side of carriageway to provide construction access directly from the Site onto the A34 (see 2.6.21 for further detail) , including localised vegetation clearance.
- **T&T12** – at the junction of the A417 Wantage Road, Newbury Road, Reading Road and the A4130 at Rowstock for construction vehicle access.
- **T&T14 and T&T16** – potential temporary access works on the A338.
- **T&T17** – the use of temporary access rights on a private road connection to Drayton Sewage Treatment Works (STW).

Drainage strategy

- 2.5.104 In accordance with the requirements of the National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2021), local planning policy and associated guidance, surface water runoff rates for storm events would be restricted to the equivalent greenfield runoff rate. To make productive use of the water, it is anticipated that the on-site drainage system would convey flows to areas of the Site where it would be used to support environmental and amenity enhancements, such as seasonal wetlands and the water channel for the Wilts and Berks Canal [embedded design mitigation].
- 2.5.105 The reservoir has been sized such that the volume of water falling into the reservoir body from a rainfall event would not be large enough for the freeboard to be overtopped.
- 2.5.106 Landforms would be sloped to allow flows to travel either towards the new watercourse channels or into the landscape drainage.

Road drainage

- 2.5.107 The road drainage design would avoid any increase in surface water runoff from new impermeable surfaces including carriageways and non-motorised user (NMU) paths, and to ensure no unacceptable impacts to water quality in receiving watercourses [embedded design mitigation]. It would also seek to maximise BNG contributions and amenity gains from the new infrastructure.

Groundwater drainage

- 2.5.108 Construction of the reservoir and embankments would alter groundwater flow and levels within the underlying superficial deposits aquifer by changing flow pathways. To avoid an increase in groundwater flood risk, a groundwater drain would be put in place alongside construction of the reservoir to encircle the reservoir embankments [embedded design mitigation] to provide a groundwater flow pathway and avoid increases in groundwater levels. This would be a trench approximately 14km in length, up to 5m wide and 7m deep. The trench would be extended through the full thickness of superficial deposits to the underlying clay.
- 2.5.109 This high permeability trench would convey groundwater from the area to the south of the reservoir to an area north of the reservoir, in line with existing groundwater flows. The drain would discharge to the eastern watercourse diversion and into the River Ock, without increasing downstream flood risk (see paragraph 2.5.47 for details of watercourse diversions and floodplain compensation measures).
- 2.5.110 This groundwater drain would be constructed as the earthworks commences for the reservoir embankments and would remain as a permanent feature in operation.

Security

- 2.5.111 Security measures would be in place to mitigate risks of unauthorised access to operational areas of the reservoir and associated infrastructure, such as operational buildings, and assets. This might include security rated fencing including an anti-climb topping, security rated doorsets, security rated hatches, security rated ventilation openings and security measures to protect service and containment openings.
- 2.5.112 Systems to detect intruders and video surveillance would be in place in critical buildings and areas.
- 2.5.113 The majority of the Site is expected to remain accessible at all times via public footpaths.

Lighting

- 2.5.114 The lighting strategy for permanent site lighting is still under development, but is being developed in line with Guidance Note 8 Bats and Artificial Lighting at Night (Institute of Lighting Professionals, 2023) and policy relating to dark skies and artificial lighting relating to the North Wessex Downs National Landscape (North Wessex Downs Area of Outstanding Natural Beauty Council of Partners, 2021a and 2021b) to only use lighting where there is a clear functional or safety requirement [embedded design mitigation]. Lux levels would be kept to a minimum, and luminaires would have no direct upward light when in final mounting location. The design would avoid the use of diffuse bulkhead luminaires on buildings.
- 2.5.115 The design would avoid uplighting to trees or façades, with uplighting considered only under canopied areas where all upward light is fully contained by the structure.
- 2.5.116 The majority of proposed active travel routes within the draft Order limits would be used for leisure, with limited commuting use. By reference to PLG23 Lighting for Cycling Infrastructure (Institute of Lighting Professionals, 2020), the majority of routes would be unlit as rural routes.

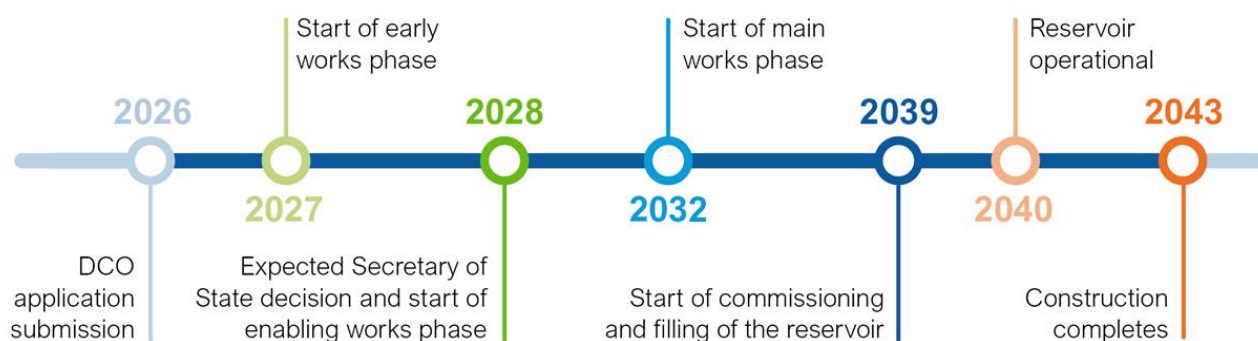
- 2.5.117 Crossing points on unlit roads would be fitted with reflective features (e.g. retro-reflectors, white rock or post) to provide indication to vehicles with headlamps of presence of a hazard area.
- 2.5.118 An emergency lighting strategy is being developed. This would focus on ensuring safe evacuation to places of safety and muster points in the event of power loss.

2.6 Construction

Construction programme, sequencing and phasing

- 2.6.1 Construction is expected to take place over three phases (early works, enabling works and main works). This would be followed by commissioning and filling of the reservoir. The detailed sequencing of construction activities is still being developed. It is expected that timeframes of the phases would overlap, such that some areas of the draft Order limits might be within different phases at any one time. Plate 2-8 summarises the expected Project timeline.
- 2.6.2 An early works phase would commence in 2027, consisting of early ecological habitat creation or enhancement, and where possible, translocation of protected species. It is currently proposed that these would be undertaken prior to the DCO being granted by the Secretary of State, subject to separate consents as required. During this period, licensing and secondary consents for the enabling works and main works phases would also be sought where required.
- 2.6.3 The enabling works phase would take place after the DCO is granted (expected to be in 2028), which would see the continuation of early works activities, plus archaeological mitigation works, demolition, site clearance, utility diversions, access roads, establishment of the main compound. The watercourse diversions would be undertaken in this phase, with both being diverted at the same time on the eastern and western sides of the reservoir location over a period of approximately two years. This phase would also include establishment of a temporary rail siding and materials handling (RSMH) facility by 2032 and provision of the Steventon to East Hanney Road Diversion early in the phase. This phase would last approximately seven years, concluding in 2034.
- 2.6.4 The main works phase would commence in 2032, starting with earthworks and construction activities associated with the reservoir embankments, the pumping station, the reservoir and river tunnels, the River Thames intake / outfall structure and T2ST WTW. The later activities are expected to include construction of public and recreational facilities, and landscaping, which would continue in parallel to and after reservoir commissioning and filling period. The main works phase would be completed by 2043, taking approximately 12 years.
- 2.6.5 The reservoir commissioning and filling period would take place during the main works phase from 2039 to 2041. This would commence once the Construction Engineer has certified the reservoir embankment as safe to fill and would consist of filling the reservoir via abstraction from the River Thames and collection of rainwater to enable water being available for use from the end of the first fill year (expected to be 2040).

Plate 2-8 Project timeline



Construction working hours

- 2.6.6 It is anticipated that the typical working hours during construction would be:
- 8am – 6pm each weekday (excluding bank holidays)
 - 9am – 1pm Saturdays
 - 1pm – 6pm Saturdays (for the maintenance of equipment and plant only).
- 2.6.7 A period of up to one hour before and up to one hour after these working hours would be required for start-up and close-down of activities. This would typically include deliveries, movement of staff to and from the Site, unloading of equipment, plant or materials, maintenance of plant and equipment and general preparation work. This would not typically include the operation of plant or machinery, or bulk materials being delivered to site that are likely to cause a disturbance to local residents or businesses.
- 2.6.8 As far as reasonably practicable, construction works will be carried out during the core working hours so as to minimise adverse noise and vibration impacts from relevant construction activities. However, due to the nature and scale of the works, many activities may be required to take place beyond these core hours to ensure the safe operations, construction personnel safety, or for reasons of engineering practicability. The listed activities below may need to be conducted outside of the core working hours defined above. In many situations, this may result in a need to undertake works on a 24 hours / seven days per week basis. These activities include:
- Setting out activities such as marking out the dimensions of design onto the Site may require extended hours to ensure these can be undertaken safely when plant and equipment is not in use.
 - Utility diversions and connections which may need to be completed at specific times of the day, for example to suit low periods of demand.
 - Surveys (e.g. for wildlife or engineering purposes), habitat creation works and species translocation may need to be carried out outside core working hours.
 - Tunnel shaft sinking and associated tunnelling tasks are likely to require 24-hour working, seven days per week.
 - The RSMH facility could require 24-hour working during its establishment to carry out work during night-time rail possessions on the Great Western Mainline. The unloading and loading of trains may be carried out during the evening, night or early morning periods depending on the available timetable slots for trains accessing the Great Western Mainline, to be agreed with Network Rail.

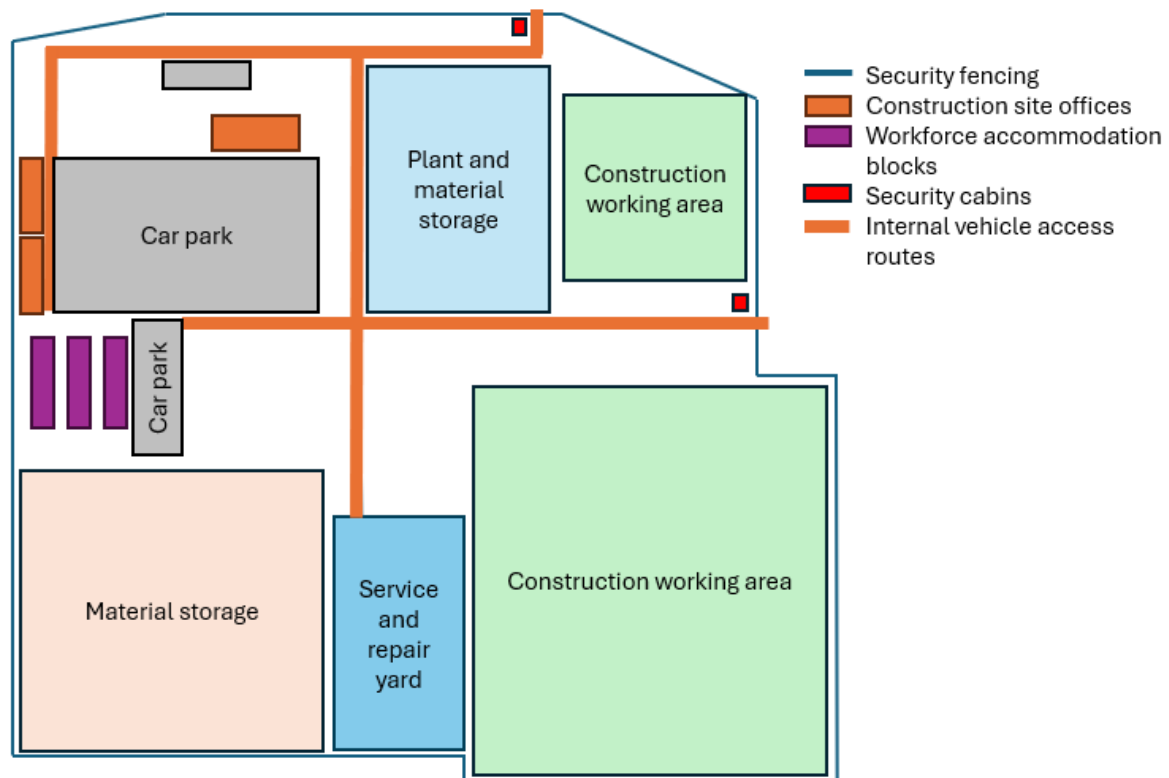
- Highways-related works, e.g. highways lane closures and lifting activities over live highways, may need to be carried out during suitable periods of low traffic use.
- Earthworks activities, particularly those associated with the reservoir embankment, are season and weather dependent. The contractor would seek to maximise undertaking earthworks activities during the drier season, working longer hours and additional weekend hours during the summer period (typically May-September) to take advantage of additional daylight.
- Reservoir earthworks would also pause during winter months if the weather is adverse. The main reservoir earthworks are likely to be carried out from March-November, although drier weather beyond this period may extend this reservoir earthworks period. Earthworks associated with other Project components including the pumping station, tunnels, shafts and intake / outfall structure would take place all year round [embedded design mitigation].
- Some activities commencing during core working hours may need to extend into evening and night-time hours if they involve activities that cannot be safely stopped once started. This might include major concrete pours. Long concrete pours are anticipated to be required at the pumping station and for reservoir tower construction.
- Large or unusual unloading activities may also be carried out outside of core working hours to avoid congestion risks on the road network.
- Some activities will require 24 hour use of equipment such as generators or pumps.
- Commissioning activities including reservoir filling, valve testing and ground movement monitoring would usually be carried out 24 hours a day and 7 days a week where possible with monitoring and out of hours response required overnight and at weekends in some cases.

Construction compounds and haul routes

Compounds

- 2.6.9 There would be a need for up to 20 compounds during the construction phase of various sizes and in differing locations to support the different phases of construction and the different works. Not all will be required at the same time, or for the full duration of the construction phase. Provisional locations and sizes each of these compounds have been identified as shown on Figure 2.2: Construction elements.
- 2.6.10 The main compound would be located in the north-east of the Core Project Area close to the pumping station position and would support the construction of reservoir embankments (including earthworks), pumping station, reservoir tunnelling and provide facilities, site administration and site management. The main compound and the compound for the RSMH facility would also contain concrete batching facilities. An example layout for the main compound can be seen in Plate 2-9.

Plate 2-9 Example layout of the main construction compound



- 2.6.11 Construction compounds typically comprise workforce parking spaces, cabins, storage areas and welfare facilities. Additionally, smaller satellite compounds would be provided for early ecological and archaeology works, and as satellite compounds for the reservoir earthworks. These would be towable self-contained units. Indicative locations of these are also shown on Figure 2.2: Construction elements.
- 2.6.12 Compounds would typically be powered through a mains connection and renewable energy source(s) (e.g. small scale solar) for longer compound installations, where feasible. Smaller satellite welfare would be powered by diesel generators.
- 2.6.13 The construction compounds may include temporary accommodation facilities for workers. This would likely be located at the main compound. Such accommodation facilities may be up to two storeys high.
- 2.6.14 Construction compounds would be designed to minimise flood risk resulting from high rainfall events, for example, by ensuring appropriate storage, protection and bunding of potential contaminants and storage of topsoil and other bulk material in appropriate locations. Weather forecasting and flood alerts will be used to plan construction activities [embedded design mitigation].

Haul routes

- 2.6.15 A series of haul routes would be required during different sequences of the construction works. The main haul routes would be on the inner and outer perimeter of the reservoir embankment. These would be constructed to be suitable for the duration and extent of use expected, using a variety of finishes.

- 2.6.16 Track matting would be used for earlier activities using smaller plant and equipment, such as ecological or archaeological mitigation works, where appropriate. Crushed stone or granular fill, surface-dressed with bitumen where appropriate, is expected to be used for the majority of haul roads. Where feasible, permanent roads would be used for construction purposes.
- 2.6.17 Permanent accesses and internal roads would be in place as early as possible within the sequencing.
- 2.6.18 Temporary access may be required over existing or diverted watercourses. These would be avoided as far as possible, using existing permanent or temporary accesses where available. Where new crossings are required, these would be sized to convey the design flood flows (normally the 1% annual probability flood) plus appropriate climate change allowances (depending on the period they would be installed for). Measures would be provided to prevent runoff, silt and other pollutants being washed into the watercourses.
- 2.6.19 The design of crossings of very high / high sensitivity watercourses would comprise a clear span solution, where feasible, in order to avoid in-channel impacts on hydromorphology, aquatic habitats, and river continuity (including fish passage). Crossings of low sensitivity watercourses and / or ditches would likely comprise temporary culvert structures with a buried invert level below the channel bed, where practicable, in order to reduce effects on flow and sediment continuity and reduce blockage risk.

Construction access points

- 2.6.20 Up to six points of access would be required into the Site as shown on Figure 2.2: Construction elements. It is expected that the majority of construction materials vehicles would enter and leave the site from the main access point on the A415 (A1). Other access points will be required, however, the number of vehicles needing access to these secondary locations will be kept to the reasonably practicable minimum. These accesses provide:
- The main access into the Site via A34 Marcham interchange and A415 (Access A1)
 - Access via the diverted Steventon to East Hanney Road to enable the construction of the RSMH facility (Access A2)
 - Access from the A338 to support the construction of the western extent of the Steventon to East Hanney Road diversion (Access A3)
 - Access from the A338 to support early ecological and archaeological mitigation work, and the western watercourse diversion (Access A4)
 - Access from Steventon Road to support the construction of the eastern extent of the Steventon to East Hanney Road diversion (Access A5)
 - Access from the B4017 through Caldecott for the construction of the River Thames intake-outfall structure and associated works (Access A6).
- 2.6.21 Consideration has been given to seeking a temporary construction access into the Site from the A34 northbound in the vicinity of Drayton. Due to the level of uncertainty in the need for this access, the PEI Report traffic-related assessments (Traffic and transport, Air quality and Noise and vibration) have assumed that there would be no temporary construction access available directly from the A34. All other assessments have assumed that construction related impacts could occur should this be available later.

Public Rights of Way diversions / closures

- 2.6.22 Where practicable, PRow within the draft Order limits would remain open during construction. Some temporary closures or diversions of PRow passing through the draft Order limits would be necessary. These are expected to be closed or diverted for the longer term in the Core Project Area and more short term in areas beyond this. Where this is the case, advanced notice will be given to users. Localised diversions would be in place for National Cycle Route 5 and the Thames Path. PRow diversions would be put in place ahead of any closures, where feasible, with advanced notice to users. PRow affected by construction would either be reinstated or realigned where the current route is no longer feasible due to the existence of Project features [embedded design mitigation].

Construction approach

- 2.6.23 The full details of the construction approach are still being refined alongside early contractor involvement. To allow design flexibility whilst ensuring a precautionary approach to the preliminary assessment documented within this PEI Report, reasonable 'worst case' parameters and assumptions about the construction of the Project have been established and are considered sufficient for the assessment (see Chapter 4: Approach to the environmental assessment for further information). This section outlines the construction approaches expected to be taken for some of the key features of the Project.

Utilities diversions and connections

- 2.6.24 A large number of utilities diversions and new connections are needed for power, water, telecoms and foul drainage both temporarily for use during construction and for the permanent supply in operation. Several utilities would also be removed where these are no longer required. Task-specific electricity generators would be in use throughout the Site where work is remote from mains sources.
- 2.6.25 Notable utility diversions include:
- The diversion of an existing 132kV overhead electricity cable which runs through the draft Order limits. This would be rerouted for a length of approximately 1.95km to the north-east of the existing alignment on a series of nine pylons at the same height as the existing situation. This would require access to a pylon to the east of the A34 to assist with the restringing of the cables, but not a new pylon east of the A34. It should be noted that this existing asset is classed as non-contestable² by the asset owner, Scottish and Southern Electricity Networks (SEN); and therefore the final responsibility for the diversion design sits with them. This design may vary from the route considered in this PEI Report. Thames Water is in discussion with SEN on this route, which will continue to be reviewed.
 - The diversion of an existing gas main near Drayton Road due to settlement of the ground expected to be caused by the construction of the river tunnel below. The diversion length would be approximately 150m long.

² Non-contestable works are those connection tasks within the electricity distribution network that must be carried out by the Distribution Network Operator (DNO) or their designated agents. These works are considered essential for maintaining the safety and integrity of the network.

- The diversion of an existing gas main to the south of the reservoir embankment which would conflict with the proposed alignment of the Steventon to East Hanney Road diversion. The diversion length would be approximately 800m long.

Site clearance and demolition

- 2.6.26 Site clearance would commence after completion of any required ecological or archaeological mitigation works. Based on survey results, the topsoil depth across the Site is expected to be approximately 300mm deep. Topsoil would be stripped completely over the reservoir footprint and eastern, southern and western portions of the Core Project Area. In the north-east corner of the Core Project Area it is assumed that there would be a relatively limited topsoil strip as the components proposed in this area, such as the main access road and areas for species relocation, would not require the same depth of excavation. Similarly, there would be a limited need for topsoil stripping to undertake the river tunnel construction works in the location of the intermediate shaft.
- 2.6.27 Construction of the Project would likely require demolition of 20 residential properties, nine separate farms or small holding complexes (some including residential buildings), multiple isolated agricultural structures, three solar farms, the existing Steventon to East Hanney Road, an industrial business complex at the Steventon Depot, Landmead airstrip and four business properties located at the former Goose Willow Farm.
- 2.6.28 Prior to demolition, buildings and structures will be surveyed to determine the potential presence of asbestos-containing materials (ACMs). All ACMs would be removed as far as reasonably practicable before any demolition takes place.
- 2.6.29 Rock crushers would be used on Site to reclaim materials or crush down building materials for reuse or disposal. These would be mobile and would likely be used close to the area of demolition or close to the material temporary stockpiling location.

Watercourse diversions

- 2.6.30 Excavation activities would start in the northern part of the Site, near the River Ock and move to the south (downstream to upstream). The smaller existing ditches would be connected as the new channels are constructed, and the main ditch / watercourses that are being diverted would be connected once the channel is fully constructed.
- 2.6.31 Water would likely need to be pumped out of the newly constructed channels prior to connection to the main ditch / watercourses that are being diverted due to groundwater ingress. This water would be over-pumped into existing watercourses downstream of the construction activity with necessary silt and pollution management measures in place, however the risk of effects from siltation / pollution would be mitigated by working from downstream to upstream, as noted above.

Reservoir earthworks and embankments

- 2.6.32 The reservoir embankments would be constructed through the excavation of clay from the central area of the Site. This excavation would form the base of the reservoir, with the 'won' clays then placed in horizontal layers and compacted to create the structural parts of the embankments. Layers of subsoils, topsoils and granular materials would be added, for example, for landscaping or drainage.

- 2.6.33 Excavation would start in the north-eastern area of the future reservoir base and extend gradually towards the south-west. At the same time, the reservoir embankments would begin to be constructed in the same direction.
- 2.6.34 Prior to constructing the reservoir embankments, as part of the main works phase, a temporary 'trial embankment' approximately 300m in length would be built before commencing construction of the permanent reservoir embankment. This is standard practice for large reservoir projects and serves a dual purpose to test and check the form of the embankment design and construction, confirm equipment and any conditioning requirements (e.g. water and scarification that may be required) and help refine likely timescales involved.
- 2.6.35 The embankment construction works would require a large number of construction vehicles and Non-Road Mobile Machinery (NRMM). This could include large items of plant usually associated with the largest of construction sites or quarrying activities, such as 125 tonne excavators and 75 tonne dumpers. An image of a typical excavator can be seen in Plate 2-10 and a typical construction vehicle of the movement of bulk materials in Plate 2-11.
- 2.6.36 Rollers would be used for compacting layers of clay. Conditioning will involve laying clay in layers, harrowing the surface and then wetting as required.

Plate 2-10 Image of a typical excavator



Plate 2-11 Image of a typical construction vehicle for the movement of bulk materials



Reservoir towers

- 2.6.37 Up to four reservoir towers would be constructed from reinforced concrete with foundations in the bedrock in the base of the reservoir. The reservoir towers would be constructed through the creation and excavation of a shaft below existing ground level using a diaphragm wall technique. This involves the installation of a continuous vertical barrier (usually piled) around the perimeter of the new structure underground. This barrier would retain the surrounding materials whilst the area within the barrier is excavated. The excavated material would be removed by cranes, with treatments applied to arisings (e.g. bentonite) to stabilise it if required.
- 2.6.38 Further foundations would be piled beneath this area before the base of the tower is formed. The connection to the reservoir tunnel would then be constructed, followed by construction of the top of the tower. The surrounding land would be excavated to the finished ground level whilst the reservoir works continue. Pipes and finishes would be installed at the top of the tower using a crane.

Reservoir tunnels

- 2.6.39 The construction of the reservoir tunnels would be undertaken using a Tunnel Boring Machine (TBM) or using a method known as Sprayed Concrete Lining (SCL).

- 2.6.40 The TBM would be assembled and commence excavation from the pumping station. This would travel towards the reservoir before being removed and dismantled. The excavation would be undertaken using an earth pressure balance (EPB) (closed mode) TBM to control the effects on groundwater. A precast primary concrete lining would be installed, with a secondary concrete tunnel lining cast in situ.
- 2.6.41 SCL tunnelling involves excavating the ground using an adapted excavator in the tunnel and using a spraying robot to line the unsupported ground with a fibre-reinforced concrete. Work would also start at the pumping station and move towards the reservoir. A secondary concrete tunnel lining would be cast in situ.

Pumping station

- 2.6.42 The pumping station would be constructed by using a diaphragm wall technique as described for the reservoir towers above.
- 2.6.43 Piling of further foundations would be required beneath this area which would support the installation of a reinforced concrete base slab, forming the base of the pumping station. The new pumping station equipment would be installed below ground and then the above-ground components including the pumping station building, and electrical and control building would be constructed.

River tunnel

- 2.6.44 The river tunnel would be constructed using a TBM which would be assembled and commence excavation from the pumping station construction working area. The TBM would continue to excavate towards the River Thames intake / outfall shaft construction working area, before being removed via the intake / outfall shaft and dismantled. The excavation would be undertaken using an EPB (closed mode) TBM to control the effects on groundwater. A precast primary concrete lining would be installed, with a secondary concrete tunnel lining cast in situ.

River Thames intake / outfall structure and shaft

- 2.6.45 In order to construct the intake / outfall structure and associated shaft, and to manage the potential release of silt, clutch sheet piles would be installed from the land to create a temporary cofferdam in the River Thames inside the line of the permanent guard piles.
- 2.6.46 It is envisaged that the cofferdam would extend approximately 10m into the River Thames from the western bank. The cofferdam would run along the River Thames for a length of approximately 160m. Most work is expected to be undertaken from the riverbank, however, barges may be required for the installation of the cofferdam.
- 2.6.47 The area behind the cofferdam would be de-watered to create a safe space to install the intake / outfall structure and associated shaft. Following construction of the outfall, the cofferdam would be removed. The guard piles would then be installed from the land with support from river vessels if required.

Rail siding and materials handling (RSMH) facility

- 2.6.48 A temporary rail siding is proposed to facilitate the delivery of certain materials by rail freight and therefore reduce the total volume of material imported and exported by road

[embedded design mitigation]. This would incorporate an adjacent material handling area for the loading and offloading of materials. The use of conveyors for the transport of material within the RSMH facility is being considered.

- 2.6.49 The design for the RSMH facility and connections to the Great Western Main Line are being optimised and will be confirmed through engagement with Network Rail. Connection options are being considered to the south of the proposed realigned route of the Steventon to East Hanney Road and to the north of the Great Western Main Line as shown on Figure 2.2: Construction elements.
- 2.6.50 Upgrades to existing Overhead Line Equipment (OLE) and signalling are anticipated to support these upgrades, with potential improvements to the railway corridor itself depending on the condition which would be investigated as part of the enabling works.
- 2.6.51 New switches and crossings would be installed which would allow trains to travel in a western direction upon leaving the Site. These would span a 500m stretch of railway line within the 6.1km extents to the west of the RSMH facility. Additional compound provision may be required in up to two of the areas adjacent to the 6.1km corridor to accommodate these works.
- 2.6.52 Night-time rail possessions and / or temporary closures are likely to be required on the Great Western Main Line to construct the required components and connections. These works would be agreed and planned with Network Rail, to minimise disruption to railway operations.
- 2.6.53 Piling activities could be required for installation of the OLE and materials storage bays.
- 2.6.54 After the Project is constructed, it is anticipated that the material bays and handling equipment would be deconstructed, with materials reused or recycled where possible. Some assets may be adopted by Network Rail for ongoing use and maintenance. The embanked area created for the rail sidings would be regraded to provide landscape and habitat creation [embedded design mitigation].

Wilts and Berks Canal

- 2.6.55 The corridor safeguarded for provision of the water channel for the Wilts and Berks Canal has been identified as a potential haul road route during the early phases of construction. The canal crossing beneath the Steventon to East Hanney Road diversion would be designed to allow this to operate as a construction haul road from the RSMH facility to the reservoir embankment construction area prior to construction of the water channel.

Landscaping

- 2.6.56 Topsoil reinstatement would vary across the Site to respond to the environmental design requirements. For the purposes of the PEI Report, it has been assumed that a minimum 200mm depth of topsoil would be reinstated on the outer face of the reservoir embankment and the landscaped areas within the Core Project Area to the south, west and east of the reservoir. This would be increased to 300mm in areas of woodland creation on the reservoir embankment.

Water management

Dewatering

- 2.6.57 Due to the potential for high groundwater levels, dewatering would be required for most activities involving excavation throughout the Site, including most notably:
- Excavation of new watercourse channels
 - Excavation of the water channel for the Wilts and Berks Canal
 - Reservoir excavation and embankment construction
 - Construction of the pumping station and reservoir towers
 - Excavation of the river tunnel shafts
 - At the River Thames intake / outfall structure behind the cofferdam.
- 2.6.58 Water would be managed using settlement ponds in the north and south of the Core Project Area. The two recreational lakes would also be used as settlement ponds during construction. These would form the main collection points for treatment of groundwater prior to discharge into local environment or local watercourses, subject to Environment Agency permits and water quality requirements, where required. The quality and quantity of discharged water generated across construction areas would be monitored to manage flood risk and enable action to be taken if needed.

Drainage strategy during construction

- 2.6.59 Temporary construction surface water and groundwater drainage systems would be required to manage the potential effects of flooding arising during the construction works and would be appropriately designed to manage risks at different Project phases [embedded design mitigation].
- 2.6.60 Temporary site drainage measures would be progressively installed before the relevant earthwork activities and would be retained until the permanent drainage system of the relevant part of the Project is fully operational (with appropriate storage and sediment control measures available), or site restoration works are completed. This includes the installation of the reservoir embankment toe drain and the permanent groundwater drain described in Section 2.4 [embedded design mitigation].
- 2.6.61 Materials storage would be mindful of existing flood zones but would not always be able to be stored outside of these. Conveyance would be carefully considered in the storage locations and arrangement of materials.
- 2.6.62 Measures would be implemented across the Site to treat potentially polluting matter contained within surface water runoff. This would include measures to manage sediments, hydrocarbons (generated by fuel oils), cement and other alkali-based construction materials and heavy metals.
- 2.6.63 The management of surface water across the construction site would take account of existing surface water catchments and existing receptors of surface water would be retained wherever practicable.
- 2.6.64 The temporary construction drainage systems would include the provision of adequately sized attenuation and treatment facilities, where appropriate. The sizing of attenuation

would take account of areas of existing flood risk and the relevant permitting requirements of the Environment Agency and / or the Lead Local Flood Authority.

- 2.6.65 The temporary construction drainage systems would take into consideration best practice guidance for drainage systems such as Defra's non-statutory technical standards for sustainable drainage systems, with due regard to the short lifetime and limited accessibility of the systems.
- 2.6.66 The quality and quantity of surface water and groundwater generated across construction areas would be monitored to manage flood risk and enable action to be taken if needed.

Materials and waste management

Cut and fill balance

- 2.6.67 Excavated materials would largely be used to create the reservoir embankment. Excavated materials would generally be stored on the outside of the reservoir embankments footprint to the west and east. Some stockpiling would also take place within the north and south-west area within the reservoir footprint. Excavated topsoil intended to be used for landscaping purposes would be stored in stockpiles of up to 2m in height, with subsoil being stored in stockpiles of up to 8m in height.
- 2.6.68 The Project is aiming for a cut and fill balance of materials won from excavation (cut) and those used in construction (fill), that seeks to minimise materials import and export. Early site investigation works have been used to determine where site-won material would be suitable for use in the design to improve materials efficiency.
- 2.6.69 Based on the emerging design information, it is estimated that approximately 65.8 million cubic metres (Mm³) of excavated material would be generated by excavation activities during construction of the Project. The design allows for approximately 62.1Mm³ (94.4%) of excavated material to be reused on site. It is estimated that there would be an approximate 3.7Mm³ (5.6%) of surplus excavated material; however, this volume will continue to be reviewed to explore opportunities for reuse on site, beneficial reuse locally or within the wider supply chain [embedded design mitigation]. This would require management outside the draft Order limits and is expected to be removed from the Site via the RSMH facility and road. This would consist of predominately of non-hazardous topsoil.

Materials import

- 2.6.70 Approximately 9.7 million tonnes (Mt) of materials would need to be imported to the Site for construction. This would consist of the estimated import quantities shown in Table 2.10.

Table 2.10 Estimated materials import requirements

Key construction material type	Total forecast quantity (tonnes)
Crushed rock (rip rap)	1,726,559
Sand and Gravel	4,022,529
Recycled / secondary aggregates	2,708,318
Asphalt	177,477

Key construction material type	Total forecast quantity (tonnes)
Concrete	595,920
Steel	17,330

Materials and waste transportation

RSMH facility

- 2.6.71 It is assumed that the rail siding would be in use 24 hours a day, five days a week for the reception, loading, unloading and dispatch of trains. It would accommodate an average of three arrivals and three departures per day for five days per week (across approximately 47 weeks per year). The configuration of the RSMH facility would be such that trains could arrive from the west and be able depart to the east or to the west. The trains would typically have 20 wagons plus locomotive and it is expected that the same train could be used to import and export different materials as necessary. The Preliminary Transport Assessment Report (PTAR) (Thames Water, 2025), provided with the PEI Report for Statutory Consultation, contains road traffic assumptions and rail traffic assumptions used in this PEI Report.

Transportation by road

- 2.6.72 Routes for construction heavy goods vehicle (HGV) transport of materials and waste will be mandated by the lead contractor. These routes would focus on use of the A34 as the primary arrival and departure route. Generally, construction traffic would be directed not to pass through local villages unless this is necessary to reach a specific site access location. Whilst materials sources and destinations are still to be confirmed, it is currently assumed for the purposes of assessment that 60% of construction traffic would arrive on the A34 from the north and 40% would arrive on the A34 from the south.
- 2.6.73 From the A34, the assumed routes to each of the construction access points are shown in Table 2.11 and illustrated in Figure 2.2: Construction elements. The assumed HGV movements into and out of these accesses are located in the PTAR.

Table 2.11 Routes between A34 and construction access points (see Figure 2.2)

Access point	Assumed route from the A34
A1	via A34 Marcham Interchange and A415
A2, A3, A4	via A34 Milton Interchange, A4130, A417, King Alfred Way, and A338, passing Rowstock, the Hendreds, Charlton and Grove (and traffic to A4 also passing the Hanneys)
A5	via A34 Milton Interchange, A4130 and B4017 through Steventon
A6	via A34 Marcham Interchange, A415 and B4017 through Caldecott

Lighting and fencing

Lighting

- 2.6.74 The general strategy for temporary site lighting would be to only use lighting where there is a clear functional or safety requirement. The temporary lighting design would keep lux levels to a minimum and be dark-sky considerate as far as possible [embedded design mitigation].
- 2.6.75 Warm white colour temperatures of ≤ 3000 kelvin (K) would be used for all large scale area lighting. Localised lighting around facilities on presence detection may utilise ≤ 4000 K.
- 2.6.76 Portable temporary lighting would be used at an appropriate mounting height and distance from the task to avoid extreme tilt angles of luminaires.
- 2.6.77 Where lighting installations would be in place for more than six months (for example at compounds, offices, parking welfare facilities and storage areas), these would seek compliance with the obtrusive light thresholds for an E1 Environmental Lighting Zone wherever practicable.
- 2.6.78 As construction moves around the Site, there may be requirement for short term localised fixed facilities at a smaller scale. Lighting is assumed to be installed to avoid / reduce obtrusive light issues and seek to mitigate them as far as reasonably practicable.
- 2.6.79 Temporary task lighting may include lighting fixed to vehicles and heavy plant machinery. High intensity task lighting would only be applied for the duration of the task and switched off at all other times.

Fencing

- 2.6.80 The entire perimeter of the Site is not assumed to be hoarded or fenced. Fencing would be in place on a task-by-task basis. This would typically be security fencing (e.g. Heras) rather than timber hoarding however a cost-benefit analysis and risk assessment would be required to inform the chosen temporary fencing. The extent of fencing in place would expand as the works move through the Site.

Construction workforce

- 2.6.81 It is estimated that the peak number of workers on site at any one time would be around 1,800 (excluding T2ST workforce). However, during the peak period for earthworks activities (in 2036), around 1,500 workers are expected to be on site on a given day.
- 2.6.82 Transport would be provided by the contractor from larger local settlements such as Abingdon and Didcot, which may accommodate larger numbers of workers and provide public transport connections.
- 2.6.83 As noted in paragraph 2.6.13, the main construction compound may include temporary accommodation facilities for workers.
- 2.6.84 The construction phase would be guided by a Construction Workforce Strategy and measures to maximise economic benefits during construction would include:
- Engagement with local colleges and training providers to help the local community obtain relevant skills to access construction employment opportunities.

- Engagement with local colleges and job centres to advertise and encourage uptake of employment opportunities by the local community.
- Provision of construction apprenticeships.

2.7 Operation and maintenance

Recreation and leisure opportunities

- 2.7.1 As described in Section 2.1, the Project aims to support diverse recreational and leisure activities for both local residents and visitors. These would be accessible via a network of pathways and to those arriving in cars or on coaches. Vehicle parking would be provided as outlined in Section 2.5.
- 2.7.2 Visitors would be able to participate in activities such as:
- Walking (and wheeling), cycling and horse riding on new pathways
 - Fishing, swimming, paddleboarding and sailing at the Recreational Lakes Centre
 - Sailing and other water sports for non-motorised craft at the Water Sports Centre
- 2.7.3 The Nature Education Centre would provide opportunities for learning and experiencing nature.
- 2.7.4 The operation of the Project would provide local employment opportunities through the operation of these facilities.

Reservoir operation

- 2.7.5 In order to fill the reservoir, water would flow via gravity from the River Thames, passing through the intake screens. When the water level in the tunnel is high enough, the pumps in the pumping station would transfer the water (via the reservoir tunnels) into the reservoir via the primary tower inlet jets. This process is shown on Plate 2-12.
- 2.7.6 In order to remove water from the reservoir, the secondary towers provide the means to draw off at different locations and at different depths. Water would enter the reservoir tunnels via the connection at the primary tower. The reservoir tunnels would transfer water through the pumping station, where it would pass through the energy recovery turbines before being transferred to the river tunnel, and into the River Thames via the outfall structure. Transfer of water from the reservoir via the pumping station to the River Thames would be by gravity. Alternatively, water would transfer from the pumping station to the T2ST WTW, which would transfer into a future T2ST pipeline connection close to the railway. The Project would provide a transfer to Farmoor (the Project's relationship with other water infrastructure projects and associated consenting is covered under paragraphs 2.4.5 - 2.4.21 above). This process is shown on Plate 2-13.

Plate 2-12 Schematic for filling of the reservoir – Overview

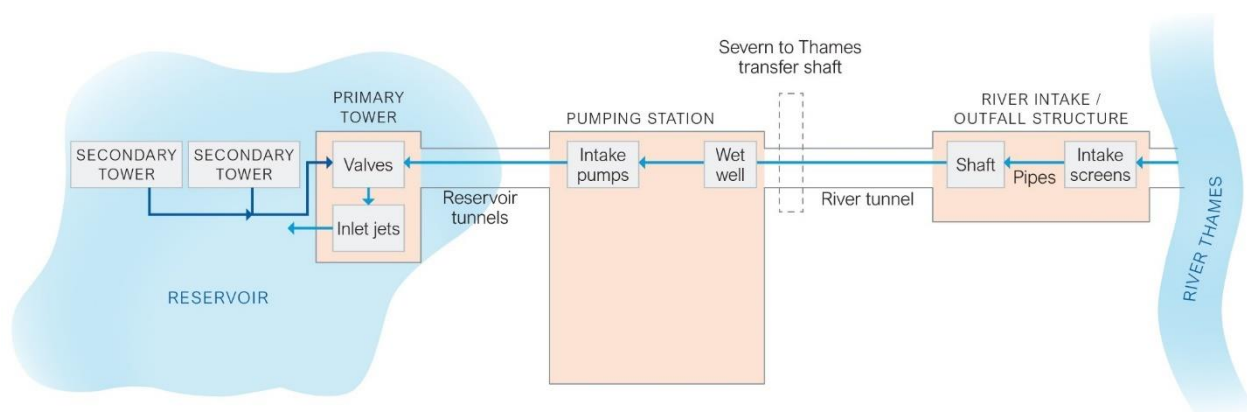
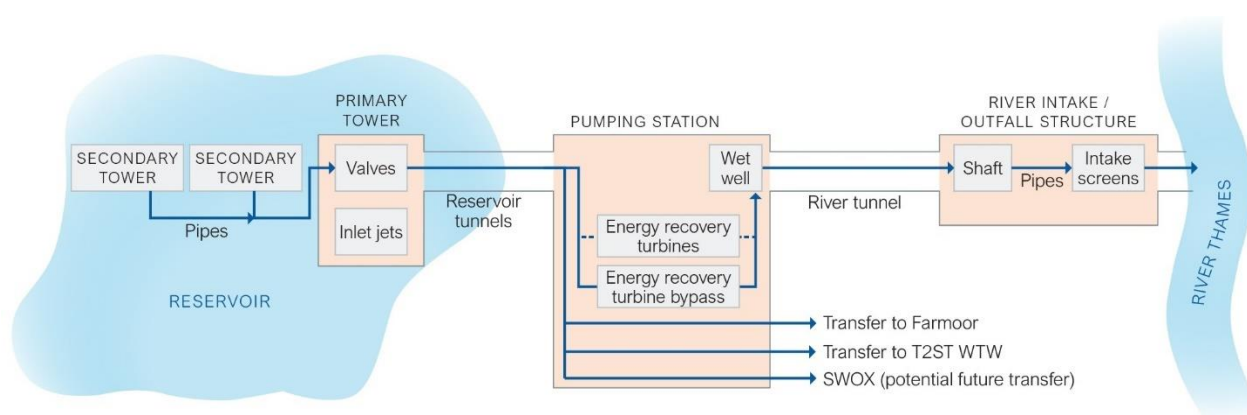


Plate 2-13 Schematic for release of water from the reservoir – Overview



- 2.7.7 An Operation and Maintenance Manual would be produced for the operation of the reservoir and associated infrastructure, based on the Flood and Water Management Act 2010, Reservoirs Act 1975 and Health and Safety Executive (HSE) guidelines (Health and Safety Executive, 2021).

Abstraction and discharge

- 2.7.8 Abstraction and discharge of water from the River Thames into the reservoir would be subject to the conditions of a licence / permit, the terms of which would be agreed with the Environment Agency. The licence / permit would include conditions or limits to abstraction and discharge in order to avoid adversely affecting flows and water quality within the River Thames and further downstream.
- 2.7.9 Abstraction would also be reduced or paused when water quality within the River Thames, informed by routine monitoring, could adversely affect the water quality required within the reservoir and associated infrastructure.
- 2.7.10 The Project would include measures to address risks of drought and of increased precipitation [embedded design mitigation]. The emerging design would abstract up to 1000MI/d at the intake / outfall structure, where the daily increase to reach this maximum would not exceed 300MI/d. Abstraction would be limited to periods where the minimum

river level flow for abstraction (also referred to as the 'hands off flow' level) would be at least 50% of the Q50³ flow as measured at Culham and Kingston.

- 2.7.11 The peak discharge of the reservoir to the River Thames would be up to 321MI/d, with a potential peak of 600MI/d when discharges to WTWs and other locations are included (i.e. maximum draw to all destinations).
- 2.7.12 When no abstraction or discharge is required, the river tunnel would be emptied to prevent the water contained within the tunnel from degrading to a point where discharge to the river or to the reservoir would have a water quality impact on either water body.
- 2.7.13 A permanent system would be provided to pump the water contained within the river tunnel and Intake / Outfall shaft into the River Thames.
- 2.7.14 Flow and water quality measurement facilities would be installed in accordance with the conditions of the licence / permit.

Air mixing and recirculation of water

- 2.7.15 Water in the reservoir would be routinely mixed to prevent stratification, where water can separate into distinct layers with different temperatures, densities and oxygen levels. Mixing may also serve to reduce the risk of odour [embedded design mitigation]. Mixing would be achieved by a combination of pumped recirculation and air mixing. Recirculation would draw water from the reservoir to the wet well in the pumping station and return it to the reservoir via the main inlet pumps. Mixing would also be achieved by an air mixing system, using air diffusers located on the bed of the reservoir, which would be supplied by low level pipework.
- 2.7.16 The required number and timing of pumped recirculation inlets or air mixing diffusers would be informed by the results of ongoing water quality modelling.

Emergency drawdown and testing

- 2.7.17 An emergency on-site plan according to Environment Agency guidance (Environment Agency, 2021b) will be developed during the design and construction phase of the Project, before filling the reservoir [embedded design mitigation]. The on-site emergency plan will include emergency response protocols, escalation procedures, emergency drawdown measures and an on-site plan determining the access routes and the location of equipment controls. It will ensure the right people can prevent, control and respond to any threat from the reservoir that could endanger life or property. On-site plans refer to emptying the reservoir in an emergency or undertaking temporary repairs and facilitating this through the associated procedure which is certified every five years by a reservoir Supervising Engineer.
- 2.7.18 The on-site emergency plan works in conjunction with off-site emergency plans. Off-site emergency plans are coordinated by the Local Resilience Forum (LRF) involving reservoir operators. Guidance and templates (Defra, 2021) set out considerations such as flood risk, coordination of a response, vulnerable communities, infrastructure and recovery. The guidance also refers to data protection for sharing of reservoir flood mapping outlined in

³ The Q50 flow is the 50th percentile flow. The flow in cubic metres per second which was equalled or exceeded for 50% of the river flow record.

the National Protocol for the Handling, Transmission and Storage of Reservoir Inundation (Flood) Maps for England and Wales (UK Reservoir Safety Group, 2018). This data is used for both on-site and off-site plans.

- 2.7.19 The plan would include details of emergency drawdown measures; however, it is considered highly unlikely that this would ever actually be required.
- 2.7.20 The required emergency drawdown rate is 1m of reservoir depth per day at Top Water Level to comply with Environment Agency guidance: Guide to Drawdown Capacity for Reservoir Safety and Emergency Planning (Environment Agency, 2021c). The reservoir emergency drawdown flow would be taken by gravity through the reservoir tunnels and river tunnel, before discharging to the River Thames via the outfall structure.
- 2.7.21 It is assumed that the emergency drawdown system would be tested at least annually in line with the Supervising Engineer's annual examination (under the Reservoirs Act), lasting for approximately 15-20 minutes with tests typically running over a one or two day period, with water being released into the river tunnel. Flow directly into the River Thames during a test scenario may be reduced by storing water within the river tunnel, discharging water to the River Thames over a longer period via a small dewatering pump. Tests can also be timed to avoid high flows in the River Thames.

Energy use

- 2.7.22 Preliminary estimates of peak operational energy usage (kWh/year) have been prepared. These do not represent regular annual consumption, whereby the amount of abstraction and treatment of water would depend on the current levels of water in the reservoir, and the specific requirements for supply and discharge into the River Thames at the time. The estimated peak energy usage would be approximately 77,700 megawatt-hours per year (MWh/yr) (excluding external lighting). The use of this energy is broken down in Table 2.12.

Table 2.12 Summary of estimated annual electrical demand

The Project Annual Electrical Demand	The Project [MWh/yr]
Reservoir Equipment	13,300
Facilities and Plantrooms	5,400
Pumps transferring to T2ST	500
T2ST WTW Plant	51,600
Farmoor Transfer pumps	6,900
Total	77,700

Maintenance requirements

River Thames intake / outfall structure and river tunnel

- 2.7.23 Within the River Thames catchment, a number of invasive non-native species (INNS) are present, including both Zebra and Quagga mussels. Both types of mussels are prone to colonising structures with water in them and over time may affect pipework, valves, culverts and access facilities. If these structures are not maintained, this can affect

pipework and the operability of valves. No treatment would be undertaken for abstracted water entering the reservoir or transferred from the reservoir.

- 2.7.24 A management and maintenance regime would be in place to monitor and remove Zebra / Quagga mussels from these structures [embedded design mitigation]. To enable sufficient operation, adult mussels would be manually scraped from the wall for disposal. This activity, when required, may take place over a few months at a time.

Reservoir draw-off towers and tunnels

- 2.7.25 Regular inspections would be undertaken of the reservoir towers and reservoir tunnels.
- 2.7.26 To inspect the towers, a large crane would be used to launch floating equipment from the reservoir embankment. This would provide access for the inspection.
- 2.7.27 The reservoir tunnels would be subject to visual inspection to check the tunnel lining structure and potential defects and Quagga or Zebra mussel colonisation.

Habitat management

- 2.7.28 It is assumed all habitats within the draft Order limits would be maintained for a minimum of 30 years to provide the necessary mitigation, and to meet their target condition in line with BNG requirements.

Roads and rail

- 2.7.29 It is expected that routine highway maintenance would be undertaken by the appropriate highway authority where roads are adopted. All other road routes within the Site would be maintained by the operator.
- 2.7.30 Rail sidings would be decommissioned and removed at the end of construction, but any remaining assets (e.g. associated with the existing line) may be adopted and maintained by Network Rail.

Design life of components

- 2.7.31 The following timeframes as set out in Table 2.13 have been adopted for the design life of the Project. Although the Project's operational life is understood to be indefinite for its defined purpose, some components will require maintenance, repair or replacement at some point. For the purpose of the assessment within this PEI Report, the Applicant has adopted a conservative approach using the 120 years design life.

Table 2.13 Design life of key components

Component	Design Life
Reservoir embankment	120yr
Pumping Station	120yr
River tunnel	120yr
Reservoir tunnels and towers	120yr
RSMH Facility (on-site parts)	10 yrs (due to temporary nature)

Component	Design Life
RMSH works interfacing permanently with Great Western Mainline	120 yrs
Recreational buildings	50yrs
Concrete	120yrs
Asphalt surfaced routes	Minimum 20 yrs
New roads (in line with Design Manual for Roads and Bridges (DMRB)): Pavement construction	40 years
Road lighting	50 years
Road drainage	60 years
Road bridge structures and highways earthworks	120 years
Replaceable structural components, including expansion joints, waterproofing systems, safety barriers, and parapets (in line with CD350 "The Design of Highway Structures")	50 years

Workforce and visitors

- 2.7.32 It is expected that approximately 100 staff would travel to and from the Site per day.
- 2.7.33 Based on current information, it is estimated that up to 1.058 million visitors could visit the Site per year. Daily visitor numbers are expected to peak at approximately 8,000, for example on a typical August weekend day.
- 2.7.34 Public buses are expected to serve the Site during operation as well as the active travel network described in Section 2.4. For the purposes of this assessment, it is assumed that 70% of visitors (UK residents) would arrive by private vehicle, with the remaining 30% assumed to travel by public transport, by cycle or foot. Thames Water is exploring opportunities to encourage sustainable transport modes.

Security

- 2.7.35 A security strategy would be prepared and implemented during operation to manage and monitor identified risks. The content of this would be informed by Security and Emergency Measures Directions (SEMD), which require undertakers to maintain water supply in the interests of national security [embedded design mitigation]. Security measures include security fencing in specific locations to protect key operational assets such as the pumping station and the intake / outfall structure; controlled vehicular access to maintenance access roads and the reservoir crest; security measures for buildings; and intruder detection systems, alarms and video surveillance.

Inspections and monitoring

- 2.7.36 Routine inspection of assets would be undertaken in line with appropriate standards including the Reservoirs Act.

- 2.7.37 The Project would have a Reservoir Safety Management Plan (RSMP) in place. This would set out what surveillance, monitoring, and maintenance is required and how it would be operated.
- 2.7.38 Reservoir towers and floating island inspections would require the use of a large crane on the reservoir embankment to launch floating equipment.
- 2.7.39 It is expected that the following would be routinely monitored during operation:
- Water flows in drainage systems within the reservoir embankments [embedded design mitigation]
 - Reservoir water levels and quality [embedded design mitigation]
 - Reservoir embankment movement and settlement (vertical and horizontal) [embedded design mitigation]
 - Flow measurements of all abstractions, discharges and water transfers [embedded design mitigation]
 - Water quality and levels in the River Thames at abstraction and discharge points [embedded design mitigation]
 - Gas monitoring in tunnels
 - Automatic counting for vehicles entering and leaving the Site.

2.8 Decommissioning

- 2.8.1 The Project would form a long-term solution to ensure a secure and sustainable future water supply for the South East region. Although some components of the Project would have a defined design life, all components 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 a permanent reservoir and associated infrastructure. No activities are proposed that would require decommissioning or associated decommissioning plans.

References

It should be noted that the Institute of Environmental Management and Assessment (IEMA) has recently rebranded as the Institute of Sustainability and Environmental Professionals (ISEP). Guidance that was historically published by IEMA is still referenced under that institute name.

Department for Environment, Food and Rural Affairs (2021), Reservoir owner and undertaker responsibilities, Panel engineers responsibilities, and emergency flood plan template available at: <https://www.gov.uk/government/publications/reservoir-emergencies-on-site-plan>

Department for Environment, Food and Rural Affairs (2023). Local Nature Recovery Strategies: policy guidance. Accessed May 2025. https://assets.publishing.service.gov.uk/media/6421a4bdf97a8001379ecf1/Local_nature_recovery_strategy_statutory_guidance.pdf

Environment Agency (2021a) Water stressed areas – final classification 2021. Accessed September 2025. <https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>

Environment Agency (2021b). Reservoir owner and undertaker responsibilities: on-site emergency flood plans. Accessed July 2025. [Reservoir owner and undertaker responsibilities: on-site emergency flood plans - GOV.UK](#)

Environment Agency (2021c). Guide to drawdown capacity for reservoir safety and emergency planning. Accessed May 2025. <https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/guide-to-drawdown-capacity-for-reservoir-safety-and-emergency-planning>

Flood and Water Management Act 2010 (as amended). Accessed May 2025. <https://www.legislation.gov.uk/ukpga/2010/29/contents>

Health and Safety Executive (2021). Reservoirs: an owner's guide. Accessed June 2025. <https://www.hse.gov.uk/pubns/indg379.pdf>

Institute of Environmental Management and Assessment (IEMA) (2024). Implementing the mitigation hierarchy from concept to construction. Accessed May 2025. <https://www.iema.net/media/oone2qce/iema-mitigation-in-eia-guidance-final.pdf>

Institute of Lighting Professionals (2020). PLG23 lighting for cycling infrastructure. Accessed May 2025. <https://theilp.org.uk/publication/plg23-lighting-for-cycling-infrastructure/>

Institute of Lighting Professionals (2023). Guidance note 8: bats and artificial lighting at night. Accessed May 2025. <https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/>

Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. Accessed May 2025. <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

North Wessex Downs AONB Council of Partners (2021a). Dark skies of the North Wessex Downs: a guide to good external lighting. Accessed June 2025. https://www.northwessexdowns.org.uk/wp-content/uploads/2021/11/Lighting_Guide_07-05_MEDRES.pdf

North Wessex Downs AONB Council of Partners (2021b). North Wessex Downs AONB position statement on dark skies and artificial light. Accessed June 2025.

<https://www.northwessexdowns.org.uk/wp-content/uploads/2021/11/Position-Statement-on-Dark-Skies-and-Artificial-Light-Final.pdf>

Planning Act 2008 (as amended). Accessed May 2025.

<https://www.legislation.gov.uk/ukpga/2008/29/contents>

Planning Inspectorate (2018). Nationally Significant Infrastructure Projects: Advice Note Nine – Rochdale Envelope. Accessed May 2025. <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope>

Reservoirs Act 1975 (as amended). Accessed May 2025.

<https://www.legislation.gov.uk/ukpga/1975/23>

Thames Water (2024). Water Resources Management Plan 2024. Accessed May 2025.

<https://www.thameswater.co.uk/about-us/regulation/water-resources>

Thames Water (2025). Preliminary Transport Assessment Report.

UK Reservoir Safety Group (2018). National Protocol for the Handling, Transmission and Storage of Reservoir Information and Flood Maps.

Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended). Accessed May 2025. <https://www.legislation.gov.uk/uksi/2017/407/contents>



It's everyone's water